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Improved Cider Mill.

In preparing apples to make cider they are usually crushed between corrugated rollers, and ground or mashed up. In this process many large pieces are carried through the rollers unacted upon, thereby wasting the material and reducing the quantity of cider made from a given amount of fruit.

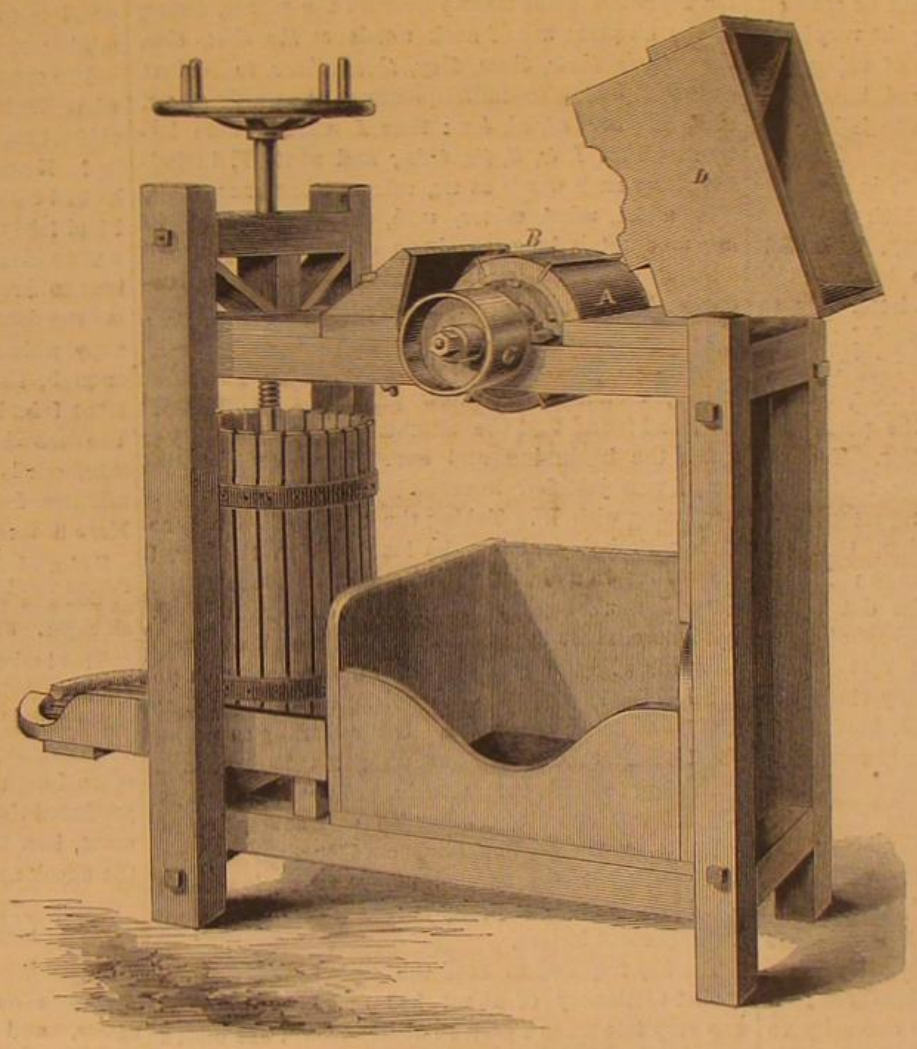
In this engraving a representation of a new mill is given, wherein the apples are not ground but scraped, thus reducing them to a fine pulp, which is the most favorable condition for obtaining all the juice.

The details are as follows:—The cylinder, A, has knives, B, in it, which are driven at a high velocity by a belt on the pulley, C. The hopper, D, which is tipped up in the engraving to show the cylinder, feeds the apples down to the knives, where they are subjected to the action alluded to. From the knives the prepared pulp falls into the box below, after which it is pressed as usual. A press is attached to the mill for that purpose.

In order that the knives may be always efficient, a flap is placed in juxtaposition with the cylinder, cleaning it and the knives as they rotate.

This mill is made portable, or can be, for family use. Very many occasions arise where a glass of cider is sometimes as welcome as a cup of coffee, and by the aid of this mill it can be obtained. For bakers and others, who make large quantities of mince pies, and reduce apples to pulp for various culinary purposes, this mill will be a valuable assistant.

It was patented through the Scientific American Patent Agency, by William and Lewis Clayton, on July 11, 1865. For further information, address them at No. 8 Walnut st., West Philadelphia, Pa.



CLAYTON'S CIDER MILL.

CRYPTOGRAPHY.

This is the art of reading and writing dispatches, messages, etc., in such a way that only those who possess the key can decipher them. It has borne a most important part in all the business of life, from love to war, from mischief to money-making, and is in daily use now for these objects. Dispatches in cipher are often sent by telegraph, and much trouble they are to the operators. A knowledge of cryptography and a faculty of reading secret language is an enviable one. We find in a foreign publication an interesting and explanatory article on this subject, which we reproduce much abridged, to suit our columns.

FRED.	[112·18]	[236·49]	[207·76]	[132·3]	[27·61]
[142·54]	[121·32]	[12·32]	[72·6]	[202·30]	[38·106]
[262·51]	[78·22]	[63·94]	[110·6]	[262·51]	19·33]
[160·60]	[230·92]	[37·51]	[210·29]	[204·79]	[15·67]
[143·61]	[121·32]	[236·54]	[37·101]	[21·17]	[236·54]
[238·78]	[5·1]	[175·75]	[143·61]	[13·7]	[204·79]
[114·2]	[10·102]	[121·32]	[123·15]	[78·112]	[157·62]
[100·58]	[134·19]	[264·30]	[268·66]	[5·1]	[187·71]
[80·45]	[117·75]	[265·62]	[9·101]	[245·62]	[154·55]
[158.46]	[256·41].				

"Well," I said, after looking at it for a few moments, "this cipher does not seem to be of the simplest kind! Before undertaking the task, I should like to know the terms." He mentioned them, and I am bound to say that they were very liberal.

"But, after all," I said, "this may not be J. C.'s advertisement. Yet I shall have the trouble all the same!"

"And the check also, my dear sir," said Waitzen with fervor.

"Very good; on those terms I undertake it. If I cannot succeed in reading the cipher, I agree to lose my pains."

My first step was to get some inkling of the nature of the cipher, of the plan on which it proceeded. Exclusive of the word at the head, I found that the specimen I had consisted of 252 figures, divided by brackets into 55 groups, a dot in every case again separating the figures within each bracket into two parts. The number of figures inclosed in each bracket varied from 2 up to 5; the proportions in which the various combinations were found differing widely, there being only two instances of groups of 2 figures each; 2, of 3 each; 13, of 4 each; and 38, or more than three-fifths of the whole number, of 5 each. Now, the object of these brackets and dots might quite possibly be merely to increase the difficulty of reading the cipher; it was, however, equally possible that they were there to serve their ostensible purpose, the division and subdivision of the figures. Carefully guarding against absolutely assuming the correctness of this latter view, I sought in the cipher itself for something to lead me to its adoption or rejection. I found that the characters used were the numerals from 0 to 9. I looked at this "0" a little more closely, and found that it occurred 19 times. Now, had the division and subdivision of the figures been arbitrary merely, it would require no proof to show that it should have occurred once, at the very least, at the beginning of a group. It did not so occur.

The first step was gained; the division was a necessary part of the cipher.

The fact I had remarked led me on another step. Had the plan of the cipher been to represent certain letters by certain figures, I should have been entitled to expect the "0" at the head of a group; since, in English, the language in which the cipher was probably written, there is no letter of frequent occurrence which is not also an initial letter, a rule which holds good in all the European languages with which I am acquainted.

I should have been already almost justified in concluding that the meaning of the cipher depended on the grouping, but I found other proofs, which at the same time led me still further on. I have already remarked the frequency of groups of 5 figures. Now, this singular predominance of groups of 5 figures would scarcely harmonize with any plan which represented letters by single arbitrary signs, although it would no doubt be possible to compose sentences consisting chiefly of words of 5 letters, retaining or rejecting the vowels. But in the great majority of cases of 5 figures, I found 3 figures before the dot. To these figures before the dot I, for the moment, restricted my attention. I found that (taking all the groups) they ranged, with intervals, from 5 to 268; in 37 cases out of the 55, there were three figures. Discarding repetitions, I found that under 100 there were 15; between 100 and 200, 15; and from 200 to the end, 13; a degree of uniformity higher than I had expected to find, and high enough to establish that it was the result of the grouping being dependent on a plan.

I had thus determined that the divisions were not arbitrary, and that the characters used did not singly represent letters; by inference, therefore, as they must be held to mean something, that in groups they represented letters or words.

I now went over the groups of figures after the dots, and found that they ranged from 1 to 112. Dividing the numbers between these points equally at 56, I found, discarding repetitions, that up to that number there were 27; above it, 22. With the light I had now got, all converging on one point, I should, in a long specimen, have expected a far more exact proportion; it was one of my difficulties that I had to deal with so short a piece of writing. The proportion, however, was, as in the former case, sufficient to prove the existence of a system. The numbers stopped short at 112, whereas, in the other groups, they went as high as 268; the two systems, regulating the groups before and after the dots, were therefore different. It did not absolutely follow that they depended one on the other, but the bracketing rendered it highly probable that they did. I considered myself justified in assuming that each bracketed group represented a letter or a word.

So far, the conclusions at which I had arrived had been almost forced on me. There was now, however, less certainty in my progress. My examination of the cipher had, nevertheless, shown me in what direction the probabilities lay. They pointed to a conclusion which might well have made Chr. Wait-

zen tremble for the success of my attempt. The first instinctive notion I had formed of the cipher had been confirmed by all I had arrived at; it was, that the numbers referred to a book,—the first group of figures in each bracket indicating a page, and the second, a word or line in that page.

Now, when Poe, in his remarkable story of *The Gold Beetle*, tells us "that it may well be doubted whether human ingenuity can construct an enigma of the kind" (he is speaking of cryptograms), "which human ingenuity may not, by proper application, resolve,"—a proposition safe in its vagueness,—he must be held to speak of ciphers which only proceed on a plan the very method of which affords a guide to its solution. Taking the cipher in his tale, for example, each letter being represented by a distinct sign, the frequency of recurrence of particular signs leads to their identification with certain letters. His remarks can hardly apply to cases where the signs used being purely arbitrary, their solution requires a knowledge of the pre arranged plan. In the cipher, the meaning of which I was attempting to discover, I had reason to believe that the signs represented, in an arbitrary manner, letters or words. If this view was correct, the cipher did not contain within itself the means by which it might be read; I could only be successful by discovering the very book used in its construction, and the mode of using that book. The task, at first sight, appeared hopeless; but, upon consideration, I saw enough to induce me to proceed.

I remarked several repetitions. Now, in a cipher constructed with the ingenuity of which this gave evidence, it would have been very easy, had each sign, by the indication of a page in a book and a line or word in that page represented a letter only, to pick out dozens, and even hundreds of each letter so as to avoid a recurrence of signs which might afford a solution to the enigma. The repetitions, on the other hand, were too few to allow of the possibility of each sign representing a distinct letter. The recurrence, of signs led me to believe that each group of figures within a bracket represented a word. I had arrived at the conclusion, that the number before the dot gave the page; I was convinced that the number after the dot represented a line in each page. The highest of these numbers was 112; now, it must be a very empty page indeed which does not contain many times 112 words. The second number could, then, hardly refer to the sequence of words; it could only represent the line.

Now, what book would one take by preference for the construction of a cipher of this character? In any ordinary book, there would be extreme difficulty in finding the particular word required, amounting, in many cases, to impossibility; there is only one class of book which will furnish immediately without labor every word wanted—a dictionary. If a dictionary were used, there would be no necessity to indicate more than the line in which the word, in its alphabetical order, was found; with other books, three numbers would be required—for the page, the line, and the word, respectively. This confirmed my supposition. By a fresh examination of the cipher, I might test this view, and I therefore arranged in a table, like the following, the numbers before the dots, indicating by a mark, for a reason which the reader will see presently, the place of the absent numbers:

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.	.	.	.	.	110	.	.	.	.	245
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(2) 5	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	114	.	.	.	.	.
.	.	.	.	.	.	142	.	.	.	.
.	.	.	.	.	.(2)143		.	.	.	.
9	.	63	.	.	117	.	.	.	.	.
10(2) 37		.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
12 38		.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.(2)121		.	175	202	.	256
15	.	.	.	.	.	.	.	.	230	.
.	.	.	.	.	.	.	.(2) 204		.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
19	.	72	.	.	.	.	.	207	.	.
[illegible]	.	.	100	.	154	.	.	.	.(2)262	
21	.	.	.	.	.	.	.	.(2)236		.
.	.	.	.	.	.	.	210	.		264
.	.	.	.	.	157	.	.	238		265
.	.	.	.	.	158	.	.	.	.	.
.	.(2)78		.(2)132		.	.	.	.	.	.
.	.	.	.	.	160	187	.	.		268
27	.	80	.	134	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.

I had still something to do before I could apply my test, which was the frequency of occurrence of initial letters, as they occur in a dictionary, that is, without repetitions, is as follows: S, C, P, D, A, R, B, T, M, I, F, E, U, H, L, G, W, O, V, N, J, Q, K, Y, X, Z. But the reader will at once see that the recurrence of words of frequent and inevitable use may entirely upset this order. This is what does in fact happen. For my purpose, I had to ascertain the frequency of occurrence of initial letters as they are found in ordinary writing, or more properly for my purpose, in conversation. To arrive at this, I took a number of *Chambers* that was lying on the table, and made an analysis of a few pages of a tale written in the first person. I found that the order of initial letters was this: T, A, I, W, H, O, M, S, B, F, D, C, N, P, L, G, E, R, U, J, K, Y, V, Q, X, Z. The letter *T* predominates largely over all the others, owing to the frequent use of such words as *the, that, this, then, there, their, them, they, these, those, to.* Next comes *A*, owing to the frequency of the words *a, an, and, am, are, at, al,* &c.: then *I*, under which letters we have *I, is, it, its, into;* and next *W*, including many such words as *we, where, when, was, were, who, which, what, whose, with, what, will,* &c. In any moderately long specimen of "conversational" writing, these four letters, as initials, will largely predominate over all others. Now, of these four letters, *A* is at the head of the alphabetical order, *I* about the middle, and *W* at the end, except by a few pages in large dictionaries. I now proceeded to apply my test, and found that the numbers lay in a cluster towards the beginning and end. Those quite at the end, I was justified in assuming, represented words beginning with *W*. Taking the last number, 268, as giving, probably, almost the last page in the key, I found that in a dictionary of about that length, the letter *I* should begin at about page 120, or a few pages before, since the small dictionaries omit numbers of words with the prefixes *un, in,* and *re,* which go to swell the letter part of large dictionaries, such as that I was using as a guide. On referring to my table, I found that there was no great indication of clustering towards the middle; but the specimen on which I was operating being so very short, I could scarcely expect to find all the other points in my favor. Had I had several pages to deal with, I could have indicated pretty correctly the limits of all the important letters.

The key required to read the cipher was, then, a pocket dictionary of about 268 or 270 pages. It was very late when I arrived at this result, but before going to bed I looked at another point which I had remarked. I found two groups of figures identical as regards the number before the dots, but varying in those after; they were (236·49) and (236·54).) By calculating the proportion to be given to each letter in a dictionary of 268 pages, I found that the two words indicated by these numbers should begin with *th*. There was an interval of *five* words between them. The compilers of small dictionaries proceed with so little method, that this interval did not guide me to the positive identification of these two words, but assuming that they were of common occurrence, I thought I could determine that they must form one of five pairs—*that, the; the, their; their, them; them, then; these, they.*

I had now done all that I could for the present, and went to bed with fair hopes of being able to find the dictionary used as a key; for I reflected that two copies must have been required—one to compose and the other to decipher, the cryptogram. It would probably, then, be a dictionary in ordinary use, so ordinary that *two* copies of it could be purchased at the same shop.

In the morning, therefore, I took a cab to Paternoster Row, where, as the reader probably knows, there are wholesale booksellers at whose warehouses small shopkeepers can supply themselves without the trouble of sending to different publishers in quest of works. At one of these warehouses I was known, and was allowed to make an inspection of all the pocket dictionaries in stock. I selected about half a score that seemed more or less likely to meet my requirements, and then hurried home, having foolishly left my cipher behind me. On reaching home, I carefully tried my dictionaries one by one, in every way suggested by what I had already learned of the nature of the cipher. I at last found one which, by taking the first number for the page, and the second for the word, not counting lines, but only words in their alphabetical order, gave sense. The title page informed me that it was "Webster's Dictionary," the "one hundredth thousand," and was published at 158 Fleet street. With very little trouble I made out the following:—

FRED.—I hear that search is being made in all direction s canal was drag d It was arrest on suspicion but servant saw another man in the cab at the time a policeman saw him afterwards in it cab man not found stay v here you a r e I will advertise twentieth N o v

I need only say in explanation, that where a word like "are" was not in the dictionary, it was spelt by indicating the letter of the alphabet at the head of each division in the dictionary; a plan also adopted in the word "dragged," the termination being indicated by the separate "d." It was thus possible to spell any proper name or word which might not occur in the dictionary.

The contents of the cipher were so different from what Waitzen had led me to expect, that it was evident there was some mistake. Yet what could it be? He could not have given me a wrong slip, for he had called my attention to the word at the head. I had fairly earned the promised reward, but there was so clearly a mistake somewhere, that I was anxious to ferret out the mystery. Waitzen had given me the date of the paper, and I therefore sent for a copy which was got after some delay. Singularly enough, there was in it, just below the advertisement I had deciphered, another one also in cipher. The second cryptogram was of the simplest description, one letter was substituted for another. In ten minutes, I had a translation of it lying before me. Here it is:—

FEDE.—I don't think that I am watched; not sure. Police went down to Liverpool after you. Get as soon as you can to A., where I will join you. I got the bag all right. Steamer sails on the seventeenth.

This looked much more like Chr. Waitzen's affair. I had just deciphered it when I heard his knock at the door. I showed him my reading of the first advertisement; he looked at it in blank dismay, but when I assured him there could be no mistake, and produced the key, showed him, greatly to his wonderment, how to use it, he took from his pocketbook the check and handed it to me.

"VACUUM" AND THE INDICATOR.

BY JOHN T. HAWKINS.

I have on many occasions observed that there exists, and among young engineers particularly, a very material confusion of ideas upon the real condition of things within the condenser of a steam engine. Nor is it to be wondered at that this is the case under the present system of expressing the variations of pressure within a condenser in "inches of vacuum," the numbers increasing as the pressure diminishes seeming to them to represent, not the pressure therein, as it should, but certain degrees of absence of pressure.

A perfect vacuum, or total absence of pressure, is an unvarying standard, and to simplify the real relations of the condenser with the boilers, instruments now known as vacuum gages should be changed in name and made to record upward in pounds per square inch, precisely as the steam gage does; then the apparent mystery surrounding the idea of a vacuum would never insinuate itself into the minds of learners nor cause confusion among the better informed.

All vacuum gages of the nature of the closed top manometer, as the scale upon them is now arranged, indicate incorrectly for every variation of the atmospheric pressure and can only be correct for one. For instance, the manometer scale is graduated upon the supposition that the atmospheric pressure is equal to 30 inches of mercury, and the lowest figure upon the scale is 30, diminishing upward. If, with a perfect vacuum in the condenser, the mercury descends to the point marked

30 at one pressure of the atmosphere it will at any other, or even if there were no atmospheric pressure at all; so it is manifestly incorrect to say that the vacuum in the condenser is equal to 30 inches of mercury, if the pressure of the atmosphere will support no more than 28 inches, or if it be sufficient to support 31 inches. But if we place 0 upon the scale in the place of this 30, and graduate it upward in divisions representing pounds and fractions of pounds pressure to the square inch in the condenser, this gage will indicate absolutely correct whatever the variation may be of the atmospheric pressure; and, moreover, it would be impossible to misapprehend the indications.

With all vacuum gages that are affected in their indications directly by the variations of the atmospheric pressure, such as the open syphon and the different varieties of spring gage, we must make corrections, by means of the barometer, to be able to determine the exact pressure in a condenser; and it would be just as easy to do this if the numbers began at the perfect vacuum point and read upward as the pressure increased, as it is now with the numbers reading in the other direction, and would be much more intelligible. There can be no positive point upon the dial or scale of such a gage to indicate a perfect vacuum, nor can there be any such point at which any given pressure in the condenser can be recorded, no matter in what particular manner the dial or scale may be divided or numbered, so that the corrections must be made for every variation of the atmospheric pressure under any circumstances; and certainly it would be much less ambiguous to have the indications read, for instance, 2 lbs. pressure in the condenser—and be sure to convey that idea to the mind—instead of 26 inches of vacuum; for to know the pressure (which is what we really require) we must deduct this 26 from 30, and if the barometer reads 28 inches instead of 30 inches, we must deduct 24, which the gage would then indicate, not from 30 but from 28, while, under the same conditions (the scale counting upward in pounds), the scale would indicate 3 lbs. pressure, and we would have to simply reduce that indication one-half pound for every inch the barometer stood below 30.

We may trace the results of this really erroneous method of indicating pressures below that of the atmosphere to that very important instrument, the indicator, and find that it gives rise to errors of a considerable magnitude where accuracy is required.

The indicator itself is nothing more than a pressure gage, indicating precisely as the open mercurial or the various spring gages do, the difference of the atmospheric pressure and that within whatever vessel it may be attached to, varying in those indications with every variation of the pressure of the atmosphere.

It is customary, and indeed very explicit instructions are given to engineers, to take both the atmospheric and perfect vacuum lines upon a diagram; but how to take them, or rather make them correct, is not always told, and in many cases is not really understood. Most indicators are arranged with a stop, down to which the piston may be forced, and a line traced by the pencil while so held by the hand is generally regarded as the perfect vacuum line, to which all other lines in the diagram may be referred. Now, it would appear to many at first sight that, inasmuch as the atmospheric pressure varies while a perfect vacuum does not, if a correction is necessary to be made for a variation in the atmospheric pressure, it only requires that the atmospheric line, as traced by the instrument, shall be raised or lowered accordingly as the atmospheric pressure is greater or less than 30 inches of mercury.

It is not difficult, however, to show that the only line to which all parts of an indicator diagram may be referred, truly, is the atmospheric line taken with the pressure of the atmosphere admitted to both sides of the indicator piston, for which provision should always be made in the arrangement of an indicator or the pipes and cocks connecting it with the cylinder.—*Franklin Journal.*

A Reduction in wages is not always met by a strike. The workmen engaged in a hat factory at Yonkers, N. Y., in consequence of such a reduction, proposed to start a co-operative association, and have raised among themselves $50,000.

A New Anæsthetic--Another use for Petroleum.

The Boston *Medical and Surgical Journal* has a paper communicated by Dr. Henry J. Bigelow, describing a new anæsthetic. The name "rhigolene," from the Greek word which means extreme cold, is proposed by Dr. Bigelow for a petroleum naphtha, boiling at 70 degrees Farenheit. It is one of the most volatile liquids obtained by the distillation of petroleum, and is applied to the production of cold by evaporation. It is a hydrocarbon, wholly destitute of oxygen, and is the lightest of all known liquids, having a specific gravity of 0.625. Dr. Bigelow, after speaking of the different products of petroleum, says:

"When it was learned here that Mr. Richardson, of London, had produced a useful anæsthetic by freezing through the agency of ether vapor, reducing the temperature to six degrees below zero, F., it occurred to me that a very volatile product of petroleum might be more sure to congeal the tissues, beside being far less expensive than ether. Mr. Merrill having, at my request, manufactured a liquid, of which the boiling point was seventy degrees, F., it proved that the mercury was easily depressed by this agent to nineteen degrees below zero, and that the skin could be with certainty frozen hard in five or ten seconds. A lower temperature might doubtless be produced were it not for the ice which surrounds the bulb of the thermometer.

"Freezing by rhigolene is far more sure than by ether, as suggested by Mr. Richardson, inasmuch as common ether, boiling only at about ninety-six degrees, instead of seventy degrees, often fails to produce an adequate degree of cold. The rhigolene is more convenient and more easily controlled than the freezing mixture hitherto employed. Being quick in its action, inexpensive and comparatively odorless, it will supersede general or local anæsthesia by ether or chloroform for small operations and in private houses. * * * But for large operations it is obviously less convenient than general anæsthesia, and will never supersede it. Applied to the skin a first degree of congelation is evanescent, but if continued or used on a large scale, the dangers of frost bite and mortification must be imminent."

In 1861 Dr. Bigelow, in experimenting with kerosolenes, of four different densities, found the lightest of them, the boiling point of which was about ninety degrees, to be an efficient anæsthetic by inhalation.

The Eight-hour Question.

The bill to regulate the hours of labor, known as the eight-hour bill, was rejected on Friday by the Massachusetts House of Representatives, by a vote of 109 to 52. The workingmen of this Commonwealth, even admitting the restricted and partial use of the term, have not in our opinion lost anything by the failure of this bill. It is as clear as any proposition in political economy can be, that the attempt to make eight hours the legal limit for a day's work would either be inoperative, like the legal rate of interest, or that if it formed the basis of contracts between the laborer and the employer, it would occasion a change in the nominal rate of wages, sufficient to make the dollar in payment represent the same amount of labor as now. The smaller amount of wages which would thus be earned is not what the laboring men of this Commonwealth need or desire.

The friends of the measure appear to have resented an amendment introduced by Mr. Jones, of Pelham, to the effect that the two hours cut off from the day's work should be devoted to study. They seem to have regarded this provision—which is simply such an appropriation of time as has been urged among the reasons for passing an eight-hour law—as an attempted *reductio ad absurdum* of the whole scheme. It was, we believe, a very successful effort in that direction, whether it was so intended or not; but not half so effective as the thoroughgoing absurdity contained in the bill itself, in the provision which excepted agricultural laborers from its supposed benefits. If there is any class of men who need the interference of the law to secure for them moderate limits for labor, and opportunity for physical refreshment and mental cultivation, it is the laborers on the farms of Massachusetts. But the advocates of the bill were much more shy of the wrath of the farmers than of the opposition of men engaged in manufacture, and hence, to gratify the former, they sacrificed the whole principle of their measure. It is not surprising that what was left showed so little vitality.—*Boston Advertiser.*

Inspecting Pumps Twenty-four feet Under Water.

Messrs. Wilton & Bolton, the divers who were so successful in repairing the pumps at the Grove Pit, South Wales, have been engaged for a similar operation at the Crown Colliery, Warmsley, near Bristol, the property of Mr. G. Goldney, M. P., and under the management of Mr. R. Brotherhood. It appears that the pump bucket had got out of order, and the water rose to 16 feet above the bucket door. It was, therefore, found necessary either to place a new pump, or to employ divers to restore the old one; the latter course was adopted. Wilton descended, and succeeded in getting off the bucket door, and, having made a close examination of this part of the pipe, he ascended, after the lapse of one hour and a half. Bolton then descended, and, having succeeded in removing the old "bucket," he brought it up in about an hour. After a short rest, the diver descended with a new "bucket," and remained under water two hours and a half, during which he fixed the new bucket, and screwed on the door.

The engine was then set at work till Tuesday afternoon, when it was still found that it did not do its work effectively, and it was resolved to make an attempt to ascertain where the new fault lay. At half-past 4 o'clock on Tuesday afternoon Wilton descended, and discovered a leak in the bucket-door, and also one in the joints of the pipe. This was rectified, but on going down to the "clack" door, 8 ft. below the bucket-door (24 ft. from the surface), the diver found that the fault arose from the "clack" or valve of the pump having been so worn that it would not act properly. The removal of the "clack" door was attended with a good deal of risk, as it weighed upward of 2 cwts., and the diver had to reach it by clinging to the pipe. The nuts and screws had to be felt for in the dark, and a spanner, some 2 or 3 ft. long, had then to be used. A new "clack" was sent down to him, and after fixing it in its place, and securing the door, the diver came up, having been under water for no less than 2 hours and 40 minutes. The pumps were then found to work effectively, and the task of clearing the pit of water was immediately commenced. Mr. Brotherhood, Jr., descended the shaft, and superintended the operations the whole of the time the men were down; and every precaution was taken to insure the proper carrying out the directions given by the divers. Only one of the latter descended at a time, the other remaining on the stage with the life-line, ready to notice the slightest signal from his companion.

[There are some divers in Boston who are up to this sort of thing.—Eds.

MISCELLANEOUS SUMMARY.

A German firm of locomotive builders, who recently completed their thousandth engine, gave a dinner and a dollar to every workman to celebrate the event.

The Prince of Wales recently visited a ship launch and happening to stand upon a plank, numbers of the workmen cut this precious piece of timber into slivers as souvenirs.

In many high-pressure engines where the ports are large and free, the stroke of the valve long, and the same properly set, there is not only an absence of back pressure but a partial vacuum created by the momentum of the escaping steam.

W. Clare Anderson, St. Louis, Mo., is Agent for the Globe Sewing Machine, also for Folsom & Anderson's sewing machine treadle, represented and described in our last issue.

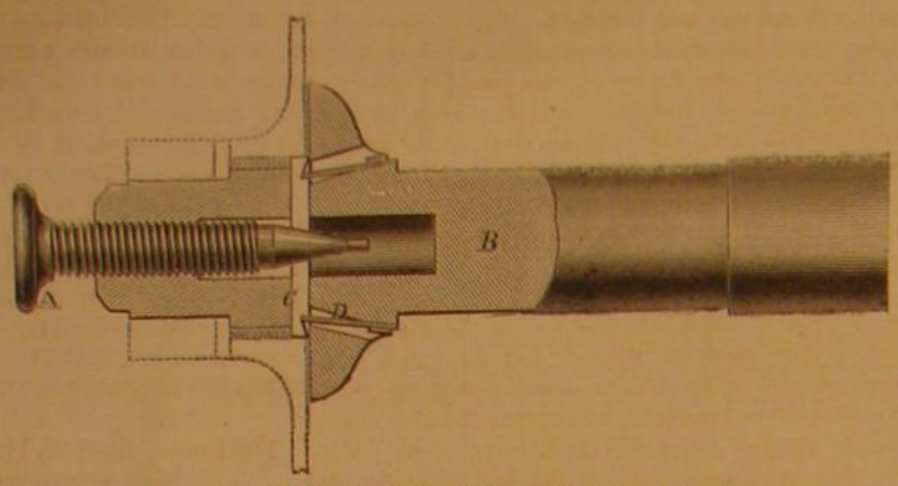
The Navy Department has notified Mr. Forbes, contractor for the *Algonquin*, to remove the engine from the same and substitute one like that in the *Winooski*.

Watt was able, on an average, to evaporate 7½ lbs. of water with a pound of coal. A cylindrical boiler will evaporate only 7 lbs., but a Cornish boiler 10½ lbs.; and a locomotive boiler, with 1 lb. of coke, from 7 lbs. to 9½ lbs.

Improved Device for Centering Saws.

The holes in circular saws are not always the same size. When it is necessary to purchase a new one or use one of smaller diameter than is generally employed, it is often found that the saw mandrel is too small, so that the saw runs untrue when made fast.

This invention is intended to obviate that difficulty by furnishing a method to center them truly at all times. In the engraving A represents a screw which has a conical end; this screw passes through the end of the arbor, B, which is hollow. In the arbor are three slots which receive dogs, C; these rest on the screw at one end, and are fitted with springs, D, to hold them at all times. It is easy to see that when the screw, A, is forced in the dogs will be driven out from the center equally in all directions, and thus afford an accurate and reliable means of adjusting the saw.



RAND'S DEVICE FOR CENTERING SAWS.

The invention was patented by W.T. & L.H. Rand, through the Scientific American Patent Agency, Dec. 12, 1865. For further information address them at Manchester, N. H.

THE SECOND LECTURE OF PROFESSOR DOREMUS'S COURSE.

At the second lecture of Professor Doremus's course the Academy was more completely filled than at the first, several persons standing in the aisles.

LIGHT.

The subject of the lecture was light. After speaking of the natural light of the sun, the modes of producing artificial lights were discussed at length. All these are various plans of heating some solid body to a very high temperature. Gases, however highly heated, emit very little light. When any substance is burned, if the product is wholly and immediately gaseous, little light is produced, while if the product of combustion is solid, the burning is accompanied by a great production of light. To illustrate this, some sulphur was burned in a jar of pure oxygen gas; the product of combustion in this case is a gas-sulphurous acid—and the flame was very dull. A coil of iron wire was then heated at the end and plunged into a jar of oxygen, when it burned with scintillations so brilliant that they were painful to the eyes. The lecturer explained that the product of combustion was a solid—the oxide of iron—and he called attention to the fact that the jar was reddened by the fumes. The bottom of the jar contained a bed of sand, covered by water to a depth of five or six inches, and as the white-hot pellets of the oxide of iron dropped into the water they continued red hot until they reached the bottom. In explanation, it was stated that each pellet on entering the water immediately became surrounded by an atmosphere of steam, which preserved it from contact with the liquid.

OUR COMMON LIGHTS.

All our light in ordinary use comes from intensely heated carbon—generally by burning carbon in connection with hydrogen. Illuminating gas is carbureted hydrogen, and the products of its combustion are steam and carbonic acid. As both of these are gases, how is it that great light is produced—light being emitted in any considerable quantity only from solids? We may burn gas so that the flame will be very dull; it is necessary only to mingle it, before burning, thoroughly with air, so that combustion will take place throughout the volume. When it is burned from a jet in the usual way, the combustion goes on only on the outside of the issuing stream, and the hydrogen is burned first, thus decomposing the gas, and leaving the carbon momentarily in the solid state. This solid carbon is highly heated by the flame, and from it, while in this condition, is emitted nearly all the light of the jet. So soon as the hot carbon passes outward from the body of the flame and comes in contact with the air, it also is burned, combining with the oxygen of the atmosphere to form carbonic acid.

THE CALCIUM LIGHT.

When hydrogen and oxygen gases are burned together, though the heat is the most intense of any that man can produce with the single exception of the electric current, the product of the combustion being water, in the gaseous form of steam, the light emitted is very feeble, but if into the flame we introduce any solid which will remain solid at the intense heat of the flame, it glows with a dazzling light. Nearly all said substances are either fused or evaporated by the oxy-hydrogen flame, but there are a few that will resist even its intense heat, and the most convenient of these is lime. As lime is the oxide of the metal, calcium, the light thus produced is called the calcium light.

Two calcium lights, prepared by Dr. Grant, of New York, a man who makes a business of exhibiting them, were then lighted, and the parabolic reflectors were slowly turned around, so as to throw the parallel beam into different parts of the house. It was curious to see the universal dropping of heads, or raising of hats and handkerchiefs, to shield the eyes from the intolerable brilliancy of the shining bit of lime.

THE ELECTRIC LIGHT.

If a piece of zinc and a piece of platinum be partially immersed in a vessel of dilute sulphuric acid, and their outer ends be connected by a metallic rod or other conductor of electricity, the zinc is gradually oxidized, and at the same time a current of electricity starts from the zinc plate, passes through the fluid to the copper, and thence flows around through the metallic rod to the zinc again. This was discovered by Dr. Volta, an Italian physicist, and is therefore called a voltaic circle.

If the metallic rod be of sufficient size to freely conduct all the electricity generated, no heat or light is emitted; but if in one portion the rod be made so small that the whole current cannot pass, then this small portion is heated, and if it be made sufficiently hot, light is produced. If the heated rod be of a metal which at a high temperature has a strong affinity for oxygen, it will, of course, be rapidly consumed, but a platinum wire may thus be kept glowing for many hours.

Upon the front of the stage was an apparatus having a point of carbon connected with one pole of a powerful voltaic battery, while with the opposite pole was connected a wheel with radiating spokes, the several spokes being armed with different kinds of metal. This wheel was turned so as to bring the copper spoke in connection with the carbon point, and was then slightly withdrawn so as to make a short break in the circuit between the carbon and copper. Both were quickly heated to a high temperature, and the copper was burned with a dazzling green flame. Iron, zinc and other metals were consumed in the same way.

Finally, the spoke of the wheel bearing a carbon point was turned in contact with its fellow carbon of the opposite pole, and then slightly withdrawn, when the space between the two was instantly spanned by the arch of the electric light; before the unequaled brilliancy of its glow the gas jets of the Academy became of a yellow, sickly hue, and the two calcium lights "paled their ineffectual fires."

THE ELECTRIC LIGHT UNDER WATER.

To show that the light was produced, not by the combustion of the carbon, but by its being intensely heated, the light was exhibited in a vacuum. The points were so arranged that they could be covered by a bell glass, the air was then exhausted by an air pump, and when the connection was made, the same brilliant effects followed.

The points were also connected in a jar of water, but this had the effect somewhat to dim the light.

The lecturer explained that the light comes mainly from intensely heated particles of carbon, which are carried over by the current from the positive to the negative electrode—wasting away the power of the former and increasing the size of the latter.

A MONOCHROMATIC LIGHT.

The large, shallow, leaden tank in front of the stage had been covered to the depth of an inch with salt—the chloride of sodium. This was now sprinkled with about two gallons of alcohol from a watering pot, and the alcohol was set on fire. The colorless flame of the alcohol received a single yellow hue from the sodium of the salt. The gas lights had been previously turned down, and as the yellow ray of the salted flame fell upon the face of the lecturer, his countenance ceased to send forth the colors of life, and became of a cadaverous aspect; the same strange change came also upon the looks of the audience, and the great Academy seemed to be filled with the faces of the dead.

THE MAGNESIUM LIGHT.

While the lights were still turned down, a coil of magnesium wire was lighted. As the pure, white light of this flame is made up of all the blended rays of the sunbeam, when it fell upon the faces of the people, their ghastly hue was changed, as by a miracle, for the glow of life and health.

ALL LIGHT ORIGINALLY FROM THE SUN.

In conclusion, the lecturer reminded his audience that as our ordinary lights are obtained by burning carbon, and as this carbon has been separated in the leaves of vegetables from the redundant carbonic acid of the atmosphere by the decomposing force of the sunbeam, it is the statement of a fact to say that all our light comes originally from the sun.

English Workmen Coming to America.

A foreign cotemporary says:—"The mania for emigration has again set in among the colliers and iron workers of South Wales, and the effects of the movement are beginning to be seriously felt, more especially by the colliery proprietors. Those who are induced by glowing descriptions to leave constant employment and good wages, and break up their homes, to seek new spheres for their labor in the States, are hardy, industrious men, who from long experience have become what may be called skilled colliers. These are the men that the district can ill afford to spare, especially at the present time, when the coal trade is so active, and their departure in such numbers will not only prove inconvenient but a positive loss to the employers of labor, inasmuch as it will take the hands brought in to supply the vacancies caused by the exodus a very long period to become proficient in their new avocations. In addition to the large numbers that have emigrated since the fine weather set in, upwards of sixty families left Aberdare for New York a few days since, and others are preparing to follow from different parts of the district. It is a matter of regret that industrious men should by false representations and delusive hopes, which have so often been exposed, be induced to leave their native homes to seek employment in America, where they will have to toil harder and be less remunerated in proportion to the cost of the necessaries of life."

[It is a matter of regret to us to pay $12 per tun for coal where it ought to cost but $8 or $9, and be told that from the high wages paid to miners it is impossible to sell it for less.—EDS.

Sharp Shearing.

Mr. Morrill, from the Committee on Ways and Means, has reported a bill in the House to levy on all horses, mules, cattle, sheep, hogs and other live animals imported from foreign countries, a duty of 20 per cent *ad valorem*. He understood that the Canadians were sending sheep over the border, and having them shorn on this side, so as to evade the duty on wool. It is generally admitted that Yankees are *par excellence* sharp in doing things, but it must be confessed that our provincial neighbors have got the inside track this time.

Correspondence

"Perpetual Motion and Perpetual Rest."

MESSRS. EDITORS:—Perpetual motion ideas, like the comet, periodically make their appearance, and one creates in the world of matter the same multiplicity of conflicting theories that the other does in the world of thought.

Perhaps during the 17th and 18th centuries there was a greater amount of time and thought wasted on this subject than ever before or since. It became at last so fruitful a question of discussion and dissension, that the French Academy of Sciences, and other like societies, debarred the subject entirely from their debates, as one entirely impossible to exist. For years a floating hearsay statement has had many believers that a reward of £50,000 stands open for the discoverer of perpetual motion. It has no foundation in fact, however.

If perpetual motion is sought for in an application of mechanical forces, with or without aid from gravitation, magnetism, etc., then we can fully concede it as utterly futile to attempt it. But if we concede that perpetual motion is the constant or perpetual moving of an object or mechanical work, as indicated by its constantly changing its position on the ground or floor wherever stationed, then I declare that such motion is obtainable. The following is an illustration which has been successfully tried, and of which you doubtless heard some years ago:—

A wheel, four or five feet in diameter, constructed similarly to a carriage wheel, of wood least susceptible to the influences of moisture, heat, etc., was placed vertically and balanced upon a steel point, resting on a highly polished metal surface in the center of the wheel. Being wholly free from any attractive power, and so nearly without friction to affect it, indicators placed by it showed that the wheel kept up a slow continuous motion on its center. In other words, it was so suspended as to be independent of the earth's motion, which in its rotation around the sun, left the wheel in a perfect state of rest.

I conceive, therefore, that the only perpetual motion attainable, is by obtaining the condition of perpetual rest. I. A. E.

New York City, April 19, 1866.

The Gear Question Reviewed.

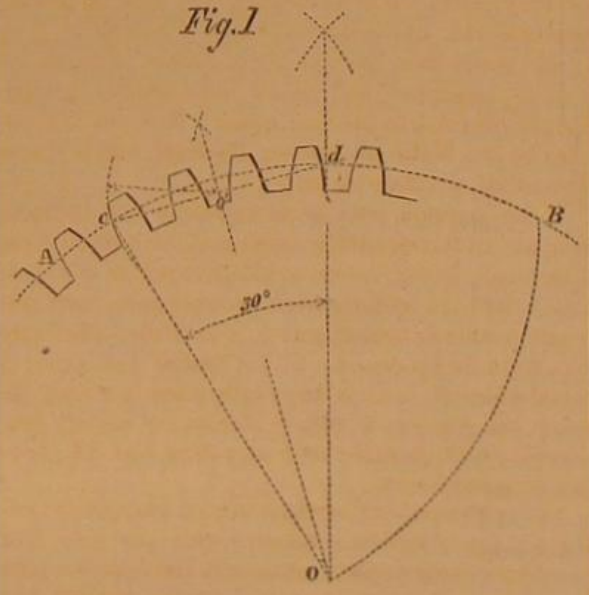
MESSRS. EDITORS:—My communication published on page 293, last volume of the SCIENTIFIC AMERICAN, has called out many others and led to an extensive discussion of the question whether the true pitch for the teeth of gears should be measured on the arc or chord. The difference of opinion upon this point thus shown to exist among good mechanics, is one which has never, to my knowledge, been properly explained, though the reason for it is very simple, and is to be ascribed solely to the difficulty of carrying out nice theories into ordinary practice. The true theory of gearing is that enunciated in your article on page 209, present volume, and also by several of your correspondents, viz., to cause two wheels to have the same motion as though their pitch circles were cylinders rolling in contact. If the contour of the teeth is formed of the proper epicycloidal curves, this effect will obtain in practice, and in this case the pitch should be measured on the arc of the pitch circle. But in gears of this construction the teeth of each wheel must be formed with special reference to the size of the wheel with which it runs, and a slight change in the size of either would produce a serious disturbance in a mechanism so finely adjusted.

As you very properly remark in the article above referred to, this nicety "would not only be costly, but wholly impracticable in the ordinary business of the workshop;" and for this reason, principally, correctly adapted epicycloidal teeth are almost wholly unknown in ordinary machinery. Mr. Corliss, of this city, has produced some very fine specimens of heavy gearing with teeth of this form almost theoretically perfect, but in general practice a form of tooth is selected which will enable any two gears having the same pitch to run together. This is rendered necessary to avoid the enormous expense otherwise required for patterns and cutters. To produce this effect various rules are employed by different persons, but these rules all coincide in one point—the shape of the tooth is governed solely by the size of the gear of which it forms a part, and not, as in epicycloidal teeth, by the gear with which it meshes. With this form of tooth, determined by any rule dependent solely on the pitch and number of teeth, the pitch must be measured on the chord of the arc, or the gears will not run well together. This is the explanation of the fact stated in your article above referred to, that "it is usual for the pitches [arcs] of pinions of small diameter, working in large wheels, to be a little greater than the wheels they drive or are driven by;" and many mechanics work on that rule *guessing* at how much larger they shall make the pitch of the pinion, without any idea why they do so except that the gears run better for it.

For gears of 60 teeth and over the difference is so small (·012 of the pitch, and less in the diameter), that it may safely be ignored, but for gears of a small number of teeth it is essential that the pitch be measured on the chord, rather than the arc, which has the effect of increasing the circular pitch. Any one may convince himself of this fact by trying the experiment. Scribner, Haswell, and Nystrom all recognize this fact in their valuable pocket-books, but Nystrom alone gives a rule by which such gears may be properly proportioned, *i. e.*, by the sine of the angle of half the pitch.

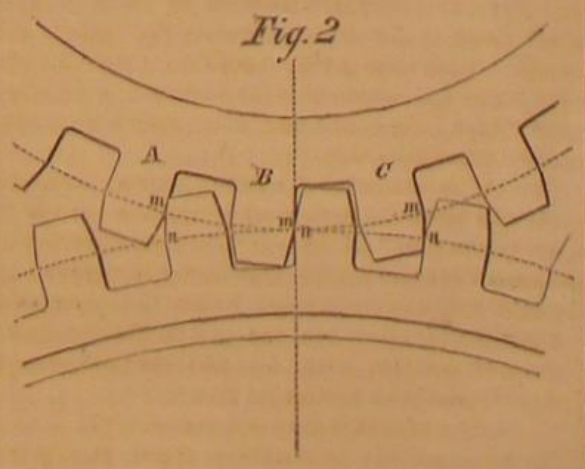
Where it is admissible the epicycloidal is the best form for teeth. The next best, and the only correct form adapted for general use, is that invented by Prof. R. Willis, of Cambridge University, England. This is composed of arcs of circles, the centers and radii of which are determined by means of an instrument invented by him and manufactured by J. R. Brown & Sharpe, of this city, which he has named the odontograph. For small gears with fine teeth, or for teeth of one inch pitch and under, the following construction produces the same form of tooth as is obtained by the odontograph; but for larger pitches, or where separate arcs are required for the points and flanks of the teeth, the instrument is the only simple means of determining the centers and radii.

Fig. 1



In Fig. 1, A B is a portion of the pitch line of a gear of which O is the center; c d is the chord of an angle of 30°, easily found by first stepping off the

Fig. 2



radius upon the pitch line, as in the figure, and taking half the arc thus subtended. The point, *o'*, at the middle of this chord, is the center, and half the chord the radius by which the sides of the teeth are determined.

While I am upon this subject allow me to refute a popular error in regard to gearing, which is, that properly-formed teeth will roll upon and never rub each other. The fact is that such action is impossible excepting for a brief space near the tangent point of the pitch lines. If the teeth engage before reaching that point, or remain in contact after, passing it they must rub. This will be apparent by reference to Fig. 2, which represents portions of two gears having epicycloidal teeth. At A the teeth are just coming into action, at B the acting points are in the line joining the centers, and at C they are just emerging from contact. Now, by noticing the points, *m* and *n*, in each position, it will be seen that at A they are separated, at B they are coincident, and at C again separated in the same direction by which they approached; and that in thus approaching and receding, the surfaces in contact cannot roll but must slide upon each other. At the central position only the action is rolling without friction.

G. H. BABCOCK.

Providence, April 13, 1866.

Trouble with Steam Boilers on the Mississippi.

MESSRS. EDITORS:—I inclosed you some time ago John Schaffer's letter on the subject of steamboat explosions, and the remedy he suggests. You have given the matter a favorable notice in your paper of the 7th inst., and inasmuch as we all look to your paper for reliable information on all mechanical subjects, and indeed all that tends to progress, I inclose you the statements of some of our most experienced river engineers, also the correspondence which has taken place on the subject of Schaffer's letter. You will perceive that the committee of practical engineers, who reported on Schaffer's theory, state this fact as the result of their experience and observation: "This phenomena has occurred to all of the members of the committee." "If the assertion of Schaffer be true, we would and should be satisfied as to the causes of explosion, and would not desire to seek further information."

The fact that the water will escape from the boilers through the engine, on our river steamers, is admitted by all engineers; but some contend that it cannot go out and escape without the engineer or watch knowing it, and that it is their duty to stop it. But while they all admit this, it has never occurred to them, indeed they never considered the subject, as to the space of time a boiler could be emptied in that way.

I will give you the dimensions of the boilers and engines of one boat which the evidence shows blew up for want of water in the boilers, and there is evidence that a few moments before the explosion the water was flush in the boilers, and also conclusive evidence that water began to escape out through the engines all of a sudden, and that in a few minutes after this was noticed by officers on the steamer *Dictator*, which was near enough to notice the fact, the boat blew up. The *Missouri* had 5 boilers 24 feet long, 46 inches diameter, with 21 feet 6 inches flues in each boiler, or tubes, as they are called. The flues were set 13 inches below the top of the boilers, allowing 4 inches of water over the flues; this left 9 inches for steam room. There were two engines with cylinders 30 inches in diameter, 10 feet stroke. The steam pipe was 8 inches in diameter; the engines made 15 to 16 revolutions per minute, giving two motions back and forth of the piston to each revolution. The steam necessary to supply the 30-inch cylinders through an 8-inch pipe would travel at the rate of about 4,000 feet per minute, and this draft on the steam in the boilers, unless there was large steam room, large openings from the boilers to the steam drum, would start the water to flow with the steam, and assuming that the supply to the cylinder was one-third water and two-thirds steam, or a greater or less proportion, the boiler from which the water started would be emptied in a few revolutions of the wheel.

The steamer *Sultana*, which blew up above Memphis on April 28, 1865, had boilers and engines very similar to the *Missouri*. There is abundant evidence to prove that the explosions have been caused by reason of the improper construction of the

boilers and mode of carrying the steam to the cylinders of the engines. The evidence is conclusive that the water escaped in that way while our most careful, experienced engineers were on duty.

Mr. Schaffer was an engine builder and has had twenty years' experience on our largest river steamers. He has made the science of engineering his constant study. It is difficult for such men to maintain their theories, owing to the present steamboat law, which gives to the Board of Supervising Inspectors entire control over the questions of construction of boilers machinery, etc. [See sec. 39, Act August 30, 1852].

The Supervising Board have heretofore sneered at all improvements which they have had no hand in suggesting, and the newspapers in the West, in so far as relates to steamboats, are dependent on the person they employ as river reporter. This individual gathers the river news, and whenever anything is suggested he will write short squibs on whichever side he may think will make him the greatest number of friends. The Supervising Board have heretofore held their sessions in secret and denied the right, or necessity of all persons attempting to lay information before them.

I have given you these details and facts, and if you will take the time to consider the subject, and if you agree with the theory these facts I think clearly establish, you can do much good by pointing out the correct mode of construction of boilers and carrying steam so as to avoid all danger of explosions such as has happened.

I may say this about my own opportunities for observation: I had long experience in the State of Pennsylvania in the manufacture of iron; came to St. Louis in 1838, and at one time was engaged in repairing and building steamboat hulls; in 1843 I had erected the first marine railway docks for taking out boats, which has proved a success. I have been acting as U. S. local inspector of hulls, that is, one of the local Board of Inspectors, and am well acquainted with the character of our boatmen; and from my experience am well satisfied that the steamboat law of 1852 has been a hindrance to the progress of the science in engineering as well as everything else in regard to river steamers.

St. Louis, Mo., April 19, 1866.

[As we do not know that our correspondent desires his name published we withhold it, and are obliged to him for his attention. We are, of course, powerless between the inspectors and the engineers, and it strikes us that it is a matter for the consideration of the people where the inspectors reside. If these men are not fit for their business, incapable by want of experience from understanding the details, why are they elected?

In regard to the construction of the boilers to produce dry steam or even to prevent priming, it seems not a difficult task. Locomotives in which the quantity of water in comparison to the fire surface is necessarily small, never prime in service although they do in isolated cases, and if Western boilers do habitually, it must be owing to some palpable defect easily remedied, which, at this distance, we can know nothing about. Whatever the inspectors may do, or say, they cannot prevent an engineer from reconstructing his boiler so that it will make dry steam, and to the practical men we must look for the remedy for the evil.—EDS.

A Telling Advertisement.

MESSRS. EDITORS:—A few months since the engraving and description of "Evans' Patent Graduating Circular Plane" appeared in your columns. Immediately afterward inquiries and orders began to come in, addressed to the manufacturers and agents, from every quarter of the Union. They are coming yet. We write to inquire if there is any limit to your circulation. Will it be necessary to advertise in any other journal? Inventors who do not avail themselves of your advertising medium are like travelers in a stage coach. I should prefer a locomotive. F. H. W.

Hudson, N. Y., April 19, 1866.

Chloroform---Describing a Circle.

MESSRS. EDITORS:—A notice in your last number that chloroform has been found to remove paint when other ordinary solvents failed, reminds me that the result of recent experiments by Mr. Sanford, druggist, of this place, indicates that chloroform will also restore the color of garments, where the same has been destroyed by acids.

When acid has accidentally or otherwise destroyed or changed the color of the fabric, ammonia should be applied to neutralize the acid. A subsequent application of chloroform restores the original color.

In number 11 of your valuable journal, I noticed an illustrated method of describing a circle without compasses, making the thumb the center and grasping the pencil in a peculiar manner. For many years I have been accustomed to describe a perfect circle by what seems to me (perhaps from practice) an easier method. It is to make the center of the finger nail the center of the describing circle, the nail being flat on the paper, and the pencil held between the ball of the thumb and that of the finger used. I use the nail of any or either finger, but perhaps that of the index finger would be easiest with most persons. The paper is made to rotate by the other hand, as described in your paper March 10th. The process is simple and very convenient, but is not original with JOSIAH CURTIS.

Knoxville, Tenn., April 14, 1866.

Speed of Cutting Tools.

MESSRS. EDITORS:—Will you please inform me through the columns of your valuable paper the rule for finding the proper speed for running iron planers, lathes, shaping machines, drill presses, etc. Say I have a line of shafting making eighty-five revolutions per minute, what size pulleys shall I put on to drive the above tools? P. T. W.

Dubuque, Iowa, April 21, 1866.

[The usual velocity for shafting is 100 revolutions per minute. Planer beds run about 15 feet per minute; lathes run from 15 to 20 feet per minute; that is the velocity of the work, not the pulleys. Thirteen feet for cast iron, 15 feet for wrought iron turned, and 15 feet for planers on all metals, is a fair estimate. We cannot tell the size of driving pulleys without knowing that of those on the machine. The speed of pulleys is in inverse ratio to their diameters; that is to say, a 6-inch pulley driven by an 18-inch pulley will revolve three times as fast.—EDS.

Steam Pipes and Cut-offs.

MESSRS. EDITORS:—Will you, or some of your readers, be kind enough to inform me how large a steam pipe an engine with 12-inch cylinder, and three and a half feet stroke, cutting off at 6 inches, should have, to properly supply it with steam?

I am now using a cut-off that is very good, and answers well; but, it is very liable to get out of order. I should like to get another. Is there any one you would be kind enough to recommend? A. M. H.

Strasburg, Pa., April 23, 1866.

[To find the proper size of the steam pipe, Bourne gives the following rule. Multiply the square of the diameter of the cylinder in inches, by the speed of the piston in feet per minute, and by the decimal .02; divide the product by 170. The quotient is the proper *area* (or cross section) of the pipe in inches.

There is no better cut-off for a stationary engine than one slide valve working on the back of the other, and provided with a right and left screw, to work at various grades.—EDS.

Western Steam Boilers.

MESSRS. EDITORS:—I propose to give you a few facts on Western boilers, and my views in regard to explosions, to assist you in refuting some of the theories advanced on that subject.

In the SCIENTIFIC AMERICAN of the 7th of April, there is an editorial on tubular boilers, and a letter taken from a St. Louis paper, written by Mr. Schaffer, who sets forth the theory of the engines draining the boilers on account of too little steam space, and taking the steam from the boilers too near the top of the water. Our Western tubular boilers are generally from 38 to 42 inches, in diameter, and 14 to 18 feet long, with tubes about four or five inches; there is about one-third of the top of the boiler steam space, with a steam drum 24 to 30 inches diameter; for four 38-inch boilers it would be about 4 feet long, attached by about a 6-inch connection with each boiler, which would take the steam at over three feet above the water line. I must say that in my experience as an engineer, which extends, off and on, to thirty-two years, I have never known an instance, since the old cast pipes were replaced by steam drums, of the water being drawn from the boilers in the way indicated.

In the next place, it seems to me an engineer must be asleep who would not detect so much water passing through the engine in one revolution, as the sound of the exhaust would be as different as the sound of gage cocks, when one had nothing but steam, and the other flush with water. The engine also exhausts into the heater, which has about the capacity of the cylinder, and does not have a direct passage to the escape pipe. The heater is a horizontal cylinder, and the steam passes the entire length, and has to return part, or all the distance, to enter the escape pipe. All water carried to the heater is apt to stop and pass out at the waste pipe, sometimes not leaving enough for the force pumps, which may account for the water passing out with the exhaust steam.

I believe tubular boilers to be as safe as flued boilers, but require more constant attention and greater care, as when the supply is stopped they reduce the water much faster. It is common to start a boat out with water very flush in the boilers, and either stop the doctor, or run very slow until the water falls to the proper hight; and it often occurs that the pumping engine is run so slow that it will stop on the center, and I have seen them stopped for several minutes before those on the watch noticed it. I doubt if there ever was an engineer who would admit that he had less water or more steam than the law allowed. ENGINEER.

Beetown, April 20, 1866.

Lateral Motion for Saw Mandrels.

MESSRS. EDITORS:—Lane & Bodly, of Cincinnati, Ohio, make it one of their principal claims of improvement, that a saw must have lateral motion, and they have a patent on it.

W. Herrick, of Northampton, Mass., disapproves of it altogther, and says it is utterly useless. Both have mills of their make operating successfully. I acknowledge I can see but one reason for lateral motion, and that is, the spring of timber, which in some sections of the country is worse than in others. The primitive growth on level ground is less liable to spring, while second growth is sometimes quite difficult to saw more than from 16 to 18 feet long. In that case lateral motion gives the saw a chance to avoid much friction, and it is consequently less liable to heat. A circular saw should be kept perfectly round. The manner which your correspondent suggests is a very good one, but the back of the tooth being left an inch and three-fourths, is altogether too long; three-fourths is nearer.

There is what is termed a draft in sawing lumber; if the back is too long it is inclined to resist the feed, and consequently causes the teeth to heat; then again, too much off the back causes it to enter the wood too freely, and consequently it will deviate at the least obstacle from a straight line. I have thus thrown out a few suggestions, hoping to excite the interest of some of the best sawyers, that they may be able to explain those points which some yet regard as too sacred to be made public. For the present I will be content to read; let others write.

POWAGANSETT.

Providence, R. I., April, 1866.

Hand Grenade.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of April 7th, page 226, I find a partial description of the Adams hand grenade; and as a portion of that description conveys a wrong idea of the manner in which that projectile is to be used, I would thank you to publish the following correction. Instead of "a lanyard several yards in length, one extremity of which is securely held in the hand of the person using the grenade," I use a lanyard eighteen inches in length which is firmly secured by a slip loop to the wrist of the operator: The other end of the lanyard has a spring hook by which it is attached to the igniting wire of the grenade. The grenade thus attached, can be hurled from the hand at the enemy, and the instant it leaves the hand, the sudden tension upon the lanyard withdraws the igniting wire, ignites the primer, and a five seconds time fuse, which burns

down to the powder as the projectile flies on its mission of destruction.

It will thus appear that it is as well adapted for offensive as for defensive warfare, which would not be true if the description of your correspondent was correct. JOHN S. ADAMS.

Taunton, Mass., April 12, 1866.

NEW INVENTIONS.

Making Seamless Paper Boxes, Lamp Shades, Hats, and other Hollow Articles of Paper.—The box or other article is made upon a former which is dipped into the pulp; the latter collects on the reticulated surface by means of a partial exhaustion of the air from the interior of the former, the air being withdrawn through an elastic pipe communicating with a bellows or cylinder.

The water being drawn through the perforations, a film of pulp adheres to the surface of the former which is then raised from the vat, and the coating of paper pulp being removed and dried, forms a seamless article which requires no further manipulation for most ordinary purposes, but for ornamental uses may be covered wholly or in part with a second coating of colored pulp and embossed or otherwise ornamented by stamps, swedging or perforation. Edward H. Knight, Washington, D. C., is the patentee.

Fire Engine.—This invention consists in the arrangement of two or more pump cylinders of different sizes, the pistons of which are connected to one and the same piston rod, in combination with suitable cocks or valves, in such a manner that by adjusting said valves the amount of water thrown on each stroke of the pump can be made equal to the combined capacity of both cylinders, or each of the cylinders can be worked separately, and, consequently three changes are possible, whereby the amount of water thrown can be readily adjusted to the distance of the pump from the fire, or to the hight to which the water is to be thrown. John M. Dennison, Newark, N. J., is the inventor.

Hay-loading Device.—This is a device for loading hay on wagons or carts direct from the field, or while the wagon or cart is drawn along over the same. The invention consists in the employment of gathering boards provided with teeth and arranged in such a manner as to cause the hay to be brought within the action of the rakes. The invention also relates to an improvement in the connection, whereby the device is secured to the wagon or cart to be loaded, and also in an improved arrangement of the stationary rake teeth, as well as an improved mode of operating the revolving rake teeth. The invention further consists in an adjustable holder, whereby the revolving rakes are made to act efficiently upon the hay and carry the same to the elevator. William A. Duncan, of Syracuse, N. Y., is the inventor.

Agricultural Implement.—This invention relates to a driver's seat for agricultural implements, and is more especially arranged for the seats of reaping and mowing machines, although applicable to other agricultural implements which are mounted on wheels. The object of the invention is to obtain, by a very simple and inexpensive means, a seat which will yield or give in two different directions—laterally as well as obliquely up and down, and to this end the invention consists in having the spring or elastic bar, to which the seat is attached, bent or otherwise constructed so that it will have two parts which will yield or give in planes at right angles with each other, and thereby admit of the seat yielding in any direction. Thomas S. Brown, Poughkeepsie, N. Y., is the inventor.

Water Wheel.—This invention relates to a water wheel which is designed for obtaining power from the current of a stream and where it is impracticable to build dams for the purpose of obtaining power by means of a head and fall. These devices, which are commonly termed "current wheels," are extremely useful in those cases where there are strong currents, as machinery may be driven without the expense of constructing dams, and they also may be advantageously used in tide mills. It consists in attaching a series of swinging buckets to an endless belt composed of plates connected together by joints or hinges and fitted on polygonal rollers, the whole being arranged in or on a suitable framing and in such a manner as to obtain a large percentage of the power of the water. Matthias Devoe, Big Sandy P. O., Neb. Ter., is the inventor.

Machine for Topping and Stripping the Leaves from Sugar Cane.—This invention consists in the employment or use of an endless feed apron, in connection with a toothed cylinder, slotted curved plate, and discharge rollers, all arranged to operate in such a manner as to strip the leaves from the cane in a very efficient manner. The invention further consists in the employment or use of a rotary knife, arranged to operate in connection with the parts aforesaid, so that the cane may be topped and have the leaves stripped from it simultaneously, or at one operation. This invention was patented on the 3d of last April by John M. Spencer, of Ottawa, Ill.

Science of Ballooning.

We have many readers who have devoted considerable time to investigating the science of ballooning. *Every Saturday* publishes a translation from a French journal, in which four conditions are specified as necessary to be fulfilled in making aerial voyages regular:—

I. An impervious skin to the balloon, or at least so nearly so, that it will retain the gas for a week or more.

II. The power of rising and sinking to take advantage of other currents, when we are thwarted by such as we are in.

Every one knows that, in the present state of our knowledge, the aeronaut throws out ballast to rise. Under three conditions he lets the gas escape—first, when the rarefied air permits the gas to distend the balloon dangerously; second, when having reached a favorable current he wishes to cease rising; and third, when the solar heat expands the gas too much. He also uses this power and that of ballast to regulate his momentum on landing. This is all very simple, but any one can see its many inconveniences; and the danger, when ballast and gas have been so far exhausted that you are left unprovided for contingencies. The frightful voyage of Blanchard and Jeffries, in crossing the English Channel, shows to what peril these maneuvers subject the aeronaut. Threatened with sinking into the sea, these adventurers threw over all their ballast without stopping their downward course. Their books, instruments, provisions followed. Next their clothes, and finally the wherry itself, so that they landed on the French coast, clinging naked to the cords. From the beginning of the art the dangers of this practice have been apparent. Guyton de Morveau looked forward to some substitute as the art developed itself. To find this is as much a desideratum now as then.

III. This condition relates to a matter little considered, namely, the dilation arising from solar heat. When the Duc de Chartres went up with the brothers Robert, and was carried suddenly above the clouds, the balloon so expanded under the heat of the sun that it was in danger of bursting. The valve being out of order the Duc cut the balloon in two places, when it rapidly descended. Blanchard relates, that in one of his voyages, his balloon swelled so much under the action of the heat that it snapped in every part. The narrative of MM. Biot and Gay-Lussac is more conclusive. They left the Conservatoire des Art et Metiers on the 24th of August, 1804, at ten o'clock in the morning, and, reaching a hight of 3,724 meters, were surprised at not finding it cold; but, on the contrary, the sun was so powerful that they gladly pulled off the gloves they had worn at the start, and the animals with them did not appear to suffer from the rarity of the air, while a bee flew humming away. Guyton de Morveau, in one of his statements, avers that the lowering of the mercury in the barometer was hardly perceptible, when the dilation was already considerable; and he adds, that the continuous flow of gas from the upper valve, like a thick smoke, made it seem as if the balloon had been rent in that spot. The explanation is this, that the gas confined in a case coated with resin is raised in temperature much more rapidly than the outer air. The history of aerostation is filled with instances. One day, Morveau, wishing to repair his balloon, had taken it to his garden and filled it with open air by means of bellows. The morning sun was shining, and presently the balloon began to roll about, and at one time it came near escaping two persons who sought to retain it. Morveau, having opened the valve, the air which issued almost painfully affected the eyes, and was found to be four degrees warmer than that without. In another instance, the same observer noted a far greater difference, namely, that of thirty-nine to twenty-three degrees. At another time the same balloon was heated so much that it sprung up to an elevation of forty-three feet, with a weight to be sustained of one hundred and twenty-five kilogrammes, and then burst its confinement, and when a young man tried to hold it by seizing a cord and winding it about his wrist, he was carried over a wall nine feet high, and landed beyond. The balloon continued its way, traversing a public promenade, to the great wonderment of all, and settled down one hundred and fifty paces distant.

IV. The necessity of some means of steering a balloon has been felt from the start. "It is not well to deceive ourselves into believing," wrote Guyton de Morveau, "that here is not a great difficulty."

A Cigar Ship at Sea.

The recent passage across the channel of the *Walter S. Winans*, a small yacht belonging to the Messrs. Winans, and of similar construction to the now famous cigar steamer *Ross Winans*, possesses much interest to the public who have watched the completion of the larger vessel, and speculated so much of her performance at sea. The steamer in question is 72 feet in length, with a diameter of nine feet, and is 24 tuns register. It is propelled by a high pressure engine of 25-horse power, driving a submerged three-bladed propeller, aft, of four feet and ten inches diameter. The yacht started from Havre for Newhaven at 5:30 A. M., on the morning of the 28th of March, with seven passengers. A heavy sea was running. The yacht had on board a full supply of coal, and was immersed to a few inches below her center. The engines worked smoothly and well, and she rode the heavy sea with ease and entire freedom from rolling. Rising slightly to the large waves she pierced their crests, which, dissolving, glided over the upper surface of her bow, and as far as the forward end of the deck; the main body of the waves passed gently along her sides, rising but little therefrom. Not a drop of water ever came upon her deck, while vessels of her size in sight were dashing the spray high over their bows. No shock of any kind was felt as she met the heaviest swells; on her rounded surface the waves could inflict no blow. The side seas, when her position was changed, and she lay in the trough of the sea, passed under without causing any perceptible roll; and this, too, whether she was going ahead or stopped. Early in the afternoon she arrived at Newhaven without accident of any kind.—*Manchester Guardian.*

New Solvents for Gold.

On the 26th of March M. Nickles presented to the Paris Academy of Sciences a note "On some New Solvents for Gold." The author has discovered that gold dissolves in the ethereal perchlorides and perbromides which he described last year (see *Chemical News*, vol. xi., p. 254). As the gold dissolves in the manganic compounds, the green color of these gradually disappears (proto compounds which are insoluble in ether being deposited), and a yellow or red solution of gold is left. The ether being evaporated from this solution and the residue sufficiently heated, a coating of metallic gold is left about the bottom of the tube, which suggests a process for gilding glass. The gold is reduced from the ethereal solution by proto-sulphate of iron and also by protochloride of tin, but purple of Cassius is not produced in the latter case. Many sesquichlorides and sesquibromides, the author states, also dissolve gold, those which are easily reduced answering best. The cause of the solution is obviously the instability of the per and sesquichlorides and bromides, from which free chlorine and bromine are easily separated. The ethereal periodides also dissolve gold, forming an iodide of the metal, showing that nascent iodine is a solvent, although that metalloid in the ordinary state is without action on gold. Last, an ethereal solution of hydriodic acid will dissolve gold leaf, owing, of course, to the instability of the acid and the liberation of free iodine in the nascent state.

Improved Fodder Cutter.

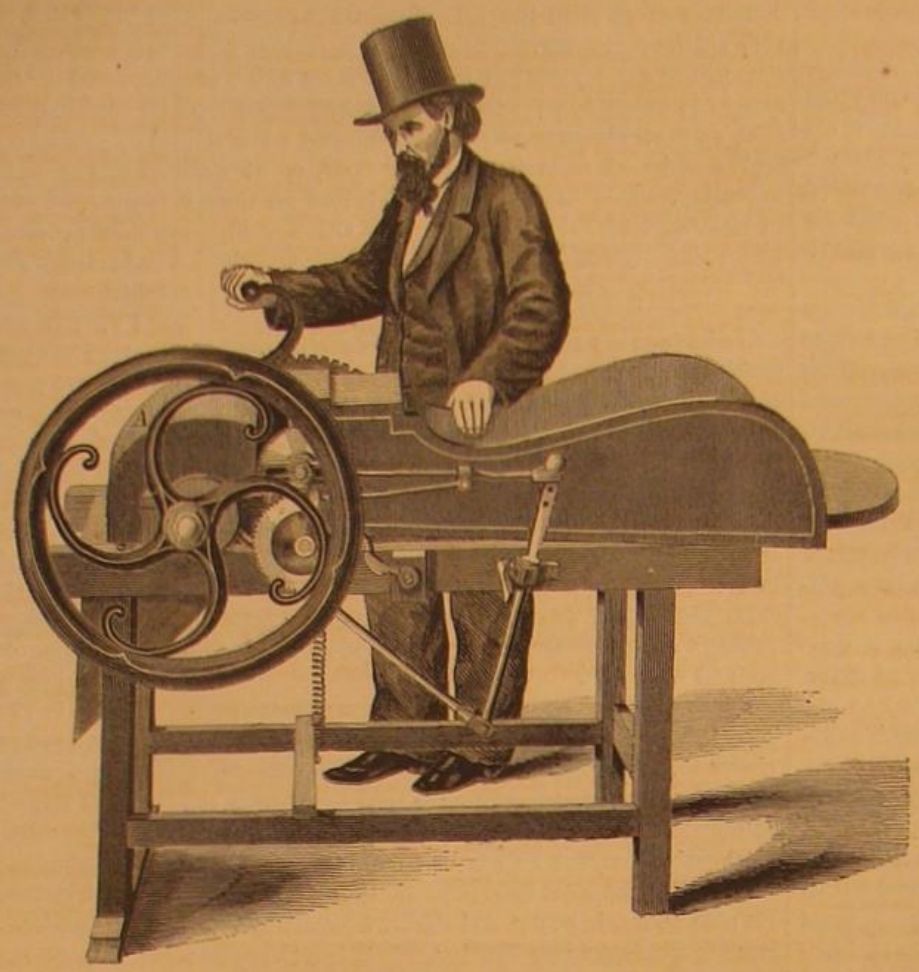
A regular and steady demand exists for good agricultural implements. Farmers are always looking out for those which are really durable and advantageous to them, and they seem willing, to judge from the quantities of all varieties sold, to give them a fair trial.

In this engraving we have shown a new fodder cutter, recently introduced at the West. It is substantially made and capable of being repaired by any ordinary mechanic or blacksmith, should an accident happen to it.

A large fly wheel is attached to the knife-shaft, which is covered by a shield, A, to prevent accidents, as well as to keep the cut feed from being scattered all over the floor. The knife is a single blade, curved and fastened, one on each side, to two arms on the shaft, so that they stand across the same, one edge being in advance of the other. In this way a drawing cut is obtained which is most efficient.

The feed on this machine is peculiar, in that it can be instantly adapted to cut any length desired, from two inches to one-fourth of an inch, and this without stopping the machine. A large number are now in use at the West, and the proprietors have many testimonials as to their efficiency.

For further information in regard to the sale of rights, etc., address the inventor, W. D. Schooley, at Richmond, Ind., by whom it was patented, Aug. 22, 1865.



SCHOOLEY'S FODDER CUTTER.

NEW PUBLICATIONS.

THE GARDEN.—A Manual of Practical Horticulture, or How to Cultivate Vegetables, Fruits, and Flowers. 166 pages. Price $1 00.

This volume embraces an exposition of the nature and action of soils and manures, and the structure and growth of plants, directions for forming gardens, instructions for sowing, description of implements and fixtures, transplanting, budding grafting and cultivating vegetables, fruits and flowers, to which is added a valuable chapter on trees and shrubs.

THE BARN YARD.—A Manual of Cattle, Horse and Sheep Husbandry. 165 pages. Price $1 00.

This volume treats upon the breeding, rearing, and general management of horses, mules, cattle, sheep, swine and poultry, how to improve breeds and how to insure the health of animals, and how to treat them for disease without the use of drugs, together with a chapter on bee-keeping.

THE FARM.—A Manual of Practical Agriculture, or How to Cultivate all the Field Crops, with a valuable Essay on Farm Management. 150 pages. Price $1 00.

It treats of soils, manures, rotation of crops, draining, fences, farm implements, crops, orchards, etc.

THE HOUSE.—A Manual of House Architecture. 176 pages. Price $1 00.

This volume treats upon the art of home building, and is illustrated with many plans of houses, villas, cottages, barns and other buildings.

The above four series are most valuable books, and are creditable to their author, D. H. Jaques. They are each profusely illustrated, and eminently practical. Publishers, G. E. and F. W. Woodward, No. 37 Park Row, New York.

THE MILLER'S AND MILLWRIGHT'S GUIDE.—Henry Pallett. Pages 281. Published by Henry Carey Baird, Philadelphia.

This work, just issued, contains a great variety of information concerning mills and millwrighting, together with illustrations and tables which are no doubt valuable to those interested in the business. The author's views in regard to engineering are somewhat crudely stated, but on the special subject matter of the volume there is much which we can approve.

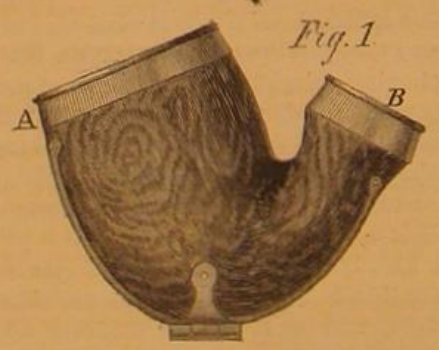
The Cast Iron Question.

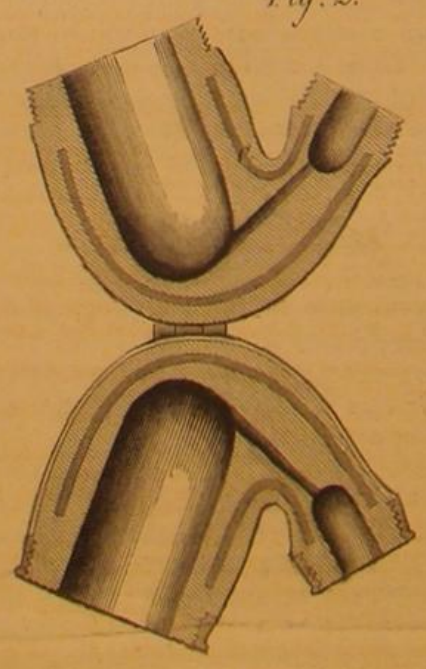
We have occupied a great deal of space lately in considering this matter, and think that we have given our correspondents a full hearing. Lest it become tedious to many who are not interested in such subjects we shall stop.

A reader writing from Boston suggests that the iron generally tried is a piece of the gate or sprue, which is porous, and of course lighter. He thinks that if a piece be cut from the lowest part of a casting, the phenomenon would not be noticed.

JEANNE'S PIPE.

This pipe is constructed to be easily taken apart for cleaning, so that the thick oil which condenses in





the passages can be quickly removed, and the pipe rendered as clean as new. It also facilitates the construction, for, by the use of special tools, the parts can be rapidly and quickly turned out.

The pipe is made in halves, which are hinged to each other, and confined by caps, A and B. Figures 1 and 2 show the pipe in perspective, and as it appears when opened for cleaning. The material shown at C, in Fig. 2, is cork, and is inserted in the body, for the purpose of making it air-tight at the point of junction. The arrangement is, in fact, the counterpart of that in the cases used for covering meerschaums, while they are taking on the rich brown, so delightful to the eyes of those who color them.

Patented Feb. 6, 1866, through the Scientific American Patent Agency, by Paul Jeanne. For further information address the patentee, No. 175 Fulton avenue, Brooklyn, New York.

Purifying Beeswax.

At a recent meeting of the Academy of Sciences Paris, M. Lies Bodard sent a note entitled "Chemical Researches on Wax." A large quantity of wax, the author states, is imported from America more or less adulterated with paraffine, and he gives a process for separating the paraffine. It depends upon effecting the etherification of the wax constituents, the paraffine remaining unacted upon. The author first dissolves 5 grammes of the substance in 50 cubic centimeters of amylic alcohol, and heats to 100°. He also heats to the same temperature a mixture of 100 cubic centimeters of fuming sulphuric acid and the same volume of water. When heated he pours the diluted acid upon the solution of wax, continues the heat as long as bubbles of gas escape, and then allows the whole to cool. On cooling a mass collects of about twice the size of the original wax. This mass consists of the unaltered paraffine with a mixture of melissic alcohol and cerotate and palmitate of amyl, the last three somewhat altered by the excess of sulphuric acid. The mass is now heated on a water bath to 100° with a mixture of 50 cubic centimeters of monohydrated sulphuric acid and 25 cubic centimeters of Nordhausen acid. The action of this must be continued for about two hours or more, until no bubbles escape even when the mixture is stirred with a glass rod. In this way all except the paraffine is carbonized. The carbonaceous mass which remains is dissolved in amylic alcohol, filtered with the aid of a heated funnel, and the residue on the filter washed with the same alcohol. The alcoholic solution is again heated with monohydrated sulphuric acid to transform the amylic alcohol into sulph-amylic acid. This not holding paraffine in solution, that body deposits on cooling, and may, if necessary, be further purified and weighed. The author also gives a process by which the melissic acid and cerotate and palmitate of amyl may be separated, which need not detain us.

Nitro-Glycerin.

Mr. S. P. Ely, living in Marquette, Mich., dissents from the assertion of Mr. Nobel that "nitro-glycerin" will not explode under a temperature of less than three hundred and twenty degrees. After remarking that he had prepared some of this chemical for blasting, he adds:

"The first I knew I had a tremendous explosion in my office. There was not enough of it to take the roof off, but the contents of the bottle were scattered over every square foot of wall and ceiling. I made a second trial with similar success, except that the explosion took place out of doors. The practical difficulty in the use of the compound seems to be that it can only be prepared at a very low temperature, and instantly and violently decomposes with any increase of temperature."

INVENTORS.—The Commissioner of Patents has invited individuals throughout the country to send to the Patent Office busts of authors and inventors, and of all men who were celebrated for mechanical skill and ingenuity—the busts to be of plaster, metal, stone, bronze, or otherwise. To all such busts the Commissioner will assign appropriate and conspicuous positions on the top and front end of each case containing models. Places above described can be found for about two hundred busts.

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PATCHING ENGINES AND BOILERS.

Some years ago, a little steamer called the *Plowboy*, which ran between Detroit and a lake port, knocked the bottom of her cylinder out, and was laid up for repair. The engine was of the beam class, and the bottom of the cylinder and the nozzle, which the lower steam chest is bolted to, were in one piece. A new casting was soon applied and the boat went out again. She had scarcely made one trip, however, before the same accident occurred again, this time from a wholly different cause. In the first disaster the bottom was knocked out from the breaking of the piston rod, but in the second it was from the inequality in the ratio of expansion between the new metal and the old. Since there was nothing to compensate for this, no way in which the weaker could yield a little to the stronger metal, the bottom and side of the cylinder were rent away, and the last end of it was worse than the first.

A serious accident which recently occurred to a steam boiler in England, shows what may happen when they are improperly repaired.

The boiler in question was twenty-five years old, but had not been in use during the whole of that period. It was a plain cylinder boiler, 30 feet long, 9 feet diameter, and made of $\frac{3}{8}$ iron, in the usual manner, while the safety valve was loaded to a pressure of but 40 pounds to the square inch.

This boiler gave way over the furnace, and was repaired there, by having a new sheet put in. Immediately after, the boiler exploded, killing one man and injuring five others. The seat of the rupture was at the junction of the old and new metals, tearing the old sheet through by the line of rivets. The direction of the break was in the length of the boiler for five feet, when the rupture developed transversely and tore the boiler into three pieces, one of which was thrown 200 yards from the original locality.

Many persons would say that this is extraordinary, and instead of looking in the right direction seek, to mystify themselves and others by elaborate theories, but the cause was plainly the weakening of the old plate by the strain imposed on it in putting in the new.

It is not a little singular, and significant that while the inspectors in England who have charge of those excellent institutions for the prevention of steam boiler explosions, denounce the cylinder boiler in such terms as these: "the recommendation is not given without good reason, that boilers of this treacherous, plain, cylindrical, externally-fired construction, should be discarded for those fired internally, which are much more reliable," a few unthinking persons at the West are endeavoring to have tubular boilers rejected and these "treacherous, plain, cylindrical, boilers" substituted instead.

"HOT ENGINEERS."

While public attention seems to have been directed not unreasonably, to the disastrous boiler explosions at the West, another class of men are changing the order of things, and seem to be turning their efforts in the other direction, endeavoring to destroy boats and boilers as fast as possible.

A letter recently received from a correspondent at Beetown states that on the Western waters, particularly the Upper Mississippi, the most reprehensible practices prevail. Engineers are sworn to carry not over one hundred and fifty pounds pressure, "but," says our correspondent, "they do not consider their oath binding;" therefore they proceed to alter the gages. Two hundred and two hundred and fifty pounds to the square inch, is not uncommon. "Men that refuse to work the boilers at such pressures are not in great demand." Our informant says: "Here you may wonder how it is that the passengers do not discover this." In the first place the gages are so set that the passengers would have to go on the foot board of the engine to see them, and he would be a bold man who would do that where he wasn't wanted; and in the next place, the face of the gage is taken off and the hand changed, so that there will be fifty or sixty pounds pressure in the boiler before it indicates at all. Instead of this, however, a good many who wish to be popular with the captain and crew, and be known as "hot engineers, without the risk, practice the reverse and set the gage the other way, so that it will show fifty or sixty pounds *cold*." It must be confessed that of the two, this is much the best deception.

The men also shut off the cock on the gage partially, so that it will show incorrectly. "Hot engineer," we take to mean a reckless man, and if these persons habitually break the laws and take oaths which they "do not regard binding," their places should be supplied by others.

CITY REFORMERS.

The Legislature of New York has blessed this city with a most admirable health law, and the Commissioners, of whom Jackson S. Schultz, Esq., is the President, are working with great energy to carry out the provisions of the bill, and already our hitherto dirty streets, and many other abominable nuisances that have festered here under municipal misrule, are being cleaned up and removed.

We called on Mr. Schultz a short time since to inquire if the inhuman system of driving droves of animals through our crowded streets could not be abated. He assured us that the whole thing would be stopped in less than three months, and, furthermore, that the slaughtering of animals in the thickly-settled parts of the city would also be stopped. This business is hereafter to be carried on outside the city limits.

The new License Law has been placed under control of the Health Board, and the Commissioners are determined to so fix the licenses that liquor sellers shall hereafter pay the expenses of our police force, for the reason that most of its duties arise from the sale of intoxicating liquors. Commissioner Acton declared that seventy thousand persons were arrested last year for crimes that were directly traced to the influence of liquor. It was decided by the Board of Commissioners that there should be two classes of licenses—the first to pay $250, the second, $100, which at present calculation would yield an annual revenue of over one million dollars.

Verily the world moves; the millennium is coming.

ILL VENTILATED, OVER CROWDED SHIPS.

The steamship *Virginia* arrived at this port recently with a large number of passengers, many of whom were on the sick list. She was immediately put in quarantine, the sick cared for and isolated from the city until cured.

Investigations made by the proper officers show that none of the passengers came from ports infected with cholera, and that it was not until some eight days after the departure of the *Virginia* from Liverpool, that disease broke out on board. It appears that the ventilation was so defective that the passengers suffered greatly, and being enfeebled by bad air and insufficient food, poor in quality, were especially liable to attack. That many died is not to be wondered at. But it seems passing strange, however, that with all the modern appliances for obtaining fresh air and creating a thorough circulation in apartments, that so little attention is paid to it. On ship board, of all other places, this matter is easy to regulate. The loss to the owners by the detention of their vessel amounts to a large sum, and if not for humanity then for the pocket's sake, a little more interest in the welfare of the steerage passengers would pay. Every person who has been to sea, however, in a steamship, must acknowledge that the officers are not always to blame in this matter. When there are only one hundred passengers it is a matter of the greatest difficulty to get those in the steerage to behave with common decency. They defy persistently all the laws and rules of the ship, not perhaps in all cases to be ugly, but from their inability to comprehend the importance of them. Tell a man who has lived thirty years without ever being really clean, that if he does not instantly change his habits he will lose his health and life, sooner than heed the advice he will die, and his fellow by his side will die from the same cause.

They prefer to skulk away in their berths, to grovel in filth in the darkest corners, to be dirty when it is easier to be clean, because that is the way they have always lived. It requires close watching and strict discipline to preserve even an ordinary degree of health in emigrant vessels at all times, still more when epidemics rage.

In view of these facts the strictest quarantine should be enforced, and if legislation is necessary to security, certainly those in authority should see that nothing is omitted.

AGRICULTURAL EXHIBITION IN BRAZIL.

Senor D'Aguiar, the Consul General of Brazil, has handed us the rules and regulations that are to govern the "Exhibition of Agricultural Implements," which is to open at Rio Janeiro on the 19th of October next. These rules are published in another column. The Consul General informs us that already agricultural implements made in the United States have been introduced into Brazil to a considerable extent, and the future promises greater encouragement. Our manufacturers of farming implements are generally very enterprising, and if the prospect of reward is sufficient they will enrich the Brazilian exhibition with some of their best productions.

How to Preserve Newspapers.

H. R. Heyl, of Philadelphia, has recently secured a patent for an adhesive binding tag which is an excellent article for temporarily binding newspapers, magazines, music, and other documents. Each of these tags has a string loop secured to it, and by punching through the edges of the sheets and sticking on two or three tags on the inner fold of the sheet, a string can be passed through the loops, and when tied makes the sheets secure. For a single number of the SCIENTIFIC AMERICAN three tags are enough, and two sheets of pasteboard, provided with suitable metallic eyelet holes, can be used for covers.

The tags are put up 200 in a box with punch and strings for tying up the sheets after the tags are stuck on. We can supply the boxes at our office sent by mail at $1. If a portfolio with leather back is wanted, the price of portfolio at the office is $1 25, or $1 50 by mail.

A LATIN journal, in Paris, will be a literary curiosity, equal to the Chinese journal announced for appearance in London. It has begun business under the title of *Apis Romana*.

For the Scientific American.

NITRO-GLYCERIN—THE CAUSE OF ITS PREMATURE EXPLOSION.

BY PROF. CHARLES A. SEELY.

In a recent number of the SCIENTIFIC AMERICAN it is suggested that the late disastrous explosions of nitro-glycerin were the result of spontaneous combustion. As the subject is one of great interest at the present time I trust the facts I present herewith, now published for the first time, will be acceptable.

The morning after the explosion of nitro-glycerin in Greenwich street (Nov. 5, 1865), I went to the Wyoming Hotel and made a careful inspection of the premises, being assisted by several of the gentlemen who were wounded. At this time the cause of the explosion and the explosive material were a profound mystery. Inquiries elicited the following facts: A few minutes previous to the explosion, the men, a dozen or more, occupying the bar room, which was on the level of the street, observed a peculiar odor which by some, at first, was taken to be due to a leakage of gas. It was soon apparent, however, that the odor was not of gas, and as it increased in strength, search was made for its cause. The odor was traced to a small baggage room, and there it was found to be issuing from a small chest or packing box provided with rude handles of rope. The box was brought out into the center of the bar room and placed upon the floor. But the stench became stronger and very offensive, and some of the gentlemen saw what they supposed to be smoke and a yellow or reddish flame issue from the box. All were then alarmed and the box was hastily carried to the edge of the side walk. The men who carried the box had barely time to re-enter the bar room and turn round to look at the box through the glass doors when the explosion took place.

The small size of the box, the absence of a smell of sulphur, and the terrific effects of the explosion, indicated something different from gunpowder. We searched in vain for some relic of the box or its contents.

I directed inquiries most minutely and particularly with reference to the odor. Unfortunately none of the gentlemen were familiar enough with the odors, which we of the laboratory know so well, so as definitely to describe that which they had perceived; but I was able to get so many positive statements that when they were put together, I felt warranted in concluding that the odor was that of nitric gas, and that the yellow smoke or flame was nitric gas. Under this state of things, I was inclined to believe that the box had contained gun-cotton, and that here was a case of spontaneous combustion, with which I am quite familiar. As ordinary gun-cotton, however, alone could not produce the mechanical effects shown, it was necessary to suppose that it was combined with chlorate of potash, or that the box also contained a fulminate. This theory proved to be incorrect, but its plausibility was singularly confirmed, when next day it became known that nitro-glycerin, a substance so much like gun-cotton, was, in fact, the explosive. I made a very near guess.

I have made the above narrative so minute, for the reason that the peculiar odor, and the red fumes observed at the Greenwich street explosion, so characteristic of the spontaneous combustion of compounds like gun-cotton, seemed of little consequence to others who examined the case. I desire it to be put on record that there is sufficient reason for believing that this disaster was chargeable to spontaneous combustion.

It is also proper to add, that, as a good citizen, shortly after the occurrence, I brought the subject before one of our scientific societies, and sent a communication to one of the daily papers, in which I gave warning of other explosions, in case proper precautions were not taken. Unfortunately, the communication was not published; its publication, possibly, might have prevented the fearful catastrophes at San Francisco and Panama.

As above intimated, I am familiar with the spontaneous combustion of gun-cotton. I am acquainted with the particulars of several cases which occurred unintentionally, and the conditions are now so well understood that we know how to bring it about at will, and with certainty. The conditions are simply that the cotton, slightly acid, be kept so that the acid fumes and the heat, generated by the reaction of the acid, shall be prevented from escaping. For example, take an ounce of gun-cotton, slightly acid, and contained in a bottle, and pack in with cotton wool or saw dust, in a close box; within a few weeks, in warm weather, it will be pretty sure to take fire. An actual case of this sort is described in the *American Journal of Photography*. The spontaneous combustion theory completely explains the many "mysterious" explosions of gun-cotton which occurred within a few years after its discovery.

The constitution and properties of gun-cotton and nitro-glycerin are so similar that little argument is necessary to show that the latter also is liable to spontaneous combustion. To put the question, however, beyond dispute, I have made experiments which demonstrate that nitro-glycerin is subject to the same accidents from spantaneous change, as gun-cotton. Other theories, which have appeared in the newspapers, to account for the Greenwich-street explosion, are altogether insufficient. We have, as yet, very little information with reference to the explosions at San Francisco and Panama, on which to base a perfectly satisfactory explanation. But unless we can have something to the contrary, they too, must be accepted as cases of spontaneous combustion. In the investigations of this nature, I would recommend that inquiries be most particularly directed concerning the temperature to which the packages had been exposed, and as to the escape of acid odors or fumes, previous to the explosion.

Many seem to suppose that nitro-glycerin, being proved to be a dangerous substance, can no longer be used. Congress, I see, are proposing to make its manufacture and sale a penal offense. The people and Congress, nervous under a panic, perhaps reasonable, are yet greatly in error. We cannot afford to allow a substance so useful as nitro glycerin has proved itself to remain unused; we cannot confess that our science and inventive skill are unable to find the means of making it safe. I venture to predict that, in a short time, nitro glycerin will be esteemed far less dangerous than gunpowder, and that in a great measure it will supersede it; within a few years the annual consumption of nitro-glycerin in the United States will reach a million of pounds.

Gun-cotton was at first looked upon with as much dread as is now nitro-glycerin; the accidents from it were quite as terrific as those from nitro-glycerin, and they were also then quite inexplicable. I quote a few cases. In 1847, the gunpowder factory of Hall Brothers, in England, where they were making gun-cotton, blew up, killing every man at work in the place. On the 17th day of July, 1848, a similar explosion of over 3,000 lbs., took place at Bouchet, near Paris; walls from eighteen inches to a yard in thickness, were reduced to powder from top to bottom, and heavy weights were thrown to a great distance. An explosion took place in a magazine at Vincennes, which no one had entered for several days previously. An explosion of 300 lbs. took place in Connecticut under precisely similar circumstances.

But lately what a change! Wherever there is a photographic artist you may find gun-cotton. It has been manufactured in all quarters of this city. I have myself made tuns of it. During our late war, thousands of pounds were sent by Adams Express from this city to a neighboring State, and the business was conducted in such a way that there was less risk from fire than in the ordinary handling of dry goods. It is only to our ignorance that such things appear dangerous: whenever we are forewarned we must learn how to be fore-armed. Shall we banish edge tools, and steam, and gunpowder on account of the ignorance and carelessness that exist in the world? Let us rather look upon what we call accidents as indications of something to be learned, and something to be invented.

Now, the property of nitro-glycerin, which heretofore we have not understood, and which has rendered its storage and transportation dangerous, is its liability to spontaneous combustion; in other respects it is far safer than gunpowder. It is with great pleasure I feel able to announce, positively, that sure and simple means are known, and will be put in practice, to remove that danger, so that, shortly, nitro-glycerin will be thought of only on account of its eminently useful properties.

In conclusion: The preparation of nitro-glycerin must never be intrusted to unskillful hands, and its transportation for some time to come should be regulated by suitable legislation.

MODERN MARINE ENGINEERING.

Although the marine steam engine, in general, is essentially the same to-day as it was ten years ago, the details of it, and the practice of to-day compared with the past are so changed for the better that the mechanical portion of the community are always ready and eager to obtain a knowledge of the construction at the present time.

English writers have, with a few exceptions, supplied all the literature of the profession, and to them we look for the best works on the subject. John Bourne has rendered substantial service in this way, and there are no works on mechanical engineering more useful and reliable than his "Catechism," and later "Hand Book."

We have before us a new work on "Modern Marine Engineering," applied to paddle and screw steamers, by N. P. Burgh, engineer. The work is published in England, and issued in New York by D. Van Nostrand, No. 192 Broadway.

The first number contains drawings of a new set of engines recently built in England for a Russian frigate. These are made to scale, and accurately colored to represent the different metals employed. The colors are those generally used by the profession, not attempts at pictures. They give a clear idea of the plan and general arrangement. The style in which the work is got up challenges attention. The type is large and fine, the matter is double-leaded, and in point of mechanical execution faultless. The scope of the text is somewhat comprehensive; and in view of the interest always attaching to the subject, the reader scans every page attentively. Mr. Burgh goes into the subject quite prepared, indeed confident of his ability to cope with any question, and after discussing some of the types of engines in general use, he alludes to our forefathers as follows:

"To design engines on land, and correctly manage, or rather attend to them at sea, would puzzle some of our forefathers, whose originations were nevertheless fair examples of that age of progression; what may seem perfection of arrangement, even after construction, on land, will often betray want of foresight as to access for repair or renewal at sea."

An Irish member of note, Sir Boyle Roche, is reported to have said in reply to the inquiry of a peer, —"By forefathers I do not mean our descendants, sir, but those who come immediately after us," and taking a view of engineering analagous to that of Sir Boyle Roche, it is hardly fair in Mr. Burgh to reproach those worthy men with not knowing about engines that came immediately after them.

But Mr. Burgh does not always say what he means, as in this paragraph:—

"The parallel motion, direct acting engine, cannot ever claim much favor in the estimation of those who consider natural laws; when the shortness of the connecting rod be taken into consideration, it is not surprising to relate that this type of engine soon proves its worth."

It would seem from the construction of the previous portion that Mr. Burgh intended to deny the utility of parallel motion, but as it closes it claims a special advantage from the shortness of the connecting rod, a thing that is somewhat difficult to comprehend, and that our forefathers are to be reprimanded for not having discovered.

Faults of grammar are, however, so common, that perhaps we are hypercritical, and if Mr. Burgh's English is sometimes cloudy, his drawings will supply all that relates to the construction part of our modern engines. These it seems our forefathers knew nothing about.

Mr. Burgh, in the construction of American engines of the beam variety, is very charitable. He scorns to take advantage of the ignorance of his cousins. He does not even criticise them; he disposes of us in seven lines. He merely says: "Over head motion for paddle engines is not much adopted in England at the present day. Our transatlantic fast cousins still adhere to the arrangement of the beam above the crank shaft. For smooth water and flat bottom vessels there is not much objection to this arrangement, *i. e.*, as far as power is concerned, but for correct locality of detail, to be merciful is to be silent." And that is the way a modern, marine engineer talks of beam engines of 105 inches diameter of cylinder and 12 feet piston stroke, in ships that go around "the Horn."

In another part of his work, Mr. Burgh, in describing a steam engine, states that it has a cylinder and a central rod, to which is attached "an opaque piston." Recovering from the stunning effect which this intelligence naturally produced on our sluggish mind, we reflected that as cast iron is usually quite translucent, it was an advantage to have this special piston "opaque," inasmuch as common people would be quite unable to see through it.

We cannot sufficiently admire the boldness and versatility of Mr. Burgh's mind. Whatever he bends his attention to, falls before his all-conquering intellect. He not only grapples with the mysteries of the steam engine, but he swoops upon the Latin tongue, and presses that into his services to make his machinery and his views plain to the unlettered reader.

A variety of quotations are introduced, which come before us with the charm of novelty beaming from them. As for example, on page six we read that "the truthful application of natural laws will be attended to *per se seriatim*," and on page five a certain arrangement is "not unworthy of comment *ad valorem* of the arrangement *per se*." *Ab initio* is also a favorite phrase with Mr. Burgh. It must not be supposed, however, that such a daring spirit willingly brooks the conventionalities which hampered "our forefathers" in reading the Latin tongue. Not he; in some instances he yields to the prejudice and bigotry of the day, and employs the standard spelling, but we notice that on page eighteen he breaks forth into this masterpiece: "The cause for the recognition of some promulgations is that in allusion to the originators, the phrase of *su'um cui'que*, shall be in full force." If the perpetrators of the "promulgations" alluded to, survive this, they may boast of the most vigorous constitutions.

But lest we seem to pursue this subject with too great detail, let us stop at once. The English language is capable of expressing simple ideas very clearly, and it is the extreme of bad taste to interpolate foreign phrases; particularly out of place in mechanical works.

Future numbers of this work will contain plates and cuts of all the latest marine engines, which we shall examine with great interest.

Brazilian Exposition of Agricultural Machines.

This exposition will be opened on the 19th of October next, and closed on the 2d of December, 1866, and the following regulations and instructions for the special exposition of machinery and instruments manufactured in foreign countries, for the cultivation, preparation and improvement of agricultural products, are published for the use of those it may concern:—

First, All machinery and instruments will be admitted to the exposition when followed by the following inscription "Foreign"—with the name of the manufacturer, inventor, and cost of each.

Second, Said machines and instruments will have no right to premiums, and should be worked by proper persons employed by the expositors, on the days and hours appointed.

Third, The necessary space and steam power will be furnished free for the working of the machinery.

Fourth, No machinery to be admitted which will require foundation or special constructions, or is already known or used in Brazil.

Fifth, All machinery to be taken to the place of exhibition by the expositors at their own expenses.

Sixth, No machinery to be removed without special permission.

Seventh, After the exposition is over, said machines may be sold after satisfying the conditions of art. 12, sec. 3d, free of expense to the managers.

Eighth, Tickets of admission will be furnished to those working and giving explanations in regard to the machines.

Ninth, Those wishing to take part in the exposition will give due notice of such intentions to the Brazilian Minister (in New York), with full particulars of their machines.

Tenth, All empty boxes and packages to be removed by the expositors when advised to do so, otherwise to be sold for the benefit of the exposition.

Eleventh, The managers to have the right to exclude any machine or instrument which is not under the conditions of article fourth.

Twelfth, The dispatch and clearances of machines and instruments at the Custom House are—

1st, To be received at the Custom House and sent to the place of the exposition without being opened, or paying duties, all packages destined to said special exposition and directed to the Board of Managers.

2d, The expositor or agent to make a declaration of the contents and value of each package, and sign a bond for their re-exportation or the payment of duties in case of being sold.

3d, All goods so imported and not re-exported, will be subject to a duty of 1½ per cent *ad valorem*.

4th, All packages will be sent from the Custom House under the care of an officer.

5th, Packages only to be opened at the place of the exposition, before an officer of the Custom House, who will examine the contents according to sec. 2, and subject only to the conditions of sec. 2d and 3d.

6th, All machinery and instruments sold not to be removed until all the Custom House dues are paid.

Board of Managers, Rio de Janeiro, February 19th, 1866. Luri P. Couto Ferrar, President.

By order D'Aguiar.

Consul General of Brazil,
No. 13 Broadway, New York.

New Agent for Deadening Pain.

An important addition to the means of diminishing pain has been made by an English physician, who has introduced a new method of producing local insensibility to the knife. Chloroform robs the most terrible surgical procedures of the worst horrors which formerly surrounded them, and has even rendered possible some operations which could hardly have been attempted without it; but it has its own peril—the peril of death. Surgeons justly encourage their patients, by reciting to them the statistics of fatal accidents under chloroform, which, incomplete though they be, demonstrate the extreme rarity of such misfortunes. It has, however, been observed by all authors who have collected these cases, that a remarkably large proportion of the recorded deaths have occurred where only minor operations have been contemplated. Hence a rapid and efficient means of producing local anæsthesia, and one free from any of the constitutional risks attending the administration of chloroform, is a boon of great price. Dr. B. W. Richardson effects this result by directing on the skin a finely divided spray of pure ether, using an ingenious modification of the spray tubes, lately much in vogue as toys, for diffusing perfumes. A rapid blanching of the skin, and insensibility to pain, follow in from about thirty seconds to two minutes. Upward of a hundred operations have recently been painlessly conducted under this method. It is only likely to be generally useful for superficial operations; but these are so often undergone at the cost of great terror and anguish, through dread of the risks of chloroform, that the value of this invention must be very great.

[We find this extracted from some unknown source into one of our exchanges. The external application of ether has long been practiced, but this mode of employing it in spray may be an improvement.—Eds. Sci. Am.

Name of Weights and Measures.

At a meeting of the Polytechnic branch of the American Institute held April 19th, there was an interesting discussion on the importance of legalizing in this country the decimal system of weights and measures, according to the French standard, already in use among scientific men of all nations, and which will probably be soon adopted in Great Britain. A new point was raised regarding the nomenclature. The Chairman, Prof. Tillman, said there could be no question as to the utility of the proposed reform, which would effect a great saving of time and labor in making computations, yet in adopting the decimal system of weights and measures, we should be careful to designate the decimals by names which could be readily distinguished and easily pronounced. It appeared to him that a serious evil would arise from using the French nomenclature, which distinguishes the multiples of the unit by prefixes derived from the Greek, and the divisions of the unit by prefixes derived from the Latin language. In some cases there is a perplexing similarity of names; for instance, a decameter is equal to one hundred decimeters, the only difference between these names is in the fourth letter. Although the pronunciation of these names expresses the distinction between them, it is probable that errors would often arise in writing these words. To obviate this objection, and to make the distinction between the whole series of names more plain, the Chair proposed that prefixes to the unit be used to express the multiplication or increase of the unit by ten, and that suffixes be added to express the division or decrease of the unit by ten. It is best to retain these prefixes as nearly like the French as is consistent with easy pronunciation, but the suffixes derived from the Latin cannot be easily added. After a numerous coinage of names, the following were selected as the best adapted to common use. In measures of length the word meter is contracted to met:—

39·37079 inches—1 meter.
Decamet.—393·7079 inches—10 meters.
Hectomet.—3937·079 inches—100 meters.
Kilomet.—39370·79 inches—1000 meters.
Myramet.—393707·9 inches—10,000 meters.

On the other hand the decrease of the meter is thus expressed:

Metet.—3·937 inches—·1 of a meter.
Metun.—·3937 of an inch—·01 of a meter.
Metmill.—·03937 of an inch—·001 of a meter.

In the same manner the prefixes and suffixes would be added to the unit of weight and, commencing with the highest, the following would embrace the whole series, the gram being equal to 15·44 troy ounces:—

Myragram—10,000 grams.
Kilogram—1000 grams.
Hectogram—100 grams.
Decagram—10 grams.
Gramet—·1 gram.
Gramun—·01.
Gramill—·001.

In the same manner the additions are made to lit. the contraction of one liter—·22009687 of an English gallon—a little less than a quart—myralit., kilolit., hectolit., decalit., liter, *lilet.*, litun, litmill.

The Chair believed it was of the highest importance to settle the question of names before we adopt the system, and to do it in such a way as to save as much time and trouble as possible to those who are to follow us.

SPECIAL NOTICES.

Asahel G. Batchelder, of Lowell, Mass., and Geo. O. Way, of Claremont, Minn., administrator of the estate of Lafayette F. Thompson, deceased, have petitioned for the extension of a patent granted to Henry Tanner, assignee of the said Batchelder and Thompson, on the 6th day of July, 1852, for an improvement in railroad car brakes.

Parties wishing to oppose the above extension must appear and show cause on the 2nd day of July next, at 12 o'clock, M., when the petition will be heard.

Co-operative Molders.

Some molders of Troy, N. Y., have organized a Co-operative Association, and have purchased thirty-six lots in the vicinity of J. B. Carr & Co.'s chain works, upon which they intend to erect a furnace and undertake business for themselves. These lots were purchased for the sum of $5,800, and are well located and adapted to the purpose indicated. The capital stock is fixed at $100,000—subscriptions limited to $5,000. We understand that about $40,000 have already been taken, and that the projectors feel confident of raising the balance without difficulty. Indeed, so determined are they and so confident of success, that the engine and cupola have been put under contract, and Mr. Hyde's patterns for the improved gas burner purchased by the Association. It is designed to begin work upon the building immediately, and to have the whole ready for operation by the middle of May or the first of June. The result will be watched with interest by the community in general.—*Exchange.*

An association of American riflemen is to meet a Chicago on June 13th.

AMERICAN ENTERPRISE IN CHINA.

From a recent number of the *Friend of China*, a journal in the English language at Shanghai, just received, we clip the following:—

"We wish now to draw attention to the establishment known as the Kiangaan Machine Shop, Hongqua, to which on several occasions we have made reference. As our local readers know, the site of this establishment was formerly Messrs. T. Hunt & Co.'s, then, as now, under the superintendence of Mr. Thomas A. Falls, an American engineer of some eminence in his profession. Since the establishment has changed proprietors, although only monthly tenants, the Chinese, on Mr. Falls' suggestions, have made several valuable additions and improvements on the property; one of them being a furnace of greater capacity for castings than any east of the cape, we are told. But it is to the work done on the premises to which we would draw attention. We see there, in profusion, howitzers in iron and brass, light and heavy, of exquisite finish; shell of all sizes; the place around being resonant with the roar of a steam polisher of balls as they emerge from the foundery; fusees completed, from the sheet of brown paper and paste, up; muskets in all stages of manufacture, from the small screws which secure the springs of the percussion locks, to the barrels rolled and welded as they come from the furnace; boring machines and lathes of every size, for the mortar or the pistol; immense drops for punching, cupolas for melting the crude ore, ovens for baking, draughtsmen, molders, blacksmiths, boiler makers, copper smiths; in a word, a native arsenal as ponderous and compact as the best of those we see at home.

"Assuring to peace lovers, indeed, is an inspection of this splendid foundation. Would that this peace-securing missionary institution, as we term it, had for its supporters men of better deservings; would that all this peace securing was in aid of a Government bent on enlightening, not on enthralling its subjects, both mind and body!

"The number of artisans employed by Mr. Falls, on an expenditure for salaries of some $5,000 a month, is over three hundred, fifteen of whom are Americans or Europeans; Mr. Stevenson has charge of the draughting department, Mr. McIlwrath the heavier engineering. Among some pieces prepared for shipment by the *Confucius* for transport last week to Nanking, and thence for the various war fields over the country, were some beautiful three-pounder howitzers, weighing, mounted on iron carriages, the insignificant total of five hundred pounds; twelve-pounder howitzers, similarly mounted, five hundred and twenty pounds; while there were heavy howitzers for ship board, or shore use, of over nine hundred pounds weight; one sixty-eight-pounder howitzer, of cast iron, being just ready for placing in the lathe. The wheels of the carriages seem to be particularly well made, dished as only adepts in that branch of mechanics know how to speach their stocks for whole tires on breech felloes, and it but wants Collinge's patent axletrees to make them equal to the exposition of a Long Acre coach factory.

"A week or so ago there was a trial of some of the guns at Woosung, all proving in a most satisfactory manner. A Parrott gun, in particular, was highly delighted in by the Mandarins inspecting by order of the Taoutai. The distances being calculated for 500 and for 700 yards, the fusees for those distances burnt with excellent precision; the bullets, with which the shells were filled spreading on over distances as far again. Among the three hundred artisans are men from various provinces, the best, however, being Cantonese. As many as thirty are educated youth from Peking. Though now begrimmed with the soot of the forge, or the dust of the laboratory, they are 'swells at home.' Two of them, under Mr. Stevenson's tuition, promise well as draughtsmen; and if the Manchous could only secure themselves from the intrigue of native haters, their tenure of the Chinese throne, relying on such establishments as now described, might be considered safe for another century. Time will show, however, whether these arsenals under foreign management are not the weapons to effect the usurpers' expulsion."

Thomas A. Falls, mentioned in the above article, was formerly connected with the Novelty Works, and Thomas F. Stevenson was formerly of the Neptune Works, of this city.

The Industrial Application of Oxygen.

When illuminating gas was first introduced, it was compressed in strong vessels, just as soda water is at the present day, and delivered to customers in their dwellings. Very few persons had the temerity to suppose that it would ever be conducted through the city in large mains, and be passed into every house through connecting pipes.

"We now hear," says the *Evening Post*, "of the organization of companies in France for supplying oxygen gas in portable receivers, the gas to be used for purposes of light and heat. We may some day have oxygen pipes carried along by the side of the illuminating gas ready for the various applications to which it is adapted.

"The only obstacle hitherto has been the expense. There are many substances which yield oxygen in abundance, but they are all too dear. M. Archereau has proposed the reaction of silica upon the sulphate of lime as a source of oxygen. When these substances are heated to a proper temperature, silicate of lime and two gases—sulphurous acid and oxygen—result. The former is used for the manufacture of sulphuric acid, and the latter it is proposed to compress into cylinders and sell by the cubic foot. The materials here used are very cheap, and the heat required to fuse them will be obtained from a mixture of common gas and oxygen. The silicate of lime could be used in the manufacture of glass.

"The company which has been organized in Paris to make a trial of this process, asserts that it can furnish oxygen at the rate of two cents per cubic foot; whereas, by the old methods, where the gas has been employed in the Drummond light, the oxygen has cost nearly a dollar per foot. By directing a jet of oxygen through an ordinary gas burner, the illuminating power of the gas is greatly increased, and a saving of from forty to fifty per cent effected. The introduction of the oxygen into the flame has also important consequences to health. It will destroy all the noxious gases which have escaped the purifiers, and only water and carbonic acid will result from the combustion. The amount of these latter will be less than usual, for the reason that greater illuminating effect is produced by the employment of a smaller quantity of gas.

"By the combustion of illuminating gas and oxygen nearly the same heat is obtained as in the oxy-hydrogen blow-pipe. All metals can be fused by this means if placed in suitable crucibles; and the cost of large furnaces and expensive fuel will be saved in numerous industries."

Effect of a Strike.

We cut the following from the New York *World*:—

"Strikes sometimes have a solution not looked for by either the employer or the employee. We have a recent example. The masons and plasterers have recently struck for higher wages and shorter hours, demanding, at the same time, some regulations respecting the manner of conducting the trade. The builders were obliged to yield, but limited their new contracts as much as possible. The result is a great decline in the price of building materials. Brick is three dollars per thousand lower. Lath has declined from six dollars to four dollars per thousand, and lime has declined from two dollars to a dollar and twenty-five cents per barrel.

"Thus, instead of exacting anything from those for whom building is done, or diminishing the profits of the builder (who has probably got an advance on his contract by pleading the strike), the party injured is the poorly-paid class, who go into the woods and get out lumber, who make brick, or who burn lime. The practical result of the strike of the masons has been as if they and the carpenters were each receiving three dollars per day, the masons, by demanding and receiving four dollars per day. We have another illustration. The molders about Troy have been standing out on a strike recently, during which pig iron declined seven dollars per tun, and coal two dollars per tun, the result of which will be, that the miners will ultimately be compelled to accept lower wages. Beyond a certain cost, the building of houses and the construction of machinery is checked; when the utmost cost is reached, the strike of one class of operatives works injury only to another class."

A Sulphur Well.

We have mentioned several times, says the Terre Haute *Express*, the progress of boring an oil well at Lodi, on the Wabash, some forty miles north of this city. A few days since the auger broke through the roof of a cavity. The auger was taken out, when the gas began to come up in considerable quantities, pushing the salt water before it, causing it to flow over the conductor. After the salt water was driven out, sulphur water continued to flow in a small stream. The well was sunk four feet deeper, which opened new cavities, and the water increased to ten gallons a minute, and it is now flowing five hundred barrels a day of white sulphur! The water as it flows from the conductor is white; after standing awhile, it deposits a white sediment and becomes clear. On being agitated it boils and emits gas. In mineral ingredients, disagreeable smell, and specific gravity, it is said to exceed the Lafayette Artesian—especially the sulphurous odor—and it is claimed it will rank with the most famous medical waters of the world.

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In connection with the publication of the SCIENTIFIC AMERICAN have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *twenty years*. Statistics show that nearly ONE-HALF of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after so many years' experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office.

Judge Mason, formerly Commissioner of Patents, says, in a letter addressed to us:—"In all your intercourse with the office, I always observed a marked degree of promptness, *skill*, and fidelity to the interests of your clients."

Ex-Commissioner Holt says:—"Your business was *very large*, and you sustained and justly deserved the reputation of *marked ability* and *uncompromising fidelity* to the interests of your clients."

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EXAMINATIONS.—If an inventor wishes our opinion in regard to its probable novelty of his invention, he has only to send us a pencil or pen-and-ink sketch of it, together with a description of its operation. For an opinion, without examination at the Patent Office, we make no charge, but if a

PRELIMINARY EXAMINATION AT THE PATENT OFFICE

is desired, we charge the small fee of $5. This examination involves a personal search at the Patent Office of all models belonging to the class, and will generally determine the question of novelty in advance of an application for a patent. Up to this time we have conducted over ELEVEN THOUSAND Preliminary Examinations, thus showing a more intimate knowledge of inventions at the Patent Office than can be possessed by any other person or firm.

If an inventor decides to apply for a patent, he should proceed at once to send us by express, charges prepaid, a model not over one foot in size, and substantially made. He should also attach his name and residence to the model.

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On filing each Caveat	$10
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On application for Reissue	$30
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On granting the Extension	$50
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FOR THE WEEK ENDING APRIL 24, 1866.

Reported Officially for the Scientific American

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

54,085.—Car Truck.—C. F. Allen, Aurora, Ill:

First, I claim the employment of metal boxes, b b, between the ends of the transverse beams, A A, of the truck, said boxes being so constructed and applied that they form metallic bearings or abutments for the metallic blocks, C C, and the lower strap or brace, D, substantially as described.

Second, The combination of the straps, D D D2, the posts, c c, the pillow blocks, C C, and the box, b, the wooden cross beams, A A, the whole being bolted together, substantially as described.

Third, The construction and arrangement of the plates, x x z z, blocks, p p and straps, n n, in combination with the beams, A A B, substantially as and for the purpose described.

54,086.—Railway Frog.—E. G. Allen, Boston, Mass.:

First, I claim a railroad frog made elastic by the combination of the curved plate, A, and elastic substance c, with the frog plate, C, substantially as and for the purpose specified.

Second, The combination of the independent elastic chair, M, with the frog plate, C, also made elastic, substantially as and for the purpose described.

54,087.—Weeding Hoe.—George P. Allen, Woodbury, Conn.:

First, I claim the cutter blade, A, constructed substantially as described.

Second, The pins, b, in the cutters, A, which with the uprights, B, give to the implement the advantages of a common rake.

Third, The combination of the cutter blade, A, pins, b, uprights, B, as described, and handle, c, arranged and operating in the manner and for the purpose herein specified.

54,088.—Machine for Preparing Peat.—Edward H. Ashcroft, Lynn, Mass.:

I claim the mode substantially as above described of treating or preparing peat the same consisting in breaking it up, and discharging water from it by one or more centrifugal machines or the same and a set of squeeze rollers and subsequently passing it through a drying apparatus, and form these into and through a compressing apparatus, whereby it may be compressed into such shape or shapes as may be required.

I also claim the combination of the feed rollers, one or more centrifugal machines, as described, a set of squeeze rollers, and a drying apparatus, the whole being to operate substantially as and for the purpose specified.

I also claim the combination of the feed rollers one or more centrifugal machines as described, a set of squeeze rollers, a drying apparatus, and a compressing mechanism or apparatus, the whole being substantially as and for the purpose hereinbefore specified.

I also claim the compressing apparatus made substantially in manner and so as to operate as described.

I also claim the drying apparatus as made, substantially in the manner and so as to operate as described.

I also claim the centrifugal machine composed of the toothed cylinder, or its equivalent, and the foraminous case arranged and applied together, substantially in the manner and so as to operate as specified.

I also claim the use of perforated tubes, P, in drying cylinder, O, to assist in absorption of moisture of peat in said tubes by temperature of surrounding steam.

54,089.—Gang Plow.—C. Atwood, Lebanon, Ill.:

First, I claim forming the forward connection between the beams of the frame A2, of a metal plate, C, having slots, a', in it for the passage of the attaching devices, a, and a2, so that the machine may be readily adjusted to any width.

Second, The adjustable tie or brace rods, D, or their equivalents, when used as and for the purpose set forth.

Third, The combination of the shaft, E, levers E' and E2, hook rod, F, and cross bar, G, or their equivalent devices, with the plow beams of gang plows, for the purpose herein set forth.

Fourth, The combination of the strap piece, c, and set screw, c', with the beam H, and with the braces, H3, as and for the purpose set forth.

54,090. Cut-off Valves.—George H. Babcock and Stephen Wilcox, Jr, Providence, R. I.:

First, we claim an auxiliary piston and cylinder to operate the cut-off of a steam engine, to which auxiliary cylinder the admission of steam can be regulated in point of time to correspond with any desired point in the stroke of the piston in the main cylinder, substantially as described.

Second, Combining with the main valve or valves an auxiliary piston and cylinder to operate the cut-off when arranged to travel with the valve, but to work independently of it, substantially as described.

Third, The intermediate toothed pinion, k', or its equivalent, connecting the valve gear which controls the cut-off with the moving member of the engine which actuates such valve gear when the same is arranged to alter the relation of such valve gear to its moving force without breaking the connection between the two, substantially as herein described.

Fourth, The combination substantially as described of a regulator with a cut off valve gear of the character, and possessing the qualities herein specified.

Fifth, The combination of the contracted orifice, o, Fig. 5, with a pocket, b, formed by the part of the auxiliary valve, E, substantially as described for the purpose specified.

54,091.—Beer Faucet.—Johann Conrad Baer, Cincinnati, Ohio:

I claim the arrangement of body, A, plug chamber, B, plug, C, frothing chamber, D, plunger, E e e', and rods, G G', substantially as and for the purposes set forth.

54,092.—Churn.—Thomas K. Bailey, Lockport, N. Y.:

I claim an improved churn dasher, constructed and arranged substantially as herein described and for the purposes set forth.

[This invention consists in the peculiar formation of the dasher; to the lower end of the dasher handle is firmly attached a piston head a little smaller than the interior diameter of the churn. A little above the piston head, is a ring small enough to play freely within the churn. Immediately below the piston head is another ring suspended from the upper ring by vertical rods. As the dasher descends the lower ring is pushed down by the piston head forcing the cream to pass into the upper part of the churn around the edge of said lower ring; but as the dasher ascends, a space is left between the piston head and the lower ring through which the cream passes freely to the lower part of the churn.]

54,093.—Process for Recovering Waste Alkali.—Hayden M. Baker (assignor to self, Albert M. Hastings, and Alexander McLean), Rochester, N. Y.:

I claim the recovery of the alkali (used in the preparation of paper stock), in its caustic state, by transmitted caloric, and the utilization of the vegetable matter upon the principles of destructive distillation, thereby forming useful products, such as are usual in the destructive distillation of wood and coal, in the manner herein described and set forth, or any other process, substantially the same, which produces the same intended results or effects herein described.

54,094.—Stocking Heel Protector.—Sarah J. Baker, Chicago, Ill.:

I claim a stocking heel protector, constructed substantially as herein described, and for the purposes specified.

54,095.—Plow.—L. M. Bates, Newark, Ohio:

I claim the detachable point, c, attached and secured to the plowshare by a shank, having a dovetail section, substantially as and for the purpose specified.

54,096.—Screw Tap.—Benjamin F. Bee, Harwick, Mass.:

I claim, as an improved article of manufacture, the screw tap, made as herein shown and described, substantially in the manner and for the purpose set forth.

54,097.—Medicine for the cure of Consumption, etc.—Thomas Bell, New York City:

I claim the syrup composed of althæa officinalis, alcoholic spirit, and sugar, in the proportions, and so as to form a permanent compound, having the properties herein set forth.

54,098.—Cough Sirup.—Cyrus Benedict, Jr., Omro, Wis.:

I claim the compounding and medicating the herein described article into a cough sirup.

54,099.—Cultivator.—Theopilus F. Bertrand and Peter James, Rockford, Ill.:

First, We claim the combination of the plows, draft rods, and elbow levers, O, with the frame and driver's seat, when constructed, arranged, and operating as described.

Second, The combination of the standard, braces, eye-bolt, and grooved block, when constructed and arranged as described, to vary the angle of the plow to the crop, as set forth.

Third, The combination of the standard eye-bolt j, loop, m, and draft rod, M, constructed and arranged as described, to secure center draft when plowing at an angle to the crop.

54,100.—Breech-loading Fire-arm.—Charles E. Billings, Windsor, Vermont:

I claim the combination of the brace or bolt, a, and spring, b, with the frame and hammer of the arm when arranged and operating in the manner and for the purpose herein set forth.

54,101.—Machinery for Stamping Chain Links.—Peter S. Bishop, Attleborough, Mass.:

First, I claim combining the carrier, F, constructed substantially as described, with the yielding holder plate, J, provided with a projection, d', or the equivalent thereof, substantially as described, for the purpose specified.

Second, Combining such carrier, F, and yielding holder plate, J, with a die and former, a b, for the purpose of transferring the blanks, one by one to the latter, substantially as herein described.

Third, Combining with the hooked finger, L, a spring-seated die, b, substantially as described, for the purpose specified.

54,102.—Heating Stoves.—Lewis Bridge and G. W. Ruby, York, Penn.:

First, We claim the arrangement above shown, of the fire chambers, A A, separated from each other by a central air channel, K, through which pass connecting flues B B, each chamber having direct escape flues, G G and a common flue, H, when the direct flues are closed, substantially as described.

Second, We also claim the combination of the fire chambers, A A, the air channel, K C C air space, D, and the drum E, containing a flue space, E', divided by partitions, L, substantially as described.

[This improvement relates to stoves for heating purposes, and is adapted for all kinds of fuel. It embraces an air passage extending from the under surface of the base of the stove up through the middle of the stove, so as to divide the fire space into two independent chambers, which are connected by flues that cross such central air space. Also, an air tube extending from the under surface of the base of the stove upwards, through it, near each extremity of its longer axis. Also, a horizontal air space immediately above the fire chambers, with which space the said air passages communicate. Also, a drum, in shape like a flattened ring, surmounting the fire chambers, and communicating with them by suitable flues, which extend through the horizontal air space.]

54,103.—Wool Presser.—Henry H. Brown, Washington county, Pa.:

I claim the mortised clamping front leaf and spring latch in combination with the folding side and end leaves, substantially in the manner and for the purpose set forth.

54,104.—Broom Head.—John Buchanan, Aurora, Ind.:

I claim the combination of the cap or ring, A, arms, B B, shank, S, stem, E, the plate, G, with its hooks, b, and cord, b, or its equivalent, substantially as and for the purpose specified.

I also claim the loops, D D, in combination with the cap or ring, A, and plate, G, with its hooks, b, constructed and operating substantially as and for the purpose specified.

54,105.—Milk and Cream Refrigerator.—Jos. Buchnall and J. T. Johnson, Kalamazoo, Mich.

We claim the combination of the trough A, pan, B, perforated pipe, D, and nuts, F, whose holes register therewith, and operating in the manner and for the purpose herein specified.

[This invention consists of a water trough and milkpan combined with each other, in such a way as to leave a space or water chamber between them, both pan and trough being provided with stop cocks, or their equivalent, by means of which the milk and water may be drawn from their receptacles, and replaced, each independently of the other.]

54,106.—Flour Sifter.—Charles Burnham, Philadelphia, Pa.:

I claim the combined flour sifter, scoop, and measurer, constructed in the manner as herein described and shown, to wit: with a rectangular box, grooved or ribbed horizontally, internally; with a concave sieve within said box, above the lower edge of the box; with a handle on one side of the box, and with a combined stirrer and scraper within the box, above the sieve; said stirrer and scraper being formed with rubber strips and wire brushes set tangentially, all in the manner set forth.

54,107.—Wave Power Propulsion.—Charles W. Cahoon, Portland, Maine:

I claim connecting two vessels together by means of a lever or its equivalent, so that the motion of the waves of the sea may cause the lever to act upon machinery, and thereby propel the vessel through the sea.

I also claim for the purpose, the machinery, or its equivalent, substantially as described.

I also claim the shaft, R in combination with the lever, C, or equivalents, for regulating the speed of the vessels, substantially as described.

I also claim the levers, b b, in combination with the rachet rods, E E, or equivalents, for disconnecting the wave motor, substantially as described.

I also claim the combination of a steam engine, or its equivalent, with a wave motor, substantially as represented.

54,108.—Machine-made Knitted Mitten.—Augustus C. Cary, Malden, Mass.:

I claim, as a new article of manufacture, a machine knit mitten, the thumb of which is first commenced at its tip, and knit up to where it is to be joined to the body of the mitten, and there stopped until the body is knit up and joined to said thumb portion, and then both united and knit on in a cylindrical form to the wrist, by means of needles and a thread automatically operated by a jacquard pattern, substantially as described.

54,109.—Machine-made Knitted Stocking.—Augustus C. Cary, Malden, Mass.:

I claim, as a new article of manufacture, a machine-made stocking, the heel of which is knit, turned, or formed, by a jacquard connected with the knitting machine and composed of a series of short rows or gussets, alternating with one or more continuous rounds or rings of knit work, substantially as herein described and represented.

54,110.—Stereotype Block.—Ariel Case, New Haven, Conn.

I claim a stereotype block of quadrats, and inserting therein blocks, B and F, or their equivalents, substantially in the manner and for the purpose herein set forth.

54,111.—Children's Carriage.—Andrew Christian, New York City:

I claim the improvement in that class of children's carriages known as "perambulators," herein described, the same consisting in supporting the front end of such carriage upon two in lieu of one wheel, substantially as and for the purpose herein specified.

54,112.—Shaft for Drilling.—James H. Clapham, New York City:

I claim the tubular rod for well drills or pumps, formed with polygonal depressions for the reception of the clamps or wrenches, as specified.

54,113.—Bolt Fastening for Boiler Head.—Edward Clark, New York City:

I claim the method of securing together boiler and other plates by the employment of conical head bolts in combination with tubes or thimbles, substantially as described.

The conical head screw bolt, A, in combination with split tube, D, substantially as described.

54,114.—Burner for Gas Stove.—I. R. Clark, New York City, and S. T. Savage, Albany, N. Y.:

We claim the inverted conical-shaped tube A, perforated upon its side at its upper portion, and capped or closed with a deflector plate, C, in combination with the cylindrical box, D, surrounding its perforated portion, and resting upon a flange F, provided with apertures or openings, G, when arranged and applied together, substantially as and for the purpose described.

54,115.—Hair Curling Fluid.—Richard Clark, Chicago, Ill.:

I claim the employment of the extract or tincture, or other decoction of boxwood, substantially as specified and for the purposes set forth.

54,116.—Imitation of Braided Human Hair.—Sarah E. Cook, Philadelphia, Penn.:

I claim a fabric woven at its edges and twisted spirally, in the manner described, so as to produce an imitation of braided human hair.

54,117.—Fruit Jar.—William F. Corpe, Windsor Locks, Conn.:

First, I claim the cover with circular groove and plunger, p, and bead, m, when constructed and used for the purpose set forth.

Second, I claim the shoulder, c, lip, d, recessed cover, f, projection, h beads, m n, and inclosing band, g, in combination, when constructed, arranged, and employed as and for the purposes herein specified.

54,118.—Solar Mirror for Photographic purposes.—Wm. Crane and Warren H. Pease, Goshen, Ind.:

We claim, First, The apparatus, herein described, for directing a line of light from sunrise to sun set, whatever the altitude of the sun may be, made and applied substantially as and for the purpose above set forth.

Second, We also claim retarding the speed of the movements of the rock shaft, O, by means of the traveling nut, V, and its pin, X, substantially as herein shown.

54,119.—Device for Tightening Wire Fence.—Peter S. Crawford, Union, Ill.:

I claim the arrangement and combination of the lever, A, hook, D, with drum, B, and rims, E, when constructed and operated as set forth, and for the purpose described.

54,120.—Compressed Rod Solder.—Lewis and Robert Crooke, New York City:

We claim the compressed rod solder hereinbefore described, consisting of lead and tin combined by fusion, and subsequent expression through a die, the same being a new manufacture.

54,121.—Machine for the Manufacture of Rod Solder.—Lewis and Robert Crooke, New York City:

We claim the hydraulic pressure solder machine composed of the hydraulic cylinder and ram, the solder cylinder and piston and the die, perforated with numerous holes of the form and size of the rods to be produced, all combined and operating, substantially as set forth.

Also the combination of the solder cylinder, piston, and die, perforated with numerous holes, as aforesaid, with a pipe to supply water to cool the solder cylinder, substantially as set forth.

54,122.—Cultivator.—H. W. Curtis, Worcester, Mass.:

I claim the wings, E E, connected at the rear of the plowshare, D, by means of joints, in combination with the segment racks, G G, and the pinion H for adjusting the wings, E E, all arranged to operate in the manner, substantially as and for the purpose herein set forth.

54,123.—Water Wheel.—Dwight Cushman, Hartford, Conn.:

I claim a water wheel consisting of a series of buckets, B, having their faces standing at an obtuse angle from the hub, and having their outer edges forming a vertical line, or nearly so, as shown by the line extending from e to e, of figure 4, arranged and operating in combination with the hub, A, as herein shown and described.

54,124.—Track Clearer of Mowing Machine.—John M. Davis, St. Louis, Mo.:

I claim the curved mold-board shaped blade, a, provided with the adjustable rod, D', when said blade is constructed as described, and is applied to the shoe, B, and finger bar, A, in the manner and for the purpose herein specified.

54,125.—Car Truck.—Walter Dawson, Pottsville, Pa:

I claim the bearings A4 and B4 or their equivalents, arranged relatively to the truck, and to the load substantially in the manner and for the purpose herein set forth.

54,126.—Revolving Grain Feeder.—M. Decamp, South Bend, Ind.:

I claim the roller, d, provided with spirally-arranged scrapers, f f f, in combination with inclined sides, b, and opening e the several parts being arranged and operating as and for the purpose specified.

54,127.—Marking Stock.—George W. Devin, Ottumwa, Iowa:

I claim the rivet, a, provided with a head and shoulder, as described, when used with the label or plate, A, for the purpose of marking stock, substantially as described.

54,128.—Water Wheel.—Matthias Devoe, Marysville, Kansas.:

The endless chain of plates, D, provided with swinging buckets, E, and placed around polygonal rollers, B B, fitted in a suitable framing, A, all arranged to operate substantially in the manner as and for the purpose therein set forth.

54,129.—Steam Valve.—Thomas B. Dexter, Lynn, Mass.:

I claim the shell, A, provided with the openings and plugs m, for the purpose of introducing material and enabling the valve to be ground to its seat without removing the hub, D, or other parts, as set forth.

54,130.—Lever Power of Windlasses, Etc.—Perry Dickson, Jersey City, N. Y.:

I claim the connecting of the dogs, D, of the pulley, C, to the lever, H through the medium of slides, G G, arranged as shown, or in any equivalent way, so as to admit of the slides being adjusted on the lever at a greater or less distance apart, in order to vary the speed and power of the device, substantially as and for the purpose specified.

[This invention relates to an application of lever power, for operating windlasses and turning shafting, and has for its object, the vari-

ing of the lever power so that speed may be obtained and power sacrificed, when the power and not the latter is required, and power obtained and speed sacrificed when power is required. The invention is applicable to various purposes; ordinary windlasses, hoisting machines, ship windlasses, hand cars for railroads, etc.]

54,131.—Machine for Cutting Shoe Soles.—James Downing, Philadelphia, Pa.:

I claim a machine for cutting shoe soles, constructed and operated substantially as herein described and for the purpose set forth.

54,132.—Apparatus for Carburetting Air.—Oliver P. Drake, Boston, Mass.:

I claim as my invention the combination, as well as the arrangement, of one or more vapor gers. B' B, their induction and eduction pipes o u, and a system of pipes, t x y z, and stop cocks so arranged as to enable the air to be driven either through the whole of vaporizer or vapotizers, or a portion or portions thereof.

I also claim the improved air forcing apparatus composed of the drum, A, and the series of flexible sheets, k, as explained, and having mechanism substantially as described, for operating them by means of a cranked shaft, such mechanism being the annulus, o, applied to the crank, p, and the series of rods, n n, connecting such annulus with the movable plates, m m, of the several bellows.

I also claim the improved flexible top ærometer, E, having the cap, w, and guide, x, combined and arranged with its disk, v, and flexible top, w, as specified.

I also claim the combination as well as the arrangement of the air forcing apparatus the annular channel, g, and the ærometer, E.

I also claim the combination as well as the arrangement of the chamber, F, the annular channel, g, the air forcing apparatus, and the ærometer.

I also claim the automatic combination arranged in the chamber, F, and for operating the lever valve, h', the same, o' p', applied to the shaft, D.

I also claim the combination of the weight, d', rod, e', shaft, b, arm a', annulus, y, and spring, z or the equivalent thereof, with the ærometer, E, constructed substantially as described.

I also claim the arrangement of the supply tank, C, and its communicating pipe, F, with the vaporizer, B.

I also claim the combination of the air pipe, d, with the air forcing apparatus or its pipe, e, and the supplying tank, c, arranged and connected with the vaporizer as set forth.

54,133.—Machine for Raking and Loading Hay.—William A. Duncan, Syracuse, N. Y.:

First, I claim the arrangement of the folding gathering boards, H, bars G, and elastic teeth, I, in combination with the frame, A, all constructed and operating in the manner and for the purpose herein specified.

Second, The loaded tooth, H, one or more, fitted between rollers, g, in the rear cross-bar of the frame, A, substantially as and for the purpose specified.

Third, The adjustable board or plate, l*, placed in the rear of frame, A, in connection with the cylinder, D, provided with rakes, substantially as and for the purpose set forth.

Fourth, The arrangement of the sliding fork bars, E, cylinder, D, and cams, F, constructed and operating in the manner substantially as described.

Fifth, The ribs, m, attached to the inner side of the rear cross-bar of the machine, substantially as and for the purposes set forth.

Sixth, The combination of the cylinder, D, provided with sliding rakes, the elevators, adjustable tooth or teeth, and gathering board provided with elastic teeth, all arranged to operate substantially as and for the purpose herein set forth.

54,134.—Egg Beater.—Timothy Earle (Valley Falls), Smithfield, R. I.:

I claim the combination of the spindle, B, with its beaters, a a a, the pinions, D D', and the toothed sector, C, the same being arranged to operate together as described, for the purposes specified.

54,135.—Watch.—S. D. Engle, Hazleton, Pa.:

First, I claim the combination of the studs, c, and ring, B, arranged with the body, H, recess, d, and notches, f, constructed and operating in the manner and for the purpose herein described.

Second, I claim the cup, h, with its flange, h2, and washer, i, arranged with the key hole, g, in the manner and for the purpose herein described.

[The object of this invention, is to more perfectly exclude dust and dirt from the working parts or movements of the watch and it consists in providing (for the movement of the watch) a separate and independent box or case, from the ordinary watch case in which box the movement is secured in the usual manner now practised for fastening it in the watch case; and then the said box fastened in the watch case, in any proper manner to allow it to be easily and readily removed therefrom, when so desired.]

54,136.—Manufacture of Watch Rims.—Charles H. Field, Providence, R. I.:

I claim the means substantially as herein described, for producing a watch rim from a single piece of metal, as set forth.

54,137.—Manufacture of Watch Backs.—Charles H. Field, Providence, R. I.:

I claim the means substantially as herein described for producing a watch back with the bezel on it, at one operation, as set forth.

54,138.—Sheep Rack.—M. Foreacre, New Harrisburgh, Ohio:

First, I claim the above described combination of hay rack and grain trough, the whole being constructed substantially as set forth.

Second, I claim making the upper part of the front of the hay rack of the board, A, in combination with short rounds, F, for the purpose of preventing the hay seed from falling into the wool of the sheep, substantially as specified.

54,139.—Combined Seeder and Cultivator.—J. L. Fountain, New Milford, Ill.:

First, I claim the arrangement of hanging the cultivator to the hounds, c at, Q, and by links, p, the levers, s r, in combination with the hounds, axle and cultivator frame, as and for the purposes set forth.

Second, I claim the adjustable arms, D, cross brace, F, and pieces, E E, for extending and contracting the frame, in combination with the seeding apparatus, lever, L, and seat, O, arranged as and for the purpose described.

54,140.—Settee and Table.—Elijah Fowler, New York City:

First, I claim the attaching of the table, C, to the settee, by means of the slots, c c', made in the sides of the cleats, b b, in connection with the pins, d d', attached to the side pins, A A', of the settee, all arranged substantially as shown and described.

Second, The skirt board, D, provided with the adjustable leg, E and applied to the settee and table, in the manner substantially as herein shown and described.

[This invention relates to a new and improved table of that class which is frequently termed "kitchen tables," as they are more especially designed for kitchen use. The invention consists in a novel and improved manner of attaching the table to the settee; and also, in the application of a skirt board, all constructed and arranged to form a very desirable article of the class specified.]

54,141.—Tree Protector.—George Frost, Cambridge, Mass.:

I claim the arrangement of the ring, A, and the two tubes, B C, when combined with the suspensory guard, D, the two tubes under such an arrangement being made to project both above and below the ring as explained.

I also claim the arrangement of the suspensory guard, d, with respect to the upper edge of the inner tube, c, of the trough, a, viz.; below the said edge, and so that there may be an annular channel between the guard and the tube, as represented.

54,142.—Adjustable Back Straps for Vests. Rodmon Gibbon, San Francisco, Cal.:

I claim as a new article of manufacture, the arrangement with the right and left straps, or tags, of a vest, pantaloons, or other garment, which said straps or tags, have no other fastening attached, of an elastic strap having a buckle at each end, and being thus adjustable and detachable, all substantially as described.

54,143.—Attachment for Upholstery Springs.—William H. Goodale, Colton, N. Y.:

I claim the securing of upholstery springs to their slats, by means of strips, C, of metal, applied in the manner substantially as shown and described.

54,144.—Mode of Boring Artesian Wells.—Alexander Hamar, New York City:

First, I claim the combination with the drill stock of the hinged, expanding cutters, when constructed, arranged and operated, substantially as described.

Second, The combination of the guide rod and cone, with the drill stock and expanding cutters, substantially as and for the purpose described.

Third, Expanding cutters having free play on their bearings to relieve their pivots from all strain of the concussion, and so formed as to be expended by the contact of the drill head.

54,145. Waxed-thread Sewing Machines.—Thomas J. Halligan, New York City:

First, I claim the construction and arrangement of the upper waxing, smoothing and thread-controlling apparatus, as described, in combination with the heater, substantially as set forth.

Second, The combination of the spool, B4, vibrating take-up bar, B, and a wax cup, C, when these parts are arranged on the bracket, A', as described.

Third, The construction and arrangement of the wax cup, c, rollers, c3 c4, depressed bar, c5, and smoothing pads, c' c', in the manner and for the purpose described.

Fourth, Applying the bar, C5, to a crank arm, which is furnished with a spring catch-arm, c3, in such manner that it can be conveniently released and adjusted upward, and also again moved down to its position and fastened, C, substantially as described.

Fifth, The metallic tubular spool, B4, which is supported upon tubular bearings in such a manner that heated air can be conducted through the spool for softening and keeping the waxed thread upon it, substantially as described.

Sixth, The chimney, E', constructed with branching tubes, B7 C8, air combination, with the hollow metallic spool, B4, and the tubular heater, D, substantially as described.

Seventh, The combination of the laterally sliding pulley, B', on the take-up bar, B, with the spool B4, when said take-up bar is arranged directly in rear of the spool, substantially as described.

Eighth, The construction and arrangement of the incline-faced smoothing pads, c c', in combination with the double cone roller, C4 substantially as and for the purpose described.

Ninth, The construction and arrangement of the metallic device, D, upon the part of the needle bar arm in combination with a heater, whereby the upper waxed thread, for an upper needle, is kept warm, and subjected to heat nearly down to the needle, and whereby, also, heat is imparted to the needle bar and needle, substantially as described.

Tenth, The combination of the re-waxing cup, F', arranged so that the needle will dip into it at every downward stroke of the needle bar, with the upper waxing cup, c, both cups being subjected to heaters, substantially as herein described.

Eleventh, The construction of the attachment, F3 e e, in combination with a lower heater, all applied so as to heat all those parts of the machine which are arranged below or beneath the table, A, exposed to wax, substantially as described.

Twelfth, The combination of the pressure pad, D2, with the vibrating take-up bar, B, substantially as described.

Thirteenth, A spring, p, made adjustable substantially as described, and applied to the table or plate, N3, thereof, in such manner as to act with an increased or its greatest tension upon the thread which is passing from the shuttle bobbin, just as the shuttle is completing its stroke, substantially as and for the purpose set forth.

Fourteenth, The combination of the inclined spring, r, lever p', and adjusting nut, p2, with a shuttle, substantially as described.

Fifteenth, The construction of a feed wheel, with a serrated steel band, P, shrunk upon it, substantially as described.

Sixteenth, The removable ground plate, f2, in combination with the clamp, g, and needle bar, A2, substantially as and for the purpose set forth.

Seventeenth, The arrangement of the elastic pressure pad, r, and its bar r2, in combination with the adjustable screw, S5, and the nut S6, substantially as and for the purpose set forth.

Eighteenth, The hooked looper, J J' constructed, arranged and operated substantially as described and for the purpose set forth.

Nineteenth, The construction of the shuttle and bobbin as represented in Figs. 5 and 6 and as herein described, for the purpose set forth.

Twentieth, The manner herein described and as represented in Figs. 6' 62, of combining the bobbin and shuttle and holding in place and applying spring pressure to the bobbin by means of a single pivoted lever spring clamp, for the purpose set forth.

54,146.—Mop Head.—George H. Hammer, Newville, Pa.:

I claim the mop head consisting of the frame, B cross bars, b and n, in combination with the spring, C, when said parts are arranged to operate as herein shown and described.

54,147.—Shot and Cartridge Pouch.—Henry Hammond, Bridgeport, Conn.:

First, I claim in combination with the pouch or holder in form of a shoulder belt as described, the mouth piece consisting of the tube, A, for discharging the cartridges and the two catch pieces, b' a c, combined therewith and with suitable moving mechanism for alternately forcing in and drawing back the pieces, b' and c, substantially in the manner and for the purpose herein set forth.

Second, The single gate, m, when used in combination with the branches, a a, and D D' of the holder for the purpose of closing one or both of these branches and stopping the discharge therefrom, as herein described.

54,148.—Method of Boring Oil Wells.—Dennis R. Harder, North Chatham, N. Y.:

First, I claim rotating the drill and drill rope continuously in one direction during the operation of drilling, by means of a suspended reciprocating cylinder having grooves in its surface which are acted upon by pins, k k, through the center of which cylinder the drill rope is passed loosely, substantially as described.

Second, Supporting and grinding a reciprocating device adapted for rotating the drill and drill rope in such a manner that this device shall receive a perpendicular movement when actuated by means of a vibrating working beam, a', substantially as described.

Third, The grooved cylinder, F, with a hole through its center and also with a hollow adjustable jack screw, F2, for receiving and holding the drill rope, all constructed substantially as described.

Fourth, The combination of rope clamps, h h, jack screw, F2, and a rotating cylinder, F, substantially as described.

Fifth, The divided cylinder, F, in combination with the divided screw, F2, substantially as described.

Sixth, Attaching the rotating device, F, to the working beam, a, in such a manner that said device, F, can be attached therefrom, and also detached from the drill rope at pleasure without lifting the drill from the well substantially as described.

Seventh, The stationary fork, l, spring pin, k k, and rotating cylinder, F, in combination with a drill rope which passes through the center of said cylinder and which is affixed thereto, substantially as described.

Eighth, The perpendicular stop post, c, in combination with the working beam, a', lifting cam, a, and the device for rotating the drill rope, e, substantially as described.

Ninth, In combination with the device for automatically rotating the drill rope, e, continually in one direction, I claim providing a means for lowering the drill as the well deepens substantially as described.

Tenth, In combination with a drilling apparatus wherein the feeding rope passes through the turning guide which is turned with an intermittent motion always in the same direction, I claim a device for preventing the rope from becoming twisted and also for supplying the rope to the drill, the said device having but a single axis of revolution, substantially as described.

Eleventh, The combination of a drill which is suspended by a rope and receives a vertical rotary motion with a device for preventing the rope from becoming twisted and also carrying the supply rope, the said device having but a single axis of revolution, substantially as described.

54,149.—Ash Sifter.—P. Harlow, Kingston, N. Y.:

I claim the arrangement of the partitions, l and p, within a barrel or cylinder sieve in combination with the delivery spout, v, of the outer casing or box, operating together, substantially in the manner described and for the purpose specified.

[This invention relates to coal and ash sifters in which a barrel or cylindrical-shaped sieve is used, and consists in a novel arrangement of a hopper therein in connection with a discharge spout, whereby the ashes, by slowly revolving the barrel sieve are caused to be entirely separated from the large particles of coal, and when entirely so sifted the coal can be automatically delivered from the sieve into a coal scuttle or other vessel.]

54,150.—Steam Engine.—Andrew Hartupee, Pittsburg, Pa.:

First, I claim the arrangement of the two cylinders, A and C, having three piston rods, E E and p', fastened to a common yoke or cross piece, K, when connected with the receiver, a, moderator, B.

Second, The combination of the valve or cock, J, pipe, I, and pipe, J, with the receiver or moderator, B, as described and for the purpose specified.

Third, The arrangement of the two cylinder heads, F and G, as specified so as to leave between them the space, H, in the manner and for the purpose specified.

54,151.—Horse Rake.—Horace R. Hawkins, Akron, Ohio:

First, I claim connecting the rake teeth with the body of the rake by a roller, E, in combination with supporting the upper ends of the teeth by means of loops or links, C, and springs, d, substantially as set forth.

Second, The combination with the upper ends, p, of the rake teeth of the links, c, springs, d and cross bar, F substantially as and for the purpose set forth.

Third, The combination with the notched bar, F, attached to the cross piece, M, of the locking bar, Q, and its spring, i, substantially as set forth.

Fourth, The combination with the foot board or treadle, N, and locking bar, Q, of the bent lever, R, arranged and operating substantially as and for the purpose set forth.

Fifth, The combination with the teeth, p, roller, E, cross bar, F, and pieces, H H, of the links, n n, clearer frame D, and fingers S, said parts being arranged and operating in the manner and for the purpose set forth.

54,152.—Car Brake.—George H. Henkel, Middletown, Ohio:

First, I claim the tumbler D, or its equivalent, in combination with the levers, C C, for operating car brakes, in the manner and substantially as described.

Second, Rods, d, and tumbler, D, provided with the friction rolls, x x, in combination with string beam, A', or its equivalent, substantially as described.

54,153. Cut-off Valve.—Joseph L. Hewes, Newark, N. J.:

First, I claim the revolving crank, A, having double or more throw than the valve is required to lift, in combination with the cut-off toe, D, and regulating toe, G, and their combination with the governor, in the manner and for the purpose substantially herein set forth.

Second, The collar, I, or its equivalent, placed in the valve chamber, in the manner and for the purpose substantially herein set forth.

54,154.—Machine for Forming Corrugated Wrought Iron.—Charles Hewett, Trenton, N. J.:

I claim the combination of the series of benders with the mold or die, substantially as described.

54,155.—Carriage Wheel.—G. G. Hickman, Coatsville, Pa.:

I claim the combination of concave faced hollow socket, A, laterally sustaining the sides of the felly with the hollow threaded cup piece, B, the elastic material, E, spoke, C, and felly, F, arranged and operating as described and represented.

54,156. Journal Box. D. H. Hickok, Morrisville, Vt.:

I claim the divided and adjustable box, D, in combination with the rollers, A, slotted bearings, C and grooved shaft, G, constructed as described and for the purpose specified.

54,157.—Distilling Petroleum.—Abram D. Higham, Jersey City, N. J.:

I claim the method substantially as above described for conducting distillations of hydro carbons that is to say, distilling the lighter portions of the charge in vacuo and heavier portions under pressure, as and for the purpose set forth.

[This invention consists in a new method of distilling hydro carbons, whereby a larger percentage of illuminating oil is obtained than by the methods heretofore known or used, the quality of residuum being diminished, and the light oils, which are commonly run off separately from the illuminating oils, being by my method made into good illuminating oil.]

54,158.—Sash Supporter and Fastener.—Warren F. Hill, Portland, Me.:

First, The combination of the bar, F, the bent lever, K B, the spring, G, and projection, L, with the plate, A, all constructed and arranged substantially as and for the purposes herein set forth.

Second, The use in conjunction with the above combination of the recess, E, for the purpose specified.

54,159.—Device for Tightening Wagon Tires.—George Hillegass, Philadelphia, Pa.:

First, I claim a device for contracting the tire of a wagon or other band, by an endless screw, F, nut, E, collar, c, and tongue, B, substantially in the manner set forth.

Second, The rib, G, on the inside of the tire, A, in combination with a device for contracting the tire, substantially as set forth.

54,160.—Cultivator. Samuel Hoffheins, Hamilton Township, Pa.:

I claim the combination of the devices for raising the shovels from the ground, and consisting of the levers, G G, foot boards, H H, and rocking seat, I, operating substantially as described and represented.

54,161.—Machine for Polishing Wood.—Ferdinand Hoffman, West Cambridge, Mass.:

I claim the combination of the movable shaft boxes, I I, the guides, m m m m, and lifting mechanism with the shaft, I, and its screw, k hub, H, and the plane stock, G, applied to a movable carriage or bed to hold and move the work to be scraped or otherwise reduced, and to operate substantially as hereinbefore explained.

54,162.—Lock.—Lewis G. Hoffman, Albany, N. Y.:

I claim the rod, C, orifice, D, and the button, E as applied to door locks substantially as described and for the purposes set forth in the above specification.

54,163.—Slide Valve.—Andrew G. Homan, Yonkers, N. Y.:

I claim the valve, f, formed with the steam ports, h and h', above and around the exhaust ports, i and i', in combination with the inlet steam port, e, and port e d k k', in the valve seat, as and for the purpose set forth.

54,164.—Sad Iron Holder.—Lewis Hover, Chicago, Ill.:

First, I claim constructing the handle, A, and shields C, of a sad iron holder in two parts, having a sliding lateral movement with respect to each other, substantially as and for the purposes specified and shown.

Second, I claim the combination and arrangement of the two parts, a a' c c', with the guides, B, constructed and operating substantially as herein set forth.

54,165.—Tire Shrinker.—James P. Howell, New York City:

First, I claim the vise, N, when supported on a pivot or its equivalent to allow it a circumferential motion in direction of the motion of the jaw, d, of the swinging arm, C, substantially as set forth.

Second, The bed plate, m, cast in one piece with the stationary arm, d, and used in combination with the swinging arm, c, for the purpose and in the manner, substantially as herein set forth and shown.

Third, The combination of the pawl R, and ratchet, a, with the lever, M, for operating and holding the movable jaw, j, of the vise, substantially as and for the purpose set forth.

54,166.—Corn Planter.—William W. Hulbard, Edinburg, Ind.:

I claim, First, The slotted levers, R R, at each end of the shaft, E, when used for operating the said shaft, with its connections, substantially as and for the purpose herein specified.

Second, The shaft, E, provided with the seed cylinders, H H, as constructed and arranged with the wire springs, F F, and rod, G, substantially as and for the purpose herein specified.

Third, The T-shaped lever, O, provided with eyes as described and used, substantially as and for the purpose set forth.

Fourth, The arrangement of the lever, O, disk, L, rod, M plate, a, and lever, N, when used substantially as and for the purpose specified.

Fifth, The wire or cord, j, provided with balls or stops when used

with the levers, R R, or their equivalents for operating the seed cylinders and regulating the distance the grain is to be dropped as is herein fully set forth.

Sixth, The seed spout, S, as constructed when used with the rods, u, said rods, u, being formed as described and connected to the seed cylinders, as and for the purpose specified.

54,167.—Elastic Webbing.—Liveras Hull, Charlestown, Mass.:

I claim as my invention, the new or improved manufacture, fabric or band as composed not only of a series of caoutchouc strands, but of a series of linen cotton or silk threads so braided on and beyond the caoutchouc strands when stretched or extended lengthwise as to form, by the contraction of the latter, frills of braiding at the opposite edges of the band, as explained.

54,168.—Collar and Neck Tie.—William Hunter, Berkeley Springs, West Virginia:

I claim, as a new article of manufacture, the collar and neck tie confinement made, substantially as herein described and for the purposes specified.

54,169.—Shifting Rail for Carriage Tops.—Shadrach Johns, Waupun, Wis.:

I claim, First, The adjustable and locking feet attached to the lower rail, constructed and operated substantially as described and for the purpose set forth

Second, The screw rod, G, in combination with rail, B', constructed and operating substantially as described and for the purpose set forth.

54,170. Knife for Removing Corn from the Cob.—John Jones, Portland, Me.:

I claim the above described knife provided with a broad adjustable gage, substantially as set forth.

54,171.—Hinge.—David C. Jordan, Sen., Brooklyn, N. Y.:

I claim the butt hinge with flange or leaves to screw upon the face and edge of the door, and upon the edge and face of the jamb, constructed as described.

54,172.—Ash Box.—James Kee and John Sloan, Philadelphia, Pa.:

We claim the raised cast iron ash or garbage box, provided with interior receptacles, as and for the purpose described

We also claim the combination of the lid, F segment, G, and spring, H, operating as and for the purpose described.

54,173.—Drying or Evaporating Device.—Washington Kendrick, New York City. Antedated April 19, 1866:

I claim the combination of the fans, B C, with the chamber, A arranged as described, that is to say, the fan, B, discharging a current of air into the chamber, A, and the exhaust fan, C, removing the air together with the vapor of evaporation

54,174.—Sad Iron.—George G. Kniffin, Long Island City, N. Y.:

I claim the dovetailed flange, c, on the standards of the handle, B, to fit into corresponding dovetailed sockets on the sad iron, in combination with a drop catch, D, all constructed and operating substantially as and for the purpose described.

[This invention relates to a removable handle for sad iron, which is provided with dovetailed flanges to fit into correspondingly dovetailed sockets on the top of the iron, in combination with a drop catch, which passes down through one of the flanges and drops automatically into a socket in the iron, as soon as the handle has arrived in the proper position, in such a manner that a handle is obtained which can be readily taken off from or attached to an iron, and which can be used for a number of irons with the greatest ease and convenience.]

54,175.—Musical Clock.—Theodore A. Kohn, New York City:

I claim the construction of two L-shaped plates marked, A, in combination with the plate, D', having the wire, K', and the manner of attaching the swinging lever marked, E, thereto as shown and described.

54,176.—Ox Yoke.—William B. Krum, Troy, Pa.:

I claim the independent action of the collar, B, and bows, C, from main yoke, A, which is produced by means of a hinge formed by D, E, which allows the bows to always remain in an easy position whether oxen are plowing or working on uneven ground, which improvement does away with the cramping and twisting produced by the old method.

54,177.—Grain Binder.—Israel Lancaster, Baltimore, Md.:

First, the sliding frame 4, acting in combination with the shaft, 7, provided with the notch, 8, and friction wheel 9, arm, 17, with the springs upon it, and the piece, 16 to which it is attached; collar, 24 with the groove, 25, and pin, 26, giving the longitudinal motion to the piece, 16, tube, 14, with the spiral thread, 2, upon it, and the block, 28, which gives the rotary motion to the tube all constructed, arranged and acting in the manner and for the purpose set forth.

Second, The application to the sliding block, h, of the irregular groove, 32, to operate the block, 28, and of the irregular piece, 41, to throw out the sliding frame, , to operate the lever, 78, which cuts the cord, and to operate the lever, 79, which releases the sheaf band, constructed in the manner and for the purpose set forth.

Third, The device for releasing the sheaf band, consisting of the lever, 79, the two bars, 48 and 55, and the arm, 80 constructed in the manner and for the purpose set forth.

Fourth, The mechanism for cutting the cord, consisting of the lever 78, the bar, 77 the arms, 76 and 74 the rod 72, and the knife, 73, constructed for the purpose and in the manner set forth

Fifth, The sliding jaw, 66, with its spiral spring 68 and the self acting device, 64 65 70, acting in combination in the manner and for the purpose set forth.

Sixth, The projection, 43, and block, 50, in combination with the levers, 51 44 60 and 61, the wheel, 62, the rods, 53 and 46, the bars, 49 and 57, and the lever, 56, all constructed in the manner and for the purpose set forth.

Seventh, The device for giving the longitudinal motion to the shaft, C, consisting of the wheel, c, with its segmental projections, t, and n, the coupling, W W and X, and the wheel, v, acting in the manner and for the purpose set forth

Eighth, The sectional gear, r, with its projection, z, the sliding rack, S, the stop 1 1, with the spring, 2, operating in combination in the manner and for the purpose set forth.

Ninth, The reciprocating bars, g g g g, constantly traveling in parallel paths without lateral motion, the connecting rods, h h h, and O O O O, the short arms, i i i, and the long arms K K K, on the vertical shafts j j j, all acting in combination in the manner and for the purpose set forth.

54,178.—Wrench.—William W. Landbeck, Rochester, N. Y.:

I claim the special construction and arrangement of the wrench, viz, with the head of the handle, A and the bearing, i of the block, D, so formed as to receive removable jaws adapted to different purposes, and with the ratchet block, s, employed in connection with the lever, B, in such a manner as to insure a strong hold upon the ratchet bar, and draw the jaws toward each other, as set forth.

54,179.—Brush.—Joseph C. Lawrence, Brooklyn, N. Y.:

I claim confining and securing bristles or other material, for brushes, in a socket by means of the expansion therein of an elastic or expansible material, substantially as described.

[This invention consists, among other things, in a novel way of holding and securing the bristles or hairs of the brush, whereby they can be at any time made more secure, and can be tightened if at any time they become loose.]

54,180.—Machine for Cutting Laths.—Charles Learned, Indianapolis, Ind.:

I claim First, The adjustable flexible guides, c, and loop, E, arranged and operated in the manner and for the purpose, substantially as set forth

Second, Operating the reciprocating rests, H, in the manner and for the purpose substantially as set forth

54,181.—Button Attachment for Apparel.—Isaac Luvine, New York City:

What I claim as my invention and desire to secure by letters patent is the combination of the elastic loops, F, F, and buttons, D D, both attached to the garment by eyelets in stay pieces, substantially as and for the purposes herein specified.

54,182.—Sealing Fruit Cans and other Vessels.—Wm. K. Leurs, Boston, Mass., and J. W. Bailey, West Brookfield, Mass.:

Hermetically sealing a vessel or vessels containing fruit or any other article of food or other substance whether in its natural state or treated by heat, or cooked or in any other proper manner prepared, while in a chamber or chambers or receivers, from which the air has been exhausted and a vacuum or partially so produced, substantially as herein described and for the purpose specified.

55,183. Submarine Torpedo.—J. McDonough, New York City.:

First, I claim the construction of a torpedo so as to be capable of elevation or depression under water at the will of the operator, by means of air, substantially as described.

Second I claim the combination with a torpedo of a water chamber, A, open at the bottom and adapted to allow the water to be expelled by air or gas when required, substantially in the manner and for the purpose set forth.

Third, I claim the shell, G G, with a water and air chamber open at the bottom a closed powder chamber near the top, and a passage extending from near the top of said water and air chamber adapted to be connected by a flexible pipe from the bottom of the shell to an outside source from which air or gas may be received, substantially in the manner and for the purpose herein set forth,

Fourth, I claim in combination with the above, coiling a quantity of flexible tube, d d, within the base of the torpedo so as to be uncoiled as the torpedo rises, substantially as and for the purpose herein set forth.

Fifth, I claim the combination of the elastic wires, e, with the air tube, d, substantially in the manner and for the purpose herein set forth.

54,184.—Fan.—George Mallory, Watertown, Conn.:

I claim a fan constructed, substantially as shown and described.

54,185.—Car Window.—George Mann, Jr., and Henry Hise, Ill. Antedated April 12, 1866:

We claim, First, Pivoting or otherwise securing the valves or side windows, D D, to the stationary or front part, C, of the window, substantially as specified

Second providing such valves or side windows with bolts, b, for securing them in either a closed or open position, substantially as described

Third, Making a hole or opening, E, in the bottom plate, B, of the frame of the window, for the purposes herein specified.

Fourth, We claim the slide, d, or its equivalent in combination with the hole or opening, E, for the purpose of closing the same, substantially as herein shown and described.

54,186.—Peat Machine.—Samuel Marden, Newton, Mass.:

In combination, with reciprocating follower, a mould box having a construction substantially as described.

54,187.—Lath. D. W. Maurice, Springfield, Ohio:

I claim the combination of chuck, c, socket D, and shaft, B, with the screw sleeve, E, arranged substantially in the manner described and for the purpose set forth.

54,188.—Machinery for Threading Screw Blanks.—Dustin F. Mellen, New York City. Antedated April 13, 1866:

I claim the tool block and tool holders, constructed, arranged, and combined, substantially as and for the several purposes herein set forth

I also claim the construction, arrangement and application of the socket-cutter, for chamfering the end of the screw blank before threading, in combination with the threading apparatus, as set forth.

I also claim the bar, s, for throwing back the threading tools into place, as described.

I also claim the cutting tool, o, and its clamp, p, combined as herein described.

54,189. Knife Handle.—David H. Merriam, Fitchburg, Mass.:

I claim the combination and arrangement of the two tangs, a a, and the blade, B, or its equivalent.

I also claim the application of the shoulder piece or bolster, D, to the tangs and blade, substantially in manner as specified.

I also claim the application of the handle to the tangs and blade, substantially as in the manner described.

I also claim the combination and arrangement of the cap, E, with the tangs a a, and the blade B, or the same, and the handle, C, substantially as set forth.

I also claim the application of the handle to the tangs, blade and bolster, substantially as described.

54,190.—Bag Frame.—William T. Mersereau, Newark, N. J.:

I claim jaw C, in combination with the cover, A, when the same shall be constructed and combined, substantially as and for the purpose specified.

54,191.—Cultivator.—James E. Morrison, Washington, D. C.:

First, I claim a cultivator having double-plow beams, u u, hooks, o o, clevis, p, standards, x x, and cross bars, Y Y constructed, combined, and arranged substantially as herein specified.

Second, In combination with double-plow beams united at their front ends as described, the standards, x x, and cross bars Y Y, constructed and operated substantially as and for the purposes set forth.

Third, The entire cultivator with its various devices, constructed and arranged substantially as and for the purposes herein mentioned.

54,192.—Manufacture of Lubricating Oil.—Leander M. Mott, Chicago, Ill.:

I claim the preparing of crude rock or mineral oil for lubricating purpose, and the deodorizing of crude rock, and mineral oil by means of the application of the before mentioned chemicals directly to the oil, and subjecting the same to heat, as is substantially set forth above.

54,193. Argand Gas Burner.—Robert Murray and George Oakes, Boston, Mass.:

First, I claim constructing an argand gas burner in two pieces fastened together so as to form two gas-light joints, and an air draught through both pieces, as described.

Second, The arrangement of the upper and lower castings in such a manner that the outer periphery of the upper portion of the latter is brought in close proximity with the inside of the outer wall of the upper casting, as and for the purpose specified

Third, Constructing and arranging a chamber between the upper and lower castings, as described and for the purpose specified

54,194.—Composition for Filling the Pores of Wood.—Henry S. Myers, Borough of Mount Joy, Lancaster, Pa.:

I claim the compound formed by the ingredients, in the manner and for the purpose specified.

54,195.—Machine for Soldering Tin Cans.—Peter H. Niles, Boston, Mass.:

I claim the method of soldering a cylindrical vessel of sheet metal by supporting it in an inclined position with reference to a pan of melted solder, in such manner that rotation of the vessel will cause the joint to be soldered to travel through the solder by means, substantially as described.

Also the employment of the friction rolls, c d, and the driving roll h for effecting the rotation of the can or vessel, arranged and operating substantially as described for the purpose set forth.

Also the employment of mechanism for automatically introducing the cans to the action of the rolls, and removing them therefrom, arranged and operating substantially as set forth.

54,196. Sorghum Evaporator.—Henry P. Ninde, Oskaloosa, Iowa:

I claim the combination of the three pans, when constructed as set forth, and operated in conjunction with the sliding partition, J, as described

54,197.—Stovepipe Damper.—Sherman R. Nye, Barre, Mass.:

I claim the above described damper, consisting of the concave annulars, A, the curved concave bars or ribs, B, and the ribs, C C', constructed and operating as and for the purpose specified.

54,198. Calendar Clock.—George B. Owen, New York City:

I claim the annular plate, D, numbered and toothed and placed between bearings, a, so as to be capable of rotating freely, in connection with the cam G lever, E, and pawl, F, or their equivalents, applied to a clock movement, to operate substantially in the manner as and for the purpose herein set forth.

I further claim providing the plate, D, with alternate large and small teeth, in connection with the opening in the front of the clock case so that the plate, D, will be moved under two revolutions of cam, G, to expose a succeeding number through said opening only once in twenty-four hours.

[The object of this invention is to obtain a simple and economical device which may be applied to clocks and operated from the movements thereof, so as to indicate the days of the month. Various calendar attachments have been devised for clocks, but they have not been generally adopted on account of being expensive and liable to get out of repair and to render the clocks to which they are applied very inaccurate time keepers—difficulties which, it is believed, are fully obviated by this invention.]

54,199.—Drill for Artesian Wells.—Henry Palmer, San Francisco, Cal.:

I claim a double-edged drill, cutting at the upward, as well as at the downward stroke or blow, with beveled shoulders, or upward cutters inclining equally upon the adjacent planes, and at right angles with the stem, substantially as and for the purposes specified and set forth

54,200. Broom Head.—George W. Parsons, Harrisburgh, Pa.:

I claim the combination of a sheet-metal head with a metallic clamp, constructed substantially as described, when both are so arranged that the lowered edge of the jaws of the clamp rests on the corn and the upper edge of the clamp rests on the lower edge of the metal head, and the handle and corn will be held in place by a single screw bolt, operating substantially as set forth.

54,201.—Stopper for Bottles.—Robert G. Pike, Middletown, Conn.:

First, I claim the elastic bag or sack, with an elastic ring permanently fastened around the border of the opening thereof (or its equivalent), substantially in the manner and for the purpose as described, whether with or without the perforated cork or stopper.

Second, I claim the stopper whether of cork or other material, perforated for the passage of the air, for the purpose substantially as described.

Third, I claim closing the orifice of bottles or jars by means of air acting expansively in an elastic bag or sack, placed within or over the orifice of the jar or bottle, substantially and for the purpose as described.

54,202.—Fire Alarm.—Rufus Powers, Prescott, Mass.:

I claim the use of fastenings or connections for wires in fire alarms, so constructed with soft metal or other substance, that they shall melt and release the wires or give the alarm upon being heated as described and in the manner and for the purposes set forth.

54,203.—Mordant.—E. Freeman Prentiss, Philadelphia, Pa.:

I claim the mordant, composed substantially as and for the purpose described.

54,204.—Apparatus for Molding Crucibles.—Jos. L. Presbrey, Taunton, Mass.:

I claim the combination and arrangement of the elastic bag and the crucible mold, substantially as described.

54,205.—Steam Generator.—R. Rafael, New York City:

I claim the herein-described arrangement of the furnace in the upper part of the boiler and the succession of horizontal flues whereby the products of combustion are conducted in a zig-zag course to the bottom of the boiler and there discharged into the chimney, as explained.

54,206.—Saw-filing Machine.—J. H. Rector, Syracuse, N. Y.:

First, I claim the combination of the index drum V, the lever, and point, S, the table, J, the dial, B the rack, K, and the pinion wheel, q, all arranged substantially as described.

Second, The combination of the adjustable wheels, N and m, with the table, J, the dial, B, the rack, K, and the pinion wheel, q, all arranged substantially as described.

Third, The combination of the treadle G, the index drum, V, the lever and point, S, the wheel, N, and the wheel, m with the table J, and rack, K, constructed substantially as and for the purposes above described

54,207.—Velocipede.—Harvey A. Reynolds, New York City:

First, I claim operating the steering wheel by means of lines, n, passing over pulleys, a at the sides of the horse's mouth, and connecting with a lever, j, on the ring bolt or pivot of said wheel, substantially as specified.

Second, The combination of the slots, d, in the legs of the horse, with the extension, f, of the stirrup, working therein, substantially as and for the purposes set forth.

54,208. Picture Frame.—J. F. Rice, Boston, Mass.:

I claim a picture frame and service plate made of one piece of glass, as a new and improved article of manufacture, substantially as described.

54,209.—Hay Press.—Benjamin Roberts, Highland, N. Y.:

First, I claim the arrangement of the series of levers, E E F F, frame, A A c c c c, pulleys, d d d d, rollers, a a, follower beams, D' D', and endless rope or chain b b b b, substantially in the manner and for the purpose described.

Second, The manner of arranging the cover, C, in combination with the manner of suspending it from rollers, g' g', substantially as described.

Third, The spring loops, I I, on the frame A, in combination with the hooked bill, G, so applied as to receive the ends of the battens, B' B', and to sustain the door, B, against outward pressure.

Fourth, The hooked bail, G, pivoted to plates, h h, in combination with loop holders, I I', which act upon the bails forward of their fulcra, substantially as described.

54,210.—Machine for Cutting Tobacco.—Daniel T. Robinson, Boston, Mass.:

I claim the combination and arrangement of the standard, A, lever, B, arm, d, and cutter, C, substantially in manner and to operate as before described.

54,211.—Rocket Harpoon.—Thomas W. Roys and G. A. Lilliendahl, New York City:

First We claim in combination with the stock, G, the rocket, B, the shank, C, and barbs, E, substantially as shown and described.

Second, In combination with the breech or stock of the rocket the bow or loop shank, substantially as described.

Third In combination with the stock or breech of the rocket, the barbs to secure the harpoon in the whale without regard to the number thereof.

54,212.—Shaft Coupling.—Stephen P. Ruggles, Boston, Mass:

I claim a shaft coupling made in two parts and held together and to the ends of the shaft by a differential screw bolt and screw threads in said parts and by a key, substantially as and for the purpose described.

54,213.—Hay and Straw Stacker.—C. Rundell, Chicago, Ill.:

First, I claim the employment of the screw elevator for the purpose of raising the frame or standard in the mow or stack, in stacking hay, grain, or straw in the manner substantially set forth.

Second, I claim the screw and standard or its equivalent, when arranged and operated conjointly, in the manner and for the purpose set forth.

Third, I claim the reel, connected with the pole or standard, substantially, and for the purpose specified.

Fourth, I claim the pulley, sheaves, and standard, with the run cord and pulley constructed so as to operate conjointly, as and for the purpose herein described.

54,214.—Retort for Generating Gases from Oils.—Silas C. Salisbury, New York City:

First, I claim the application and use for heating purposes, of the gases derived from oil, water, and air, or from oil and water combined substantially as described in combination with the gases produced from the fire of any ordinary furnace, for the purpose set forth.

Second, The construction and arrangement of the retort, A, substantially as described, for generating and combining the gases of oil, water, and air, for the purposes set forth.

Third, The combination of a retort for generating such gases from oil, water and air, or from oil and water, with the furnace or fire box, in which such gases are to be burned, when such retort is placed in and heated by such furnace.

54,215.—Blast Furnace.—Silas C. Salisbury, New York City. Antedated April 19, 1866:

First, I claim the application and use, in blast furnaces, of a blast or current of the combined gases of oil water and air, combined, substantially as described, applied and used substantially as and for the purposes set forth.

Second, The application and use, in such furnaces, of a blast or current of highly heated lime water vapor, substantially as and for the purposes set forth.

54,216.—Apparatus for Applying Oil and Water to assist the Combustion of Coal, etc.—Silas C. Salisbury, New York City. Antedated April 19, 1866.

First, I claim the construction and arrangement of the tubular retort, A, composed of an inner and outer perforated tube, substantially as and for the purposes set forth.

Second, The combination of a series of retorts so constructed for use and application in furnaces in the place of ordinary grate bars.

Third, The combination of a retort, so constructed, with an oil and water reservoir or supply, and an air blast, for the purposes set forth.

54,217.—Chair.—James F. Sargent, South Strafford, Vermont:

First, I claim the combination of the plate, B, seat, A, catch, D, or its equivalent, and supports, C C, substantially as specified.

Second, I claim the foot rest E, in combination with the seat, A, of a chair so arranged that its inclination may be regulated as desired.

54,218.—Apparatus for Distilling.—H. A. Schesch, Brooklyn, E. D., N. Y.:

I claim exposing the upper part, or vapor space, of a still to the action of an additional fire, built in a secondary fireplace, substantially in the manner and for the purposes set forth.

54,219.—Grain Drill.—Peter Schmitt and Peter Jacob Schmitt, Waterloo, Ill.:

First, We claim the two perforated plates, E E', with levers, G G', attached, in connection with the wheel H, provided with the arm, I, regulating or adjusting screw, i, and the bar, J, connected with the shoe-lifting bar, K, all arranged to operate in the manner, substantially as and for the purpose set forth.

Second, The attaching of the shoe hangers, X, to the front part of the frame, A, by having said hangers notched at their front ends and fitted on a rod, Y, which is secured to the under side of the front bar of the frame, A, by hooks, j, substantially as shown and described.

54,220.—Motive Power.—J. Adam Schule, New York City:

I claim the centrifugal weights, c, in combination with the shaft a, cogwheel, k, clutch l, cogwheel, n, and shaft or axle, o, all constructed and operating substantially as and for the purpose described.

54,221.—Disinfecting Apparatus.—John M. Scudder, Cincinnati, Ohio:

I claim the disinfecting apparatus, consisting of the atomizer, C D E F I J, and a portable steam generator, substantially as set forth.

54,222.—Tenoning Blind Slats.—James M. Seymour, Newark, N. J:

I claim passing a slat or lath horizontally around the cutters, substantially as described, for the purpose herein above specified; also, the projections, t, in combination with the disks or circles, v, when constructed and arranged in the manner and for the purpose herein above specified.

54,223.—Meat and Vegetable Cutter.—James Shepard, Bristol, Conn.:

I claim, First, The circular knives or cutters, A A, mounted on a shaft, B, and operating substantially as specified, or any number of cutters operating in the same manner.

Second, I claim the combination and arrangement of the knives or cutters, A, shaft, B, shank, C, with its arms, a a, and handle, D, as herein specified.

54,224.—Steam Plow.—Gibson Simonson, Mt. Carmel, Ind.:

I claim, First, The driving pulley, T, slack belt, b, and pulley, V, in combination with the idler, Z, under control of the operator, for starting and stopping the traction wheel of a steam plowing machine.

Second, The arrangement of swivel'd and internally-geared guide wheel, D K, capable of being brought into connection with the motor by means of the tiller, I, so as to enable he turning of the machine to the right or left, by power under the control of the operator.

Third, The gravitating plow frame, J, capable of being set in or out of pitch by means of the swiveled and adjustable joint, K L.

Fourth, The devices, M N P p, for the suspension and adjustment of the plows relatively to the main frame.

Fifth, The arrangement of vibrating shaft, l, lever, p', scalloped pulley, q q', pulleys, r s, and u, shaft, i, and chain, t, or their equivalents, for unearthing the gang of plows, in the manner explained.

54,225.—Water Elevator.—Hiram Moore Smith, Richmond, Virginia:

I claim the combination and arrangement of pawl and brake, E F4, brake and ratchet wheel, D, and crank, G, as and for the purpose described.

54,226.—Rock Drill.—John Y. Smith, Alexandria, Virginia, assignor to himself and Herman Haupt, Philadelphia, Pa.:

I claim the construction of a drill or reamer or kindred implement of any form bearing a wrought iron stem, combined with steels bits or cutting edges by casting the steel which forms the bits or cutting part of the drill around the wrought iron stem when at a white or welding heat, as and for the purpose herein set forth.

Second, In combination with a drill or kindred tool of otherwise ordinary or suitable construction, I claim the wings formed with deflecting surfaces at their upper ends, as and for the purposes herein set forth.

54,227.—Car Spring.—Joshua B. Smyth, Philadelphia, Pa. Antedated, Jan. 30, 1866:

I claim combining a series of steel springs, whether composed of one or more plates, and so supporting them at their ends that they shall be in no part in contact with one another when without a load, and so arranging them that they shall successively be brought into action with the increase of the load, substantially in the manner and for the purpose set forth.

54,228.—Horse Rake.—E. R. and W. P. Spear, Orland, Ind.:

We claim the arrangement and combination of the levers, L L, connecting rods, K K, draught arms, G G, and spring bars, J J, and their springs, f f, with a revolving rake, substantially in the manner and for the purpose set forth.

54,229.—Gaging Rod.—William J. Tait, Bergen, New Jersey:

I claim an improved gaging rod formed by combining the slide rod, B, and stop, G, with the ordinary gaging rod, substantially as described and for the purpose set forth.

54,230.—Can for Caustic Alkalies.—Edwin A. Thomas, Philadelphia, Pa.:

I claim a can for putting up caustic alkalies, etc., the seams of which are secured by Thomas's patent cement, and the top or cover attached by rocking down the edges of said cover over the turned out edge of the body of the filled can, substantially as described.

54,231.—Evaporator.—Tower Thomasson, Neoga, Ill.:

First, I claim the provision in an evaporating apparatus of a train of portable and separate pans, F F' F'' F''' F'''', or their equivalents adapted to be linked together and to be used in connection with the railway, E' E', substantially as described.

Second, The evaporating pan, F, when constructed with wooden ends, G G', metallic bottom, K, and partially wooden and metallic sides, H H' and I I', in the manner described.

Third, the hooks, O, and staples for devices, substantially equivalent for connecting a train of evaporator pans.

Fourth, In combination with the elements of the first and second claim, I claim the "receiving platform," S, for the purpose described.

54,232.—Tree Protector.—Timothy Tufts (assignor to Person Davis, Somerville, and Albert Taylor), Boston, Mass.:

I claim the combination and arrangement of the series of supporting nails, D, and their screws, E, and nuts, f, with the annular trough and its projections, d, or the equivalent thereof, or with the same and the annular packing, E, arranged above the trunk of a tree, substantially as specified.

54,233.—Heating Stove.—William Van de Gande, New York City:

I claim the movable fire pot or cylinder, c, the lever, L, and movable grate, H, when in combination with a coal stove, A, operating in the manner substantially as and for the purposes described.

54,234.—Railroad Car Spring.—Alexander T. Watson, New York City:

First, I claim the peculiar construction and adaptation of the sockets or grooved recesses, b b, in which the extremities of the plates or staves are set together, with the flange or lever guards, a a, by which the free action of the ends of the plates is permitted, and they are at the same time held in their proper positions, substantially as described.

Second, I claim the plates or levers constructed substantially as described and the cutting or fixing the extreme or end curves at such a point, and so combining and arranging the curves with each other that, when under pressure the elastic action of the plates is outward, and the curves of the plates, except at the ends, are caused to straighten, whereby the inability to fracture or collapse is greatly diminished.

54,235.—Harvester Rake.—George Wellhouse, Akron, Ohio:

First, I claim giving the rotary motion to the vibrating sweep-rake, by means of the arm, G, and the universal joint at the rear of the rake, substantially in the manner and for the purposes set forth.

Second, I claim the arrangement and combination of the lever, H, the connecting rod, I, and sweeping rake handle, substantially as described.

Third, I claim the arrangement and combination of the grain guard, L, the rod, M, and lever, H, substantially as set forth.

54,236.—Railroad Chair.—J. W. Wetmore, Erie, Pa.:

I claim a railroad chair, constructed of a bed piece fig. 2 which has one jaw to hold the rail, and join in two parts to hold a wedge, and which has also a recess, g g, in which the jaws fig. 3, are applied to the rail, and held in place by the wedge, with its key, s, and groove, r r' both the fixed and adjustable jaws being held by rivets passing through the notches of the rails, all substantially as described.

54,237.—Car Coupling.—C. O Wheeler, Mattison, Ill.:

I claim the hooks, B B, arranged with the springs, D, in combination with the draw pins, c, said parts being applied to the draw heads, having central extra mouths, a, and all arranged substantially in the manner and for the purpose herein set forth.

[This invention relates to a new and improved car coupling of that class which are self-connecting or self-acting, and it consists in providing the draw heads with hooks, pins and springs, managed in such a manner, that the draw heads of the adjoining cars will engage or connect themselves on coming in contact, and without the possibility of being casually detached, and at the same time admit of being readily disconnected whenever required.]

54,238.—Car Coupling.—James Wedicey, Carlisle, Pa.:

First, I claim a coupling pin for railroad cars, constructed as described for the purpose set forth.

Second, Providing the buffer with a removable abutment, A', substantially as and for the purpose described.

54,239.—Lamp Chimney Lifter.—John H. Wilhelm and James W. Larimore, Cook County, Ill.:

We claim the hands, A A, secured to the arms, B B, when said hands are provided with figures, 1, 2, 3, 4, 5, so arranged, that the chimney is securely held in said hands, and between said fingers in the vertical position in which it is grasped, substantially as herein specified.

54,240.—Eyelet Machine.—Ira E. Wilson and John Lowe, Providence, R. I.:

We claim the forcible introduction into, and application to eyelet machines, of one or more blasts, or currents of air, or streams of water, or of such other fluid under a sufficient pressure as will accomplish the above described purposes, substantially in the mode above described and for the purposes indicated.

54,241.—Animal Trap.—George Wolf, Williamsport, Md.:

I claim the above described trap, provided with the wire, G, and the eye of the cord, D, or with the equivalent of these devices (dependent upon friction alone) for holding the trap, E, substantially as described.

54,242.—Well Windlass.—T. J. Wrangham, Benson, Vermont:

I claim the arrangement of the fixed and loose ratchet wheels j j l, fixed drum, h, and crank arm, all attached to the windlass shaft of a well curb, as and for the purpose specified.

[This invention consists in a novel arrangement of mechanical devices for operating the windlass upon which the chain or rope carrying the bucket of a water well is wound.]

54,243.—Apparatus for Burning Tar.—Richard Yeilding (assignor to himself and Henry Gage), Ypsilanti, Mich.:

First, I claim a reservoir for fuel composed of tar, pitch or rosin, mixed with oil or tar alone, with its packed cone having a feeding valve, F, contained in a chamber or case, a, of nonconductive material, and having a tube or tubes furnished with regulating stop cocks for the purpose of ejecting the fuel in jets to be ignited, as hereinbefore set forth.

Second, I claim the reservoir, B, with its component parts, and the tube or tubes, K, in combination with the retort, L, and the sleeve, M, for the purpose and substantially in the manner set forth.

54,244.—Paper Collar Machine.—Charles K. Brown and William Wright (assignors to Charles K. Brown), Troy, New York:

First, We claim a combination of two rotary, creasing, or folding wheels, and a device substantially such as herein described for supporting and guiding a collar or a similar article in a curved course while being passed endwise between the said creasing or folding wheels, whereby collars or similar articles can be creased, folded, or partly folded progressively from end to end, in a curved line, substantially as herein described.

We also claim a combination of two rotary creasing or folding wheels, a device for supporting and guiding a collar or similar article in a curved course while being passed endwise between the said creasing or folding wheels, and an additional folding or pressing mechanism, whereby collars or similar articles can have a crease, fold, or partial fold made therein, progressively from end to end in a curved line, and also have such crease, fold, or partial fold increased, pressed, or finished, progressively from one end to the other, and at a continuous operation, substantially as herein described.

We also claim the combination of a yielding edge presser, G, curved pattern edge guide, D, side support, C, or side supports, c c', and creasing or folding wheels, A, B, either with or without an additional folding or pressing mechanism, substantially as herein described.

We also claim the combination of two creasing or folding wheels, A, B, and two folding or pressing rollers, F F', arranged so as to revolve in a plane perpendicular, or nearly so, to that in which the said creasing or folding wheels turn, and turn wheel, with inner and outer guides between the said wheels and rollers, substantially as described.

And we also claim the combination of a rotary guide, I, and a grooved or flaring guide, H, with two rotary rollers, F F, substantially as herein described.

54,245.—Seat for Harvesters, etc.—Thomas S. Brown (assignor to himself and John P. Adriance), Poughkeepsie, New York:

I claim constructing the support, B, of rider's seat for harvesters, mowing machines, and other agricultural implements—a spring bar or plate twisted in such a maner that the support will yield or give in two different planes at right angles with each other, and admit of the yielding of the seat in any direction, substantially as set forth.

54,246.—Device for Lubricating Carriage Axles.—N. B Brown (assignor to himself and Elbridge Sims), Antwerp, New York.

I claim the spring valve, a, in combination with the slotted receiver, A, applied and operating as described

54,247.—Fire Engine and Pump.—John N. Dennison (assignor to himself, Francis H. Gould and Rosco J. Gould), Newark, N. J.:

First, I claim the arrangement of the cylinders, B C, constructed as described within the valve chamber, a, stop cocks, l m n, partition, c, and pipe, n', operating in the manner and for the purpose herein specified.

Second, The valves or stop cocks, l, n in combination with the pistons, D E, chamber, a, and partitions a b, constructed and operating substantially as and for the purpose set forth.

54,248.—Machine Drill.—Nelson P. Eddy (assignor to himself and William P. Hawes), Fall River, Mass.:

I claim combining with a machine drill, a feed table constructed and operating, substantially as described for the purposes specified.

54,249.—Broom.—Daniel P. Farnham (assignor to himself and Moses P. Farnham), Rock County, Ill.:

I claim elastic wire jaws, D and D', attached to the handle, substantially as described, and operated by a looped lever, F, and auxiliary rings, E and E, in combination with the socket, B, handle, A, and spring catch, C, or its equivalent, when the whole are constructed, arranged, and used, substantially as and for the purposes described.

54,250.—Oil Can.—J. L. Holt (assignor to himself and J. M. Thompson) Springfield, Mass.:

I claim the arrangement of the cup, a, having connecting tubes, b, and ball and socket valve, g, in combination with an oil can, operating substantially as and for the purpose specified.

54,251.—Fish Hook.—Job Johnson and Hezekiah Howarth (assignors to Job Johnson) Brooklyn, N. Y.:

We claim the spear connected to the line in combination with the spring and with the hook, substantially as specified, whereby the spring causes the hook and spear to come towards each other when the fish bites at the bait, as set forth.

54,252.—Sirup Fount or Cup.—G. H. Knight and F. Millward (assignors to George H. Knight), Cincinnati, Ohio:

First, We claim a sirup fount having the following elements to wit—a containing vessel whose spout communicates at or near its bottom, a plunger or piston, and a retracting spring, or its equivalent.

Second, In combination with the elements of the preceding clause, we claim a vertically reciprocating and submerged disk or plunger, whose descending stroke terminates at or near the bottom of the vessel, substantially as set forth.

Third, In combination with the elements of the two foregoing clauses, we claim an enlargement of the vessel, or equivalent device, at or near the upper position of the plunger, for the purpose explained.

54,253.—Carriage Shackle.—Wilson W. Knowles (assignor to himself, Julius B. Savage, and Willis B. Smith), Southington, Conn.:

I claim constructing the shackles to receive the clip bar, substantially as and for the purpose herein set forth.

54,254.—Method of Priming Metallic Cartridges.—Timothy J. Powers (assignor to J. P. Fitch and J. R. Van Vechten), New York City:

I claim the employment for depositing the fulminate priming around the interior of a cartridge shell, of a spindle upon which the said priming is first placed, and the revolution of which throws the said priming directly into its place by centrifugal force, substantially as herein specified.

54,255.—Machine for Making Cartridge Cases.—Timothy J. Powers (assignor to J. P. Fitch and J. R. Van Vechten), New York City:

First, I claim, in a machine for drawing metallic cartridge shells or other similar articles of metal, the employment of several mandrels operating successively or in rotation in combination with one die or set of dies, substantially as and for the purpose herein described.

Second, I claim the arrangement of the mandrel or mandrels in a machine for drawing cartridge shells or other similar articles in an upright position, with the point upward, substantially as and for the purpose herein specified.

Third, I claim the construction of a mandrel on which cartridge shells or other similar articles are to be drawn with a shoulder, c, having a sharp cutting edge operating substantially as herein described, in combination with the drawing die or dies to cut off the waste metal from the edges of the shell or other article, after the drawing operation is completed, substantially as herein set forth.

Fourth, I claim the cylindrical cam, H, having a groove, b, of the form herein described, operating in combination with a series of pins, d d, in the table, D, which carries the drawing mandrels, to produce the intermittent rotary movement of the said table, and to lock the table in fixed positions during the intermission in its rotary movement, substantially as herein set forth.

54,256.—Horse Shoe Nail Machine.—Silas S. Putnam and Lucius H. Dwelley (assignors to S. S. Putnam & Co.), Dorchester, Mass.:

We claim the adjustable feeding nippers, m n, operated by a mechanism, substantially as described, so as to carry the nail rod into the machine as set forth.

We also claim, in combination with the above, the dog, e', on the shaft, S, operating substantially as set forth.

We also claim in machines for forging horse shoe and other wrought nails, cutting off the finished nail without moving the rod from its normal position, by a mechanism substantially as described.

We also claim arresting the hammers automatically after a certain number of blows and retaining them open while the nail is being cut off and the rod fed into the machine by mechanism substantially as described.

We also claim the blocks, h, so hinged as to swing out on the pins, j, as centers, in combination with the set screws, g, and springs, e, substantially as set forth.

We also claim the furnace, M, in combination with the feeding nippers, m n, and hammers, J K, operating substantially as set forth.

We also claim the cutters, T W, in combination with the connecting rods, b' and V, the lever, Q, and cam wheel, R, operating substantially as described.

We also claim the ring, Y, in combination with the hammers, J K, frame, X, connecting rod, m', lever, Z, and cam wheel, K, operating substantially as set forth.

We also claim adjusting the nippers, m n, to the size of the rod, being operated upon by means of the set screw 20 and block 19, substantially as described.

54,257.—Watch Key.—George W. Remington (assignor to himself and George H. Remington), North Providence, R. I.:

I claim the combination with the key-spindle, A, having a loosely turning casing, C, or its equivalent operating upon its ratchet, D, by a spring pawl, F, of one or more pressure springs so arranged upon it as to bear and operate upon the collar of its ratchet, substantially in the manner described and for the purpose specified.

I also claim, in combination with the above, the sliding collar, M, of the key spindle arranged with regard to the pressure springs, g g, thereof, so as to operate substantially as and for the purpose specified.

54,258.—Hammer or Burr for Facing Mill Stones.—Lewis Sauers (assignor to himself and H. Shaffaer), Mount Joy, Pa.:

I claim a series of bits or blades 1, 2, 3, 4, or more, provided with a central hole, D, for the reception of a handle, B, constructed in the manner and for the purpose specified.

I claim the diagonally joined box plate, A' A'', provided with three holes, in combination with the blades, 1, 2, 3, 4, shouldered handled iron, B E, and wedge, C, arranged in the manner and for the purpose specified.

54,259.—Mosquito Bar.—Langdon Sawyer (assignor to Benjamin F. Sawyer), Springfield, Vt.:

First, I claim the coiled spring, e m, in combination with the socket, b, and the standard, A A, combined and operating substantially as above described.

Second, The frame, F, constructed as above set forth, composed of the center bars, g, with its loops, m m, the transverse bars, I I, with their loops or slots, l l l l, the semicircular arms, j j, with their loops or slots, k k k k, and the spring, n, combined with the extension bar, b, and operating substantially as above set forth.

Third, This extension bar, b, in combination with the frame, F, constructed as above described and operating as above substantially set forth.

Fourth, The combination of the standard, A A, the extension bar, b, and the frame, F, constructed substantially as above described, constituting a mosquito bar, as herein before described.

54,260.—Grinding Mill.—Thomas J. Sloan, New York City, assignor to John G. Sloan, Paris, France:

I claim the combination of the series of drunken saws for grinding, the two series being mounted on two shafts geared to rotate with equal velocity, and the series of clearing saws being of greater diameter than, and extending into the space between the grinding saws, substantially as and for the purpose specified.

The combination of the series of grinding saws with the feed roller and the interposed rest bar, and pressure plates as the equivalent thereof, substantially as and for the purpose specified.

In combination with a series of drunken or inclined saws for grinding as described, the means or the equivalent thereof for giving to the feeding mechanism a literal reciprocating motion for the purpose of presenting the material equally to all the saws as set forth.

54,261.—Grinding Mill.—Thomas J. Sloan, New York City, assignor to John G. Sloan, Paris, France:

I claim the combination of the series of clearing disks with the series of grinding or reducing saws when the periphery of the disks is made to travel faster than the periphery of the saws, substantially as and for the purpose described.

And I also claim giving to the feeder box a reciprocating motion, substantially as described in combination with the series of circular saws set with their planes at right angles with their axis of rotation, and having spaces between them, substantially as and for the purpose specified.

54,262.—Grinding Mill.—Thomas J. Sloan, New York City, assignor to John G. Sloan, Paris, France:

I claim the combination of the series of saws with the series of disks formed with recesses or buckets in their peripheries for carrying and holding the grain to and while it is subjected to the action of the saws, the saws rotating at a higher velocity than the disks, substantially as and for the purposes described.

I also claim the hopper for supplying the grain to the buckets in the series of disks, in combination with the series of disks and the series of saws, substantially as and for the purpose described.

And, finally, I claim, in combination with the series of saws and with the series of disks constructing the lower part of the hopper with an overflow and inclined surface leading thereto, substantially as and for the purpose described.

54,263.—Grain Separator.—Charles G. and William Stoll (assignor to Charles G. Stoll), East New York, N. Y.:

I claim the combination of the sieve, E, with the closed box, A, and fan blower, I, or other equivalent devices, substantially as described, so that the air forced into the said box has no way of escape except through the apertures in the sieve, and it is compelled to act on the material placed on said sieve with its full force.

The yielding spring valve, f, in combination with the long, narrow discharge opening in the bottom of the hopper, and with the sieve, E, constructed and operating substantially as and for the purpose set forth.

The closed box, J, to which the air has access from below in combination with the fan, I, box, A, and sieve, E, constructed and operating substantially as and for the purpose described.

The adjustable valve or partitions, r, in the compartments, q, of the box, A, in combination with the sieve, E, constructed and operating, substantially as and for the purpose set forth.

The air valve, v v, in the bottom of the box, A, in combination with the blower and sieve, constructed and operating substantially as and for the purpose described.

54,264.—Banjo.—William B. Tilton (assignor to W. Nash), New York City:

I claim securing the parchment head to and within the cylinder or rim of a banjo or other similar musical instrument, by means of two annular rings, B and C, when arranged together and with regard to the parchment head and the banjo rim so as to operate substantially in the manner described and for the purpose specified.

I also claim so arranging and securing the ring, C, to which the parchment head is fastened within the banjo rim that it can be adjusted in position, substantially as and for the purpose described.

54,265.—Tweer.—James M. White (assignor to himself and David King), Springfield, Ohio:

I claim the peculiar arrangement of tweer for blacksmith forges consisting of two parts, A and B, united by the bolts, E, and having the hemispherical cup, F, resting upon legs, D, permanently attached to it which rests upon the, f, rotten piece, B, which has also a slide, C, in the bottom, the several parts being constructed and arranged substantially as and for the purpose set forth.

54,266.—Method for Preparing Magnesium for Burning.—Charles H. Wing, Newton Mass., assignor to the American Magnesium Co., Boston, Mass.:

I claim the forming of magnesium wire or ribbon into the spiral coils herein described.

54,267.—Method of Purifying Hydrocarbon Oils.—John Fordred, Blackheath, England:

I claim the employment of a solution of caustic soda or potash as a preliminary treatment or process of purification of the crude or of the distilled oils or dydrocarbons resulting from the distillation of coal, shale, or peat at a low temperature.

54,268.—Method of Ventilating Mill Stones.—A. D. Lagogney, Paris, France:

I claim the combination of the two cones, M N, air-conducting box, P, spouts, P' P', pipes, T S, and stuffing boxes, Q R, the whole arranged in relation with each other and applied to a pair of millstones, substantially as and for the purpose herein specified.

54,269.—Roller Temple for Looms.—J. Mathis, Dornbirn, Austria, assignor to H. Kayser, New York City.

First, I claim a temple composed of a series of wheels, a, set in an oblique position, substantially as and for the purpose herein shown and described.

Second, The eccentric shoulders, E, and the disks, d, which separate the oblique wheels, a, substantially as and for the purpose set forth.

54,270.—Cards for Carding Machine.—William Turner, Samuel Shore, and William Halliwell, Rochester, England:

We claim in tooth and stapler cards used in carding machines, the system of making the prongs or legs of each staple or tooth of different lengths.

54,271.—Method of Preparing Threads for Parti-colored Printing and for Properly Weaving the Same.—Stanislaus Vigoureux, Paris, France:

I claim the method herein described, of preparing threads for parti-colored printing, and of retaining them in their proper relative position for weaving for the purpose of preventing the marring or disfiguring of designs or patterns.

REISSUES.

2,233.—Bank and Safe Door Knob.—Lewis Lillie, Troy, N. Y. Patented July 5, 1859.

First, I claim the employment of the switch or bar, D, and the nut, C, or any equivalent thereof, arranged upon and combined with the knob bolt or spindle, B, in the manner substantially as and for the purposes herein described and set forth.

Second, The tapering or conical spindle, B, in combination with a door of an iron or metallic safe vault or other structure so as to prevent the lock or lock bolt switch, by which the door thereof is fastened therein, from being driven from such door, from the outside of the same, by any burglar, in the manner substantially as herein described and set forth

Third, The employment of said tapering or conical spindle, B, in combination with the lock case, c, of the lock, F, or any equivalent thereof, in the manner and for the purposes substantially as herein described and set forth.

Fourth, The employment of the tapering or conical spindle, B, or any equivalent thereof, when used in the manner and for the purposes substantially as herein described and set forth.

DESIGNS.

2,294.—Ornament for the Head.—Sarah E. Cook, Philadelphia, Penn.:

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of our reception of their funds.

PATENT-OFFICE DECISIONS.

Application for a patent for Improvement in Drilling Wells.

E. Foote, Examiner-in-chief.—The continuous rotary motion of a shaft is made to give the reciprocating movement of the drill in a manner that is ingenious, simple, and effective. To the shaft is attached a ratchet wheel, and by it, turning loosely on the shaft, is what is termed a crank, to which the rope from the drill is attached. On the crank is a pawl with its spring, against which the ratchet teeth act and carry forward the crank. The drill is thus raised to its full hight and the crank passes the center, when the weight falling, carries the crank and pawl faster than the wheel, and imparts the blow. The wheel and pawl then reconnect, and the weight is again raised.

In the principle of this invention the applicant has been anticipated by a part of the drop press of Milo Peck, patented in May, 1857. The effect of this is to limit the applicant's claims to the particular arrangement and combination he has made to effect a specific object. The claims presented in the specification seem to us to be so limited as to present sufficient invention and utility to entitle the applicant to the patent asked for.

When a real improvement has been produced we are disposed to regard an applicant's case with liberality. The device that has been supposed to interfere with this is adapted to another purpose, and is not suited to operate a drill. In making the particular application and adaptation, the applicant has displayed invention and rendered an important service.

The decision of the Examiner is reversed.

Washington, D. C., Feb. 7, 1866.

Application for a patent for Improvement in Feeding Devices in machines for planing lumber.

E. Foot, Examiner-in-chief.—Both the upper and lower rolls that feed the boards into a planing machine are, in the applicant's device, operated by bevel gears, and the two are connected by a sliding rod that admits of their adjustment to different thicknesses of lumber. The positive motion to both rolls and the provision for their necessary adjustment without effecting the gearing is the improvement claimed, and it is said to be of much practical importance. The invention was found to be anticipated by the feeding device in the planing machine of Lorenzo Vance, patented in March, 1864, and the applicant requested that an interference might be declared to give him an opportunity to show that his invention was first made. This the Examiner declined to do on the ground that the applicant's claim and specification did not sufficiently distinguish his device from a still older one, patented to Samuel Whiting in 1839. And this is the question appealed to us.

In Whiting's machine is found the sliding rod by which the adjustment is made, but the upper roller only is propelled by the bevel gears. The board, instead of being carried forward by two positive rolls pressing upon opposite surfaces, is moved by one only, which has also to overcome the *friction* of the lower roll. The arrangement of his rolls and their attachments is also less advantageous and practical than that of the applicant's. The first claim in the applicant's specification is for the combination with the feed rolls of the two sets of bevel gearing, F V H U, and the sliding shaft, G, substantially as and for the purposes described. It seems to us that this claim is appropriate, that it clearly points out the applicant's invention, and distinguishes it from Whiting's, and the Examiner's decision in regard to it must be overruled.

The second claim is for "the combination with the feed rolls for planing lumber of gearing so arranged and combined therewith as that the entire roll or either end can rise and fall without changing the pitch line of the gears by which it is driven, substantially as and for the purposes stated."

This claim is for the combination with the rolls of any kind of machinery or gearing that shall give them a certain property, that of rising or lowering without changing the pitch line of the gears. In an invention which consists solely of a specific form or arrangement of machinery, but little distinguishable from other forms of doing the same thing, this claim of functions or properties is improper, as we recently decided in the case of the interference between Tittman and Slepy. Besides, this function embraced Whiting's device, for in his machine the roll rises and falls without changing the pitch line of the gear by which it is driven. The Examiner was therefore entirely right in holding that Whiting's device anticipated this claim.

The same remarks may be made in reference to the third claim.

The fourth claim, which is for the combination with the feed rolls, of mechanism for operating said rolls upon their axis and for elevating and lowering the top feed roll, substantially as herein described, may be regarded substantially the same as the first, expressed in different language—which to prevent misconstruction is sometimes allowable. Perhaps it is sometimes ambiguous. An amendment which which should make it say "mechanism for operating both rolls," would remove all difficulty.

The fifth and sixth claims do not appear to conflict with Whiting's device.

The Examiner's decision in reference to the second and third claims is affirmed. His decision in reference to the third, fourth, fifth, and sixth claims is reversed.

Washington, D. C., Jan. 1866.

Application for a patent for Improvement in Paper Ruling Machines.

H. Foot, Examiner-in-chief.—The applicant has made the penholder in these machines adjustable in every direction by screws and jam nuts. In the means used there is nothing new. They are all found in other instruments, and to some extent, in other ruling machines. They evince the skill of the accomplished mechanic rather than the creations of the inventor. The forms are new and skillful, but this does not authorize a patent for an invention.

The decision of the Examiner must be affirmed.

Washington, D. C., Feb. 1866.

Notes & Queries

N. C. G., of Mo.—Some years ago an offer was made through our paper for a machine to feed paper to a printing press, and several patents were granted for different modifications. It was found difficult to meet all the conditions required. The Philadelphia *Inquirer* is now printed on a self-feeding press Bullock's patent.

B. T. D., Mass., and M. S. M., La.—Straw hats are bleached by putting them in a tight box, at the bottom of which a quantity of sulphur is burning.

E. S. C., Ohio.—A worm wheel 8 inches in diameter, that runs 250 turns per minute, cannot help grinding in driving a spur wheel 24 inches diameter, because the velocity of the two surfaces is so unequal. Moreover, a worm wheel is not adapted to running at a high speed. Some other arrangement should be employed.

N. B. W., Ind.—All instruments that can be used in schools are exceedingly remunerative. You must be the judge as to the probability of yours becoming popular.

W. H. H. H., of Pa.—The size of the outside of a steam boiler has nothing to do with its power. The efficiency of them depends on their heating surface and the circulation of the water. Your boiler is 5 feet high and 4 feet diameter, and you ask us if you can get 16 horse-power out of it. If you have 250 square feet heating surface, and 8 square feet grate surface you can. Such a boiler is not large enough to drive two engines 8 in. piston, 14 in. stroke with 250 feet piston speed per minute, and 125 pounds pressure.

J. H. T., of N. Y.—Freezing food for preservation is practicable by the use of chemicals, but the cost of them is an insuperable objection.

S. H. W., of Col. Ter.—We are much obliged for your letter, but the subject has been fully discussed.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine to accompany the claim, at a reasonable additional cost. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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19 2 FOWLER & WELLS, No. 389 Broadway, New York.

RESULT OF THE VAN DE WATER WHEEL CHALLENGE.—MESSRS. EDITORS:—I see in your issue of the 24th inst., a notice with the above heading, with a very one-sided statement of a trial of my Water Wheel with Leffel & Co.'s, which was in every way unfair. The wheel that Leffel & Co. put in Mr. Burbank's Mill was a new one, got up with great care, with polished steel buckets, after his first one was beat, using twenty inches more water than my wheel. According to Leffel & Co.'s table, twenty inches of water under fifteen feet head gives 6·44 horse-power. Now, 6·44 horse-power under fifteen feet head ought to grind six and one-half bushels of wheat per hour, or thirty-six barrels in 24 hours more than my wheel, and he only claims beating me 24 barrels in 24 hours, which would show the result of the trial to be in my favor. I am told by a party who knows all the particulars of the trial, that the stones which my wheel run were not in good order, and that it was an unfair trial. I had no notice, nor any one there to see to my interest in the matter. I do not know which drove the most machinery besides the mill stones; my wheel generally drives all the machinery in the mill except two smut mills. My wheel was all cast iron, rough as it came from the foundery, not polished buckets, the first tried from that pattern, using twenty inches less water under fifteen feet head, grinds twenty-four barrels flour less in twenty-four hours than the Leffel wheel. If I had been in Leffel & Co.'s place I should have kept quiet about that trial. I intend to build a wheel venting the same amount of water as the Leffel wheel, when I will let the public know the result. With regard to the challenge, my offer is still open for Leffel & Co.'s acceptance; the Five Thousand Dollars is still ready as I proposed, with a fair trial at grinding.

Below I give Mr. Burbank's certificate, saying my wheel used less water than the Leffel wheel. The new Leffel wheel vents the same as the old one. I see the certificate which Leffel & Co. publish says they did not measure the amount of water used, that it was only as fair a test as could be made without measuring water; as if the amount of water used was of no importance in a trial of the power of water wheels. Very respectfully,

HENRY VAN DE WATER.

Buffalo, N. Y., March 27, 1886.

ROCHESTER, Sept. 20, 1865.

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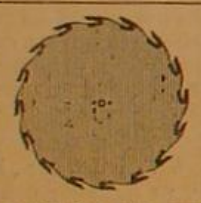

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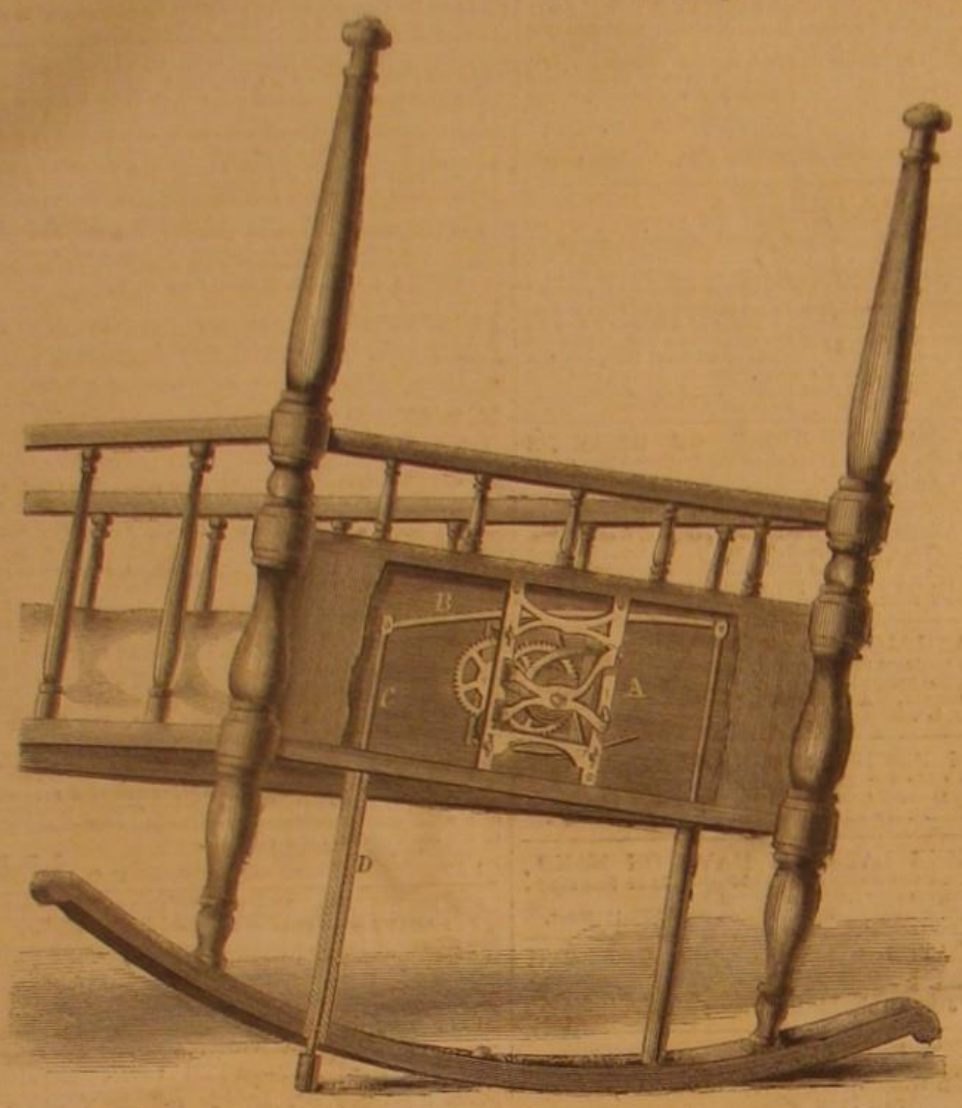
Improved Self-Rocking Cradle.

Rocking the cradle to soothe the nerves of some perturbed infant is a task that every woman is desirous of avoiding, if possible, as it is a tedious and fatiguing piece of work.

In this engraving we have shown a new way of rocking the cradle, that is, by clock work. When the child is to be put to sleep, the mother winds the wheel work, A, at the end, just as a clock is wound. When this is done the wheels give motion to a vibrat- arm, B, which is driven by a small crank in the works aforesaid. This vibrating arm has two rods, C, attached to it, which work through tubular cases, D, against the floor, and thus impart the rocking motion. The wheel work will run a long time, and after starting requires no attention.



HELMKAMP'S SELF-ROCKING CRADLE.

It was patented on Feb. 9th, 1864, by C. H. Helmkamp, of Reading, Ohio, to whom address for further information. Rights for sale.

Improved Shock Arrester.

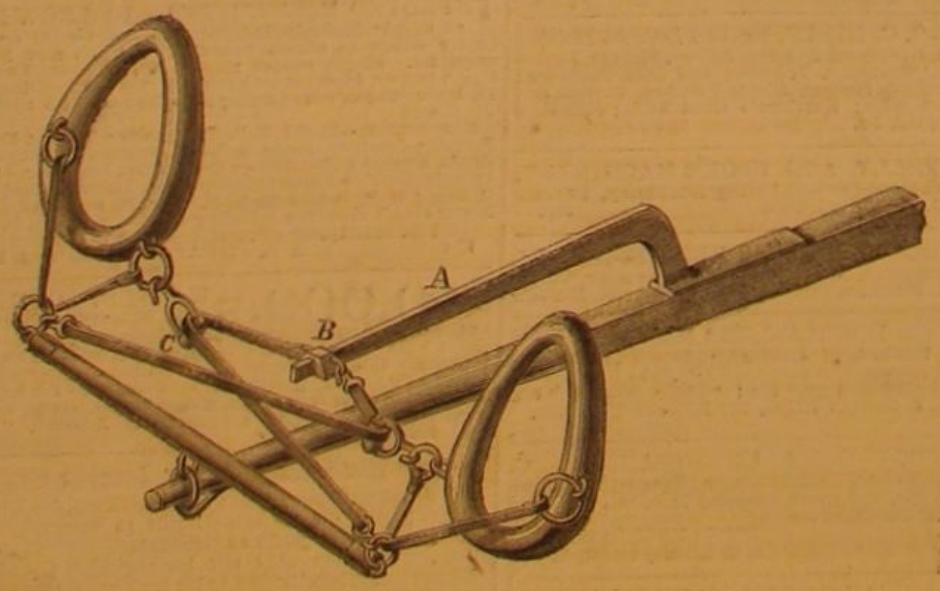
Every observing person must have noticed how severely horses are struck by the pole of the wagon when traveling on uneven ground. In cities especially, draft horses attached to heavy loads labor along as much inconvenienced and worried by the jerking of the pole, as by the work they are doing.

In this engraving our readers will see a preventive for the evil alluded to. It consists in attaching a pring, A, to the pole and connecting it by two straps to the collar, B, so that the violent lashing to and fro which sometimes happens, is received on the elastic medium, and much reduced. The straps being connected to the spring by the sliding coupling, or collar, B, allow them to conform freely to all positions of the tongue, so that no cramping will take place. The straps passing over rollers in one of the snap hooks, C, also favors the proper disposition of the parts.

This arrangement is well adapted for all kinds of cultivators, mowers and reapers, as well as wheeled vehicles, inasmuch as it prevents the cultivators, etc., from jumping into the corn when driven close to the hills, thus avoiding the waste which would occur from tearing it up.

Various parties who have tried it pronounce this arrangement to be very satisfactory. State, county or town rights will be sold by the inventor.

It was patented through the Scientific American Patent Agency Nov. 21, 1865, by F. D. Ladenberger. For further information, address him at Glenbeulah, Wis.



LADENBERGER'S SHOCK ARRESTER.

Letter Boxes on Horse Cars.

The Post Office Department has authorized the attachment to each car of the Philadelphia Union Passenger Railway Company of an iron letter box, with a wide mouth, in the exterior panel of the car. Persons on the line of the road can thus drop letters into the box as the car moves along. Perhaps this plan might be introduced with good results on some o our own lines; it seems to present some advantages over the street boxes.—*Exchange.*

[What is the particular advantage in this? It is easy enough to drop letters in the street boxes now, but not so easy to get them delivered. If the Department would authorize men to deliver the letters promptly, it would be a great advantage to the business community.

BUGBEE'S CRUTCH.

Common crutches are very insecure. In slippery weather it is next to impossible to use them safely without great care. They are also noisy on floors, and cause mortification to sensitive persons by heralding their approach in public assemblies.

The crutch here shown, or the principal part of it, is a great improvement on the ordinary ones. It is not only noiseless, but perfectly secure in all kinds of weather and all conditions of surface. In detail, it consists of an elastic cushion of rubber, A, affixed to the end of the crutch a shaft and a steel center, B.

This center is capable of sliding up in the socket, C, when not in use, or held extended by moving the pin, D, on one side, so that it falls into a slot, E. In this condition it is a complete security against accidental slipping.

It was patented through the Scientific American Patent Agency, on April 18th, 1865. Address J. G. Bugbee, Bangor, Me., for further information.

ESSENCE OF COFFEE.—The Cincinnati *Gazette* announces that "pure essence of coffee" is now made in that city out of the "cheapest, dirtiest molasses," This molasses is boiled, cooled, and when hard, is broken and pulverized. Ground rye is then mixed with it, and a small box of the mixture, labelled "pure essence of coffee," is sold for eighty cents.

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