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A MAMMOTH BAND SAW.

A band saw, fifty-five feet long, sawing planks from a pine log three feet thick, at the rate of sixty superficial feet per minute—probably the most extensive experiment in log cutting ever undertaken and successfully carried out—is the subject of the illustration herewith presented. No more forcible instance of the great capability of the continuous saw blade can, we think, be adduced, nor its superior efficiency, as compared with the gate and circular saw, for the purposes indicated be better demonstrated, than by the details below given, obtained directly from Mr. J. J. Van Pelt, in whose mills (at the foot of 10th street, East river, in this city) the immense machine has, for some time past, been employed.

The saw, which is 55 feet long, 4½ to 6 inches wide, and of 16 gage, was made by the celebrated firm of Perin & Co., of Paris, France, at a cost of one hundred dollars. The machinery was constructed from the drawings and specifications of Mr. Van Pelt, by Richards, London & Kelley, of Philadelphia, Pa. The pulleys are of 75 inches in diameter, including hubs of wrought iron, and are mounted centrally on the main column so as to equalize the strain of the saw and prevent its springing, and to economize its weight. They are covered with a lagging of pine, over which is glued an envelope of heavy harness leather. The bearings for the wheel shafts are four inches in diameter and twelve inches long, and are made of an alloy of six parts copper and one of tin. The tension is from one to four tuns, and necessarily calls for the greatest rigidity in the framing to prevent the guides from being thrown out of position by the varying tension of the blades.

The timber lies perfectly still upon the carriage and hardly requires dogging at the ends. The first cut is directed by adjusting the log as the saw progresses, after which the slab face is carried past permanent gages, very much on the principle of common hand slitting. The operation brings into play several ingenious devices for supporting, setting, and guiding the log, inventions of Mr. Van Pelt, to which, however, no especial reference is here necessary.

The kerf of the band saw is one eighth of an inch, or less than one half that of a circular saw. Its speed is 4,500 feet per minute. We are informed that it cuts pine timber at the rate of sixty feet, and oak and yellow pine at thirty feet a minute, the logs being from one inch to five feet in thickness.

By far the most important advantage remains yet to be noticed. It is that the saw will follow the curvature of long timber, such as is used in shipbuilding and is cut with the grain. This not only causes no inconsiderable saving of material, but enhances the value of the work accomplished to such an extent that it is stated that deck planks, thus sawn, are worth fully ten per cent more than when cut by a circular blade. Another and more striking idea of its capability may be gathered from the fact that a board, one eighth of an inch thick, has been taken, without the slightest variation, from the whole length of a log fifty feet long and twenty inches through. In the establishment above referred to, we learn that from eight to ten blades are yearly expended, and that the cost of running is about the same as that of the ordinary forms of saws in common use.

We do not doubt but that this entirely novel application of the band saw will lead to future investigation, tending to develop still further its advantages. There is a great and growing interest manifested in this class of machinery throughout the industrial world, and no subject offers a more promising field for the researches of the inventor and the experiments of the practical man.

Reunion of an Amputated Finger.

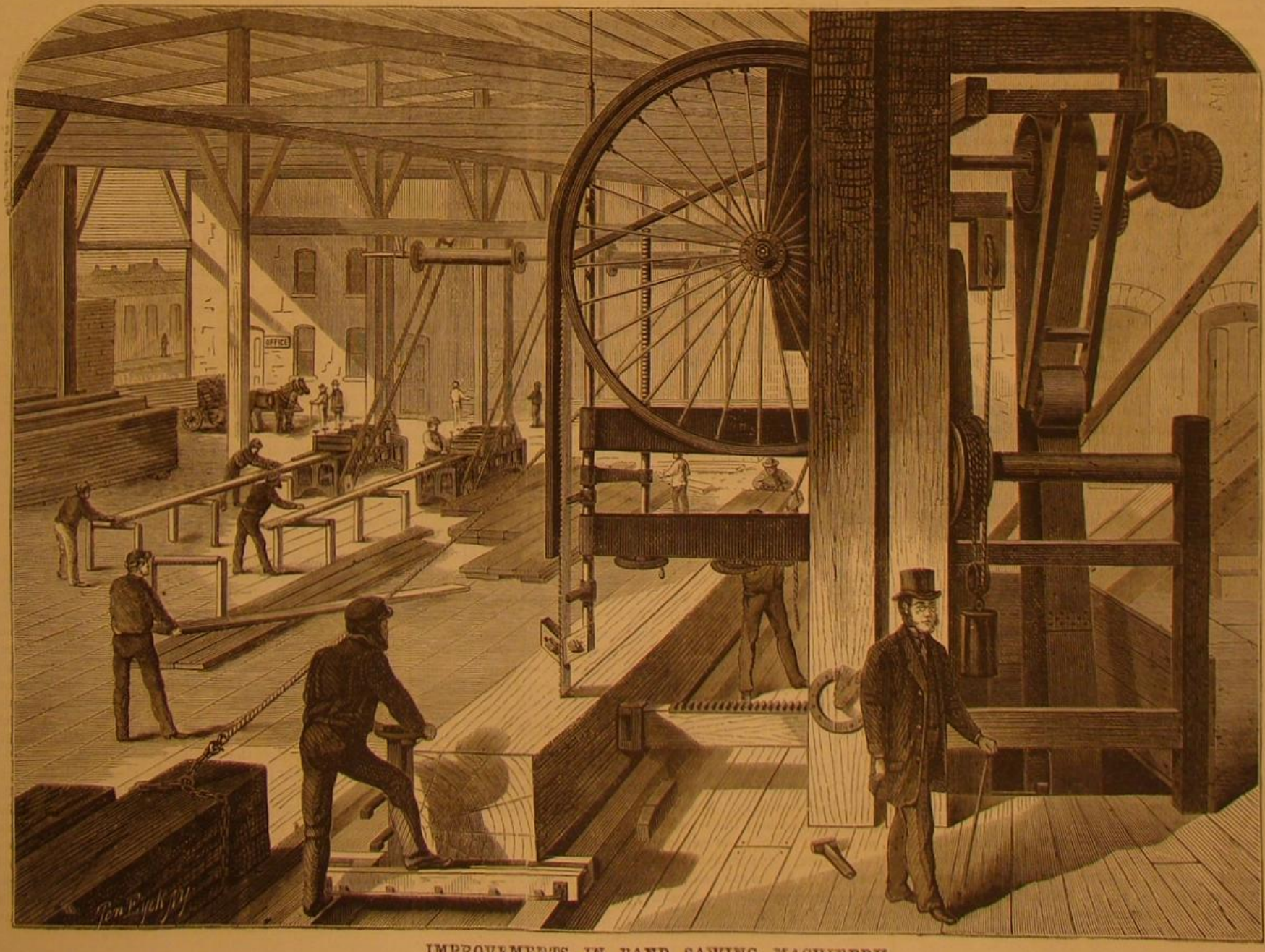
Dr. L. H. Barry, of Jerseyville, Ill., was recently called to see Mr. Solon W. Johnson, a resident of that city and a carpenter by trade, who had accidentally amputated a portion of the index finger of his left hand. When he arrived at the house, Mr. J. was busily searching for the amputated portion, which was finally found among some chips near the wood block upon which he had accidentally amputated it. The line of amputation was from a point midway between the center and outer margin of the free edge of the nail, through the nail, to a point an inch and a half from the end of the finger on its inner or proximate side, involving the joint. Although a half hour had elapsed since the accident, Dr. Barry thoroughly warmed the detached portion by placing it in a bowl of moderately hot water; and having carefully cleansed the stump, he placed the parts in accurate apposition, and secured them thus by adhesive strips and careful bandaging; and he then enveloped the whole hand in warm flannel, with directions to sustain the temperature by constant warmth, which was effected by placing his bed near the stove, and his hand on a piece of wood in the oven, the temperature of which, for two days and nights, was carefully regulated by an attendant.

On the fourth day suppuration commenced, when warm poultices were applied and continued for four weeks, using as a wash a weak solution of carbolic acid before applying the poultices. Not an unfavorable symptom presented. With the process of healing, sensibility was gradually restored; and in about two months from the occurrence of the accident there was complete reunion.

It is of the same length as before, and the nail has grown out perfect. In using the finger daily in picking up and holding nails, as he does in working at his trade, it sometimes, the patient says, becomes very tender; but the finger is certainly in a much better condition than it would have been with the hardened cicatrix which would otherwise necessarily have resulted, and there is a probability that he will gradually, to a great extent at least, recover the normal mobility of the joint.—*Medical Archives.*

PROGRESS OF HOOSAC TUNNEL TO MARCH 1, 1873.—Extensions of headings in February, 277 feet; opened from east end, westward, 13,480 feet; opened from west end, eastward, 8,996 feet. Total lengths opened, 22,476 feet. Length to be opened, 2,555 feet, being 85 feet less than half a mile.

THE circulation of the blood was discovered by Harvey in the year 1619.



IMPROVEMENTS IN BAND SAWING MACHINERY

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Contents.

(Illustrated articles are marked with an asterisk.)

A UNIFORM SYSTEM OF COLORS.

The importance of a uniform system of weights and measures has long since been accepted by the inhabitants of the civilized portions of the globe, and we appear likely to attain this object before the lapse of many years; but uniformity in the nomenclature of colors has not attracted so much notice, and since the immense progress of organic chemistry has given us such a vast variety of shades and tones, the want of a precise scale of designation is severely felt by the dyer and calico printer. For linear measurements and afterwards for weights, founded on cubic capacity, we can easily adopt a uniform unit. The French meter and the decimal grade are admitted on all sides to be the best. It is somewhat remarkable that we must also look to the French nation for our scale of colors. The great authority in all matters of pigments and dyes is Professor Chevreul, Director of the famous Gobelin tapestry manufactory of Paris. The researches on color made by Chevreul were of the most exhaustive character, and his treatise, published many years ago, is even now the best book extant on this subject. We find in the *Manufacturer's Review* an outline of Chevreul's classification of colors, taken from a recent work of Van Laer, which we substantially reproduce on account of the importance of the subject and its direct bearing upon the question of a uniform system of colors. The great difficulty experienced by all classes of persons who use colors, whether artists or calico printers, is to define precisely what they want. Yellow, red and blue are general terms, comprehending a variety of shades and tints, which may be approximately described as light, dark, bright, dull, and the like; but anything like mathematical precision in naming them cannot be attained. Hence, although the dyer may have the proportions for printing scarlet, yet the precise shade cannot be given for want of a suitable nomenclature. The great chemist Chevreul fully appreciated all of these difficulties and, after long years of research, finally invented a system by which we are enabled to describe 14,000 different shades of color with mathematical accuracy. He succeeded in classifying all shades of color by recognizing in each three principles of modification:

1. The kind of color: red, orange, yellow, green, blue, purple, violet, embracing 72 types.

2. The tone or degree of intensity, pale, tender, feeble, delicate, vigorous, somber, etc., embracing 21 tones.

3. The degree of purity or of mixture with gray or black: free, fresh, fine, pure, dead, dull, subdued, etc., embracing 10 degrees.

This system resembles that in geometry in which the position of any point in space is defined by referring it to three axes at right angles to each other. Seventy-two colors were arranged by Chevreul in a circle on a round table, so that 23 fell between red and yellow, 33 between yellow and blue, 23 between blue and red, thus yielding 72 types. By employing the symbols, R, O, Y, P, B, etc., for red, orange, yellow, purple, blue, etc., and making use of numerals, it is possible to designate any color. For example, sulphide of cadmium is 5 O, straw is 5 OY, sulphur, 3 Y, apple green 4 Y G, and so on through a long list of tints. "If," says Chevreul, "you suppose the color of each type to pass from pale in the center of the circle, increasingly to deep, almost black, on the circumference of equal gradations, you will have, I suppose, about twenty tones of the same type color, the first lightly colored, the second a little more, the third still more, up to the thirtieth, which will be almost black. The whole forms what I call the scale of that color. We have here already 72 × 20 divisions, or 1,440 different shades, arranged systematically in a chromatic circle. Now, if we darken all these shades by the addition of $\frac{1}{10}$ of black to each, we shall have a second chromatic circle; then by adding $\frac{2}{10}$, $\frac{3}{10}$, etc. up to $\frac{9}{10}$ of black, which will yield the fine black devoid of all color, we shall have 10 chromatic circles or 14,400 shades, or rather 14,420, if we add the 20 intermediate tones between gray and black. All the subdued colors may thus be classified with the greatest ease. By means of these ten circles, all the shades may be described, for each is defined by the type of its scale, by its tone, and by the degree of black which may belong to it. Thus the expression 3 R, 12, $\frac{3}{10}$, signifies the color corresponding to the scale 3 of red, 12 tone, subdued by $\frac{3}{10}$ of black; this is the madder red of the French uniform."

By employing a chromo-lithograph of Chevreul's circle, samples of yarn may be assigned their true places in the system, and the nomenclature becomes intelligible to experts in dyeing; and it is possible to order skeins of any conceivable shade of color. If the colors on the chromatic circles are absolutely correct in the copies distributed for sale and comparison, the unit of colors would be as well established as is the unit for the meter; but it is difficult to start with the same shade without having recourse to a uniform standard. The question arises: What shall we adopt as our standard for the primary colors? If we take certain precipitates, we know that they vary according to the amount of water they contain and the purity of material. We cannot adopt the color of plants, insects, or minerals, as they are all open to the objection of want of uniformity. Dr. Walz has suggested the colors that would be thrown upon a screen by sunlight refracted by a prism, of a fixed angle and other prescribed regulations as to width of slit, position of the tubes, etc. The violet, indigo, blue, green, yellow, orange, and red would be likely to have a constant standard when obtained in this way, and we should approximate pretty closely to a uniform system of colors. It is important to start right in the adoption of colors, and to put it in the power of everybody to make his own scale by analysis of sunlight. The suggestion of Dr. Walz is worthy of consideration.

PAPIN'S DIGESTER FOR COOKING.

A German exchange gives an account of comparative experiments made with an ordinary cooking pot and one of Papin's digesters, which merit more attention than they are likely to receive unless the facts are more generally made known. Papin originally invented the digester to extract a greater portion of fat and gelatin from bones, and it has long been employed by the chemist and pharmaceutist for this purpose, but its adaptation to the wants of the kitchen has escaped notice. The digester is a pot (provided with a pressure gage), the cover of which can be screwed down, so that the contents can be subjected to both heat and pressure. A pressure of five atmospheres is found to be convenient for cooking purposes, and a great saving of time and fuel, as well as of the aromatic and soluble portions of the viands, is effected in this way. With a loose cover, the temperature is constant at 100° C., but with the cover screwed down and under a pressure of five atmospheres, the temperature rises to 150° C., and the cooking is more rapidly and thoroughly done. With a loose cover, there is an escape of steam, and consequently of aroma; with a fastened cover, there is only slight escape of steam through the safety valve, and no loss of volatile matter. The firing must be regulated to prevent the generation of too much steam. The employment of a higher pressure than five atmospheres is not advisable, as it involves stronger vessels and greater caution.

In the experiments instituted by Professor Junichen, of Lucerne, Switzerland, the same quality and quantity of food was taken for each trial. The food was cooked in an open pot and in the Papin digester; and as gas was employed in both instances, it was possible to measure accurately the amount of fuel consumed. The consumption of fuel and the time was computed from the commencement of the boiling in each cooking utensil. The results are given in the following table:

	Ordinary cooking pot.		Papin's digester.		Saving per cent.	
	Time in minutes.	Cubic ft. gas.	Time in minutes.	Cubic ft. gas.	Time.	Gas.
Beef	150	2·49	42	0·55	72·95	77·91
Smoked pork	117	2·82	38	1·08	62·52	61·70
Potatoes	53	1·43	20	0·50	62·26	65·03
Yellow peas	113	1·70	48	0·77	57·52	54·70
Plums	24	0·59	9	0·22	62·50	62·71
Whole pears	167	3·15	52	1·22	68·86	61·27
Pears, halves	162	2·50	46	0·78	71·60	68·80
Apples, sweet	134	2·52	43	0·58	67·91	76·98
Chestnuts	147	3·12	57	0·97	60·22	68·91
Mean saving					65·54	66·09

According to these experiments, the saving of Papin's digester, in time and fuel for nine different articles of food, amounts to 66 per cent, or two thirds: that is, if an ordinary cooking utensil requires three units of time and fuel, one unit is required for Papin's digester, or one cord of wood goes as far with Papin's digester as three cords with a common cooking pot. The subject is worthy of further investigation.

DANGEROUS MINERAL OILS.

Dangerous burning oils do not appear to be confined to America, as we find in the list of English patents a curious record of nostrums which are put into kerosene to render it non-explosive. It may be well to give some of the mixtures as contained in the patent list:

1. Gasolin, 40 gallons; gum olibanum, 1 lb.; cascarilla bark, ½ lb.; Iceland moss, ½ lb.

2. White oak bark, 2 lbs.; alkanet root, 2 lbs.; alcohol, ½ liter; cyanide of potassium, 30 grammes; to be added to 3 gallons of naphtha.

3. Naphtha, 40 gallons; carbonate of soda, 3 lbs; alum, 2 lbs.; hydrate of lime, 2 lbs.; red ash, 2 lbs.; camphor, ½ lb.; oil of saffron, 12 grammes; essence of tar, 30 grammes.

4. Naphtha, 40 gallons; potatoes, 50 lbs.; lime, 4 lbs.; sal soda, 4 lbs.; turmeric, 3 lbs.

5. Gasolin, 40 gallons; sal soda, 1 lb.; cream of tartar, 1 lb.; add enough oil of wintergreen to mask the odor.

6. Gasolin, 40 gallons; sulphur 5 lbs.; iron rust, 100 lbs.; onion, 1 bushel; resin, 5 lbs.

7. Naphtha, 40 lbs.; caustic soda, 1 lb; alum, 1 lb.; salt, 1 lb.; manganese, 30 grammes; water, 120 grammes.

It appears almost incredible that recipes like the above should be proposed in the present age. They read like the absurd mixtures of alchemistic times, and ought to be exposed and denounced on all occasions. None of the additions can have any other effect than to disguise the color and odor of the burning fluid, to clog the wick of the lamp with impurities, and diminish the illuminating power. The chances of explosion are not in the least affected by them, as it is the vapor, when mixed with a proper proportion of air, that explodes, and not the oil. No oil is safe which gives off this vapor at low temperatures, no matter how many potatoes or pounds of sulphur there may be added to it. Nearly all of the patented oils mentioned above have been offered for sale in the United States under fancy names, such as "liquid gas," "aurora oil," "safety gas," "puroline," "petroline," "septoline," "hexoline," "safety oil" and the like. The agents who hawk these wares about the country display great ingenuity in deceiving their customers. They pour some of the oil into a can, and again empty it and sit down on the can while a match is applied to the opening. They have as many tricks as the Chinese jugglers, and generally persuade their victims to make a purchase. As it requires eight or nine parts of air to one of the vapor to produce an explosive mixture, and as equal volumes of air and vapor will burn quietly, they take care not to bring about the mixture that will send them up into the air, but make the proportions most favorable for their purposes. Unfortunately, when the lamp burns low, just the right proportion of air and vapor is attained to occasion an explosion, and the accident is unavoidable.

Many of the substances mentioned in the above list settle down to the bottom of the cask, and have no more effect than so many pebbles or small shot.

The only safe oils are those known to emanate from responsible, honest refiners, and none others should be trusted. Our laws are stringent enough, but these oleaginous rogues drive a coach and four through them with impunity.

SAILING FASTER THAN THE WIND.

It appears from letters which we have received that some of our correspondents are unable to realize the possibility that a sailing vessel, such as an iceboat, can under certain circumstances go faster than the wind which drives it; they do not believe the accounts of such feats, especially as there must always be some uncertainty in regard to the velocity of the wind, in cases where no special measurements were taken with an anemometer, while the velocity of the sailing boats was recorded. Since the expression of our opinion about this matter, stating that the velocity of a sailing ice boat could surpass that of the wind, we have received several letters containing arguments against that opinion; but the writers fail to consider the true conditions under which this remarkable result can take place.

In order to proceed regularly in our explanations, we must first consider the case of a boat sailing directly before the wind; from the moment of starting, the velocity will increase and consequently the pressure of the wind on the sails will diminish. This acceleration of the boat will continue till such velocity is attained that the resistance to the progress of the boat, by friction (which increases with the velocity) becomes balanced by the pressure of the wind on the sails (which diminishes with the velocity); as soon as this point is reached, the motion becomes uniform. We have here the same conditions as govern the acceleration of a railroad train, and the uniformity of motion which it will finally attain; these conditions are well recognized by all railroad engineers. An ice boat sailing before the wind, therefore, can never attain the velocity of the wind which drives it, because, if it went as fast as the wind, the pressure on the sails would cease and the motion would be retarded; then the pressure of the wind would again be felt and increase during the retardation till the conditions were again reached in which the wind pressure balanced the resistance to the motion.

If a boat does not sail directly before the wind, but at an angle of, say, 45°, the sails are set so that the wind strikes them nearly perpendicularly; therefore, in this case, the sails are placed at an angle of about 45° with the direction of the vessel. Here the law just explained will be also applicable; the velocity of the vessel will increase, and the pressure of the wind diminish till it balances the increasing resistance to the motion; and here also the vessel can never attain the velocity of the wind. This is exactly the case which some of our correspondents assumed, and in which they attempted to prove, by the application of the parallelogram of forces, that the resultant could never equal the original propelling power. After the above explanation, it is scarcely necessary to test such a case in this way, as the result may be anticipated. Besides, the application of the parallelogram of forces to the case under discussion is not legitimate, as a sailing iceboat is not really propelled by two forces. It could be applied when a steamer uses sails as well as steam; but in the case of a sailing boat, there is only one force, which, acting in a certain direction, may under certain circumstances develop a velocity greater than itself, as

may be the case with every one of the so called six mechanical powers.

The latter give the clue to the problem in question. It is identical with the case of a wedge pushed forward by side pressure. In Fig. 1, let C *c b* represent the direction of the vessel, A B the direction of the wind, and A C the position of the sail; it is clear that, by the sideward gliding pressure of the wind on the sail, the wedge A B C will be driven forward in the direction C *c*, till it has attained the position *a b c*; then, if the sails be placed at an angle of 45°, as in the figure at A C, they will when moving, in the same time as the wind through A B, through the same space, *b c*, receive no more pressure, and we have again the conditions as before: that the vessel can never attain the velocity of the wind, but only such a one in which the wind pressure will balance the resistance.

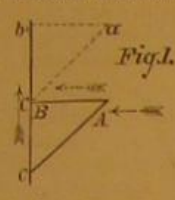


Fig. 1.

Let us, however, consider the case that the sails are set more sharply to the wind, as in Fig. 2, then A B C will move through a much greater distance to *a b c*, than the wind from A to B; and it is evident that, when the vessel has moved through the distance, A *a'*, equal to A B, the sails will have receded only a much smaller distance, and that the space passed over by the wind from A to B will correspond with a much longer distance (from A B to *a b*) and that, when the vessel has attained double the velocity of the wind, the pressure of the latter on the sail A C, *a' c'*, *a c*, and consequently the propelling power, will go on, and the wedge, A B C, will slide forward with accelerated velocity till again the resistance will be equal to the propelling power.

Fig. 2.

It is evident that in water, by reason of the leeway, the theoretical velocity cannot be as nearly approached as with a sailing iceboat, in which, when cutting the ice with sharp runners, there is little or no leeway and also much less resistance by friction than is the case in water; therefore, in the case of iceboats, the seeming paradox, that they go much faster than the wind that drives them, is often accomplished

All those experienced in the management of iceboats know this, and therefore do not need to be convinced by the above arguments, which are only intended for the unbelieving minds, who have taken the trouble to enter into correspondence with us about it.

THE INVENTION OF THE LEYDEN JAR.

Certain parts of works on physical science, written a century or more ago, are at the present day sometimes very interesting to read an account of the expressions of delight indulged in by the authors, on matters which, at present, are considered of a trifling interest compared with what is now known in regard to the sciences of nature. Priestley, in his "History of Electricity," published in London, 1767, says: "The end of the year 1745, and the beginning of 1746, is celebrated by reason of the most astonishing discoveries which have ever been made in the whole field of electrical science, namely, the wonderful condensation of this force in a glass named the Leyden jar, because it was first made by Cuneus, of Leyden, while experimenting with Professor van Muschenbroek," etc. How would the author be amazed if he could return, after a sleep of only one century, and be initiated in the since discovered mysteries of galvanism, voltaic batteries, electro-plating, electro-magnetism, dynamic electricity, the electric light, magneto-electricity, the laws of Ohm, the electric telegraph, the modern electric machine, the condenser (which is, for voltaic electricity, what the Leyden jar is for frictional electricity), the Ruhmkorff coil, the Geissler tube, the application of the spectroscope to substances illuminated by electric light, the effect of electro-magnetism on polarized light, and then finally witness the modern experiments which promise discoveries that, during the next century, will even put all these in the shade!

The history of the discovery of that form of electric induction on which the invention of the Leyden jar is founded, is thus given by Desaguillers: "Professor van Muschenbroek, of Leyden, Holland, and some of his friends, observing that electrified bodies, exposed to the air, lost their electricity rapidly, imagined that, if they inclosed a conducting body in a non-conductor, it would become possible to charge more electricity into the conductor and retain it longer. As a glass bottle was the most convenient non-conductor, and water the most common conductor, water was placed in a bottle, a brass rod put in the water, and the same charged by the intervention of this rod; but nothing particular was observed till Mr. Cuneus, who supported the glass flask by his left hand while it was being charged, supposing that the water had received as much electricity as it could contain, attempted to withdraw the brass wire with his right hand, when he was suddenly frightened by a violent shock in his arms and chest." The water served here for the inner coating of the jar, and his left hand for the outer coating; and yet, however simple and easily repeated the experiment is, there were at that time many experimenters who, after reading the published accounts and trying it for themselves, did not succeed, being still in the dark about the conditions required for success, which at the present day are so well known.

It has been proved that the discovery of the same principle and its application by Von Kleist, in Germany, in the same year, was without knowledge of the above, each investigator working independently of the other. Those who succeeded gave the most exaggerated account of their feelings. Professor Van Muschenbroek, who made the experiment with a flask of very thin glass, and therefore obtained a most powerful charge, declared in a published letter that he was so violently struck in his arms, shoulders, and chest that he lost his breath, and two days elapsed before he was recovered from his fright. He adds that he would not submit to a second shock for the whole kingdom of France.

M. Allamand made the experiment with a common glass tumbler, and says also that the shock took his breath away, that he felt such a violent pain in his arms as to fear serious consequences, but that it passed over without injury to him. Winckler, of Leipsic, tells another story. He says that when he first performed the Leyden experiment upon himself, he felt strong convulsions over his whole body; his blood was brought into a most violent agitation, and a burning fever would have been the result if he had not taken cooling medicines. He felt also a heaviness in his head, as if a large stone laid upon it; it caused him twice to bleed at the nose, which otherwise seldom took place. His wife appears to have been of an investigating turn of mind, and much less afraid than he; she took the shock twice, but Winckler says that she was then so weakened that she could not walk, and a week later, having obtained the necessary courage to permit him to give her another shock, she commenced at once to bleed from the nose.

But everybody was not so foolishly frightened. M. Bose, with a truly philosophical courage worthy of Empedocles, wished to be killed by the electric shock, in order that the account of his scientific death might procure an article for the Memoirs of the French Academy of Sciences, but his wish was not fulfilled.

The electric shock produced by the Leyden jar attracted then so much general interest that many persons traveled around Europe and made a living by administering it, some of them pretending to cure by it all kinds of diseases.

Foremost of those who advanced this branch of science must be mentioned Gralath, in Germany, who, in 1746, gave the shock at great distances and through twenty persons at once, and invented the electric battery, consisting of a number of Leyden jars. Finally, Drs. Watson and Bevis, according to the *Philosophical Transactions*, found the modern method of covering the outside of the jars with tinfoil, while the first connected several separate masses of combustible fluid with metallic wires, and ignited them all with the same spark. After accounting for many other experiments, he says, in a prophetic style: "Notwithstanding the many great discoveries made during the latter years in this branch of natural sciences, posterity will consider our knowledge to be in its infancy; therefore we must, in so far as experiments justify us, be ready to modify or abandon our conclusions as soon as other more probable theories are proposed."

Another investigator, quoting these words fifty years later, says: "Considering the rapid progress since that time, we may hope that even the so enormously advanced science of the present day (1795) will, at some future time, be looked upon as merely in its infancy."

These prophecies have been fulfilled, and who dares to assert that the climax of knowledge has now been reached? Have not the number of discoveries and their importance been progressing, since that time, in an increasing ratio? Have not our scientists become more and more expert in the art of making discoveries and inventions? What then will posterity witness only thirty years hence, in the beginning of the twentieth century? Who can prophecy the mysteries of the future, in regard to science, which is always surpassing anything man can conceive *à priori?* Who can name a subject more interesting, more useful, more fascinating, to the lover of truth, progress, and beauty?

SCIENTIFIC AND PRACTICAL INFORMATION.

FLY WHEELS FOR STEAM ENGINES.

The rule given by Molesworth for weight of fly wheel rim is as follows: Multiply the average pressure on the piston, in pounds, by the length of stroke in feet and divide by 45 times the diameter of the wheel rim. The result will be the weight of the rim in hundredweights. To obtain the weight in pounds, multiply by 25 instead of dividing by 45.

Haswell says that the weight of the rim should be from 85 to 95 pounds per indicated horse power of the engine, and gives a rule which, algebraically expressed, is as follows:

$$W = \frac{PS}{0{\cdot}00023\ R^2\ D},$$

where W is the weight in pounds, P the mean pressure on the piston, S the length of stroke in feet, R the revolutions per minute, and D the diameter of the wheel. The late Professor Rankine gives a rule which he expresses thus: $W = \frac{mg\ \triangle E}{V^2}$, where mg has a value of from 1,000 to 1,500, and $\triangle E$ is the fluctuation of energy in the machine during one revolution. Professor Thurston gives us the following memorandum:

"The effect of a fly wheel will depend upon the proportion which the product of the weight into the square of the velocity of its rim bears to the quantity of work which is alternately stored up in it, and restored by it. The latter quantity will vary with the length of stroke of the engine, the size of its cylinder, the pressure of steam carried, and the point of cut-off. It would be difficult to construct an exact formula that would be adapted for general use, but the following rule will give good results with our best forms of engine with considerable expansion:

"Multiply together the area of piston, in inches, length of stroke, in feet, and highest proposed steam pressure; divide the product by the square of the product of the diameter of the wheel, in feet, by its lowest proposed number of revolutions per minute. Finally multiply the result by 90,000. Algebraically the rule is thus expressed:

$$W = 90{,}000\ \frac{A\ S\ P}{W^2\ D^2}$$

"This formula was first proposed in 1867, and has given satisfactory results. Its author prefers it, for ordinary purposes, to any other published.

"To determine the sectional area of the rim from its weight, divide the given weight by ten times the diameter in feet, and the result will be very exactly the cross section of the rim in square inches."

We here offer, to those of our readers who have written for the information, something of a range within which to choose for themselves. It is, of course, better to make a fly wheel a little too heavy than a little too light, while (as, for example, in cotton mills making fine goods) a perfect regularity of speed is of very great importance.

PRESERVATION OF FOOD.

A singular incident of the preservation of food in hermetically sealed vessels is mentioned in the work on the Swedish expeditions to Spitzbergen and Bear Island, in the years of 1861, 1864, and 1868, under the direction of O. Torrell and A. E. Nordenskiold.

The Æolus was, on July 13, 1861, at Shoal Point, one of the most westerly points of the island of North Eastland, which is separated by a sound from Spitzbergen. A sailor named Mattilas came on board with the news that he had made a discovery on shore. It was found to be a depot, which had been established thirty-four years ago by Parry's expedition; and in it a gun totally unfit for use, a wooden box with ammunition (cartridges, caps, and powder) in good preservation, and eleven sealed cans were found. Everybody was curious to see whether the contents of the cans had resisted decay for 34 years. Mattilas opened one of the cans, and in it was discovered roast meat, with jelly and fat, as well preserved as if it had been prepared but yesterday. On the larger cans were found the words "seasoned beef" stamped in the top part; the smaller ones had the inscription "rounds of beef." One can contained spoiled coffee. The wood of the box, as is the case with nearly every bit of wood found at Spitzbergen, has not in the least decayed.

DISTILLATION BY COLD.

At a recent meeting of the Chemical Society of Berlin, a method was proposed by Smee for the detection of organic matter in the air, and at the same time for performing distillation by cold. A glass funnel drawn out and closed at the bottom is placed in a filter stand and filled with ice. The moisture of the atmosphere condenses on the outside of the funnel and runs slowly down into a capsule beneath. The quantity of liquid obtained in a given time is measured and the ammonia in it determined by the usual methods. The quantity of ammonia affords *data* for testing the amount of organic matter in the air. Certain substances that would be destroyed by heat can be condensed or distilled in this way. For example, the volatile odor of flowers, if placed with the ice filter under a bell jar, would impregnate the water and be actually distilled by the ice. It thus appears that the condensation of moisture on a tumbler of ice water is capable of practical application.

CUPRO-AMMONIUM AS A SOLVENT FOR CELLULOSE.

We have received numerous inquiries in reference to this reagent, its preparation and methods of application. Cupro-ammonium or ammonio-cupric oxide is a solution of the oxide of copper in ammonia. If we allow aqua ammonia to trickle slowly over copper turnings, some oxide of copper is formed which dissolves with an intense blue color in the excess of ammonia. Leaving ammonia for some time in contact with the copper, and occasionally shaking the vessel to secure access of air, will also yield it. Perhaps a more rapid way is to cautiously add ammonia to a solution of sulphate of copper, then to filter off the supernatant liquid from the precipitated oxide of copper, and to dissolve the fresh oxide in ammonia. It ought to be borne in mind that the cupro-ammonium re-agent must be concentrated, as the dilute has little effect. As this is a solvent for cellulose and not for all sorts of impurities, the various substances to be tried must first be freed from extraneous matters. As much of our paper is weighted with French chalk, *terra alba* and sulphate of baryta, these mineral compounds may interfere with the experiments. Pure linen paper, such as is employed in the manufacture of gun cotton, ought to dissolve in cupro-ammonium very readily. Sea weed, grass, straw, ramie, etc., would require treatment with caustic soda to dissolve out the silica and other impurities. Peat, being nearly pure carbon, would not be readily acted upon. To waterproof the paper, only the surface is acted upon and the sheets are heavily pressed between rollers. Instead of trying tungstate of soda to render wood and paper fireproof, it would be well to experiment with soluble glass as being a much cheaper article.

It must not be forgotten that chloride of aluminum is also said to be a solvent for cellulose, and there may be cases where this re-agent would serve a better purpose than the more expensive copper salt. Sulphate of aniline yields a yellow color with wood fiber, and this reaction may be employed for the detection of the adulteration of linen paper by wood. There are doubtless many uses to which it would be possible to apply precipitated cellulose, and we trust that our correspondents will persevere in their experiments upon the cupro-ammonium solvent.

HE that has no resources of mind is more to be pitied than he who is in want of necessaries for the body.

ELASTIC WASHING MITTS.

The friction necessary to proper washing of clothes was formerly obtained at the expense of the skin of the knuckles of the operator, but this destruction of the animal tissue has long since been obviated by the invention of the corrugated washboard. In many cases, however, the board is not so convenient as a manual operation, and to facilitate the latter, an india rubber mitt has been invented and patented by Mr. Marvin Cadwell, of Lansing, Mich.

The covering for the palm of the hand is provided with

rings which engage with the middle fingers and with straps and a buckle, by which the device is attached to the hand of the operator. Each side of the palm is provided with corrugations; those on one side may be smaller and finer than those on the other, the sides to be changed in use for rubbing coarse or fine fabrics. In manufacturing the mitt, a rectangular piece, a little smaller than the portion which forms the corrugated part, is cut out of the palm, and the latter is then stuck upon the former to cover the hole thus cut out. The whole is then put into proper molds, and the corrugations and rings are formed by a press into which the molds are placed for the purpose. By this method, the palm with its corrugations is made harder and less elastic than the other portions, so that the latter can the more readily adapt themselves to the shape of the hand.

Statistics of Foreign Scientists.

M. de Candolle, an eminent Swiss naturalist, has recently published, in Geneva, a volume composed of interesting facts with reference to the eminent scientific men that have lived within the last two centuries. The *English Mechanic* of late date prints a lengthy review of the work, from which we select the following conclusions:

One question put by the author is, from what class of society do most of the scientific men of the world spring? In instance of the French Academy, he says that 37 members belong to the nobility or to rich and aristocratic families; 46 are from the middle class, and 6 from the working class. He considers from this and other cases, therefore, that the middle class is the most productive. As examples he cites Huyghens, Cassini, Newton, Cavendish, Volta, and Humboldt, as being either noble or wealthy; Leibnitz, the Bernouillis, Lagrange, Herschel, Berzelius, and Robert Brown as in the middle ranks of life, and Davy, Faraday, and Gauss as sprung from poor parentage.

M. de Candolle's observations do not confirm the view that intellectual faculties are hereditary. Of 94 foreign associates of the French Academy, he says that but 3 had sons who reached the same dignity. It does not appear that distinguished savants are specially descended from men devoted to the cultivation of the sciences, such as professors, doctors, and engineers. It is among the mathematicians that the heredity seems most marked. This is shown in the eight Bernouillis, Albert Euler, son of Leonard, and Clairaut, son of a professor of mathematics.

As regards religion, from the lists of foreign members of the Royal Society in London, the number of Protestants is found to nearly equal that of Catholics. Outside of the British Isles, it is estimated there are 140,000,000 of Catholics and 44,000,000 of Protestants, so that the latter furnish relatively three times more foreign members to the Royal Society than the former. In the roll of foreign associates of the French Academy, there are no English, Irish, Swiss, or Austrian, and but few German Catholics.

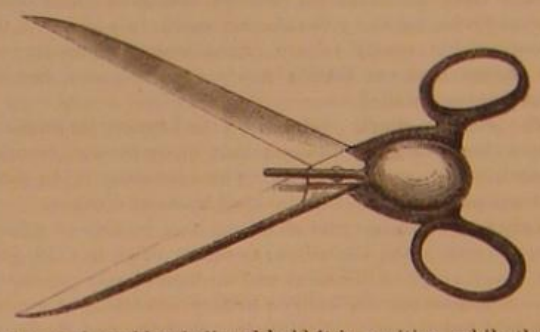
Another remarkable result is that, if the list of professions of fathers of eminent savants be studied, the profession furnishing most is that of Protestant pastor; Boerhaave, Wargentin, Hartsoecker, Euler, Campe, Linné, Blumenbach, Olbers, Wollaston, Jenner, Mitscherlich, Robert Brown, Berzelius, Agassiz, John Wallis, Fabricius, Arthur Young, Encke, Heer, Bernard, Studer, and Clausius, are all thus descended. The author also finds that a large number of distinguished scientific men are the posterity of the 50,000 refugees who were expelled from France after the revocation of the Edict of Nantes. Among these are the names of Mallet, the astronomer, Agassiz, and Desor, naturalists, and many others of note.

As to the part taken by Catholic ecclesiastics in the progress of science, it appears that the Abbé Haüy, in the beginning of this century, is the last priest who made a name for himself in the positive sciences. Padre Secchi, at Rome, is the only Romish clergyman of scientific eminence at present.

In general the smallest countries have been relatively the most productive, and among these Switzerland has always held the first rank. M. de Candolle enumerates as follows the influences which, in any country, favor the development of science: 1. A well organized system of instruction independent of parties, tending to awaken research, and to assist young people devoting themselves to science. 2. Abundant and well organized material means for scientific work, libraries, observatories, laboratories, collections, etc. 3. Freedom of utterance and publication of any opinion on scientific subjects, without grave inconvenience. 4. The habitual use of one of the three principal languages, English, German, and French, and extensive knowledge of these languages, among the educated classes.

BARBER'S HAIR BLOWING APPARATUS.

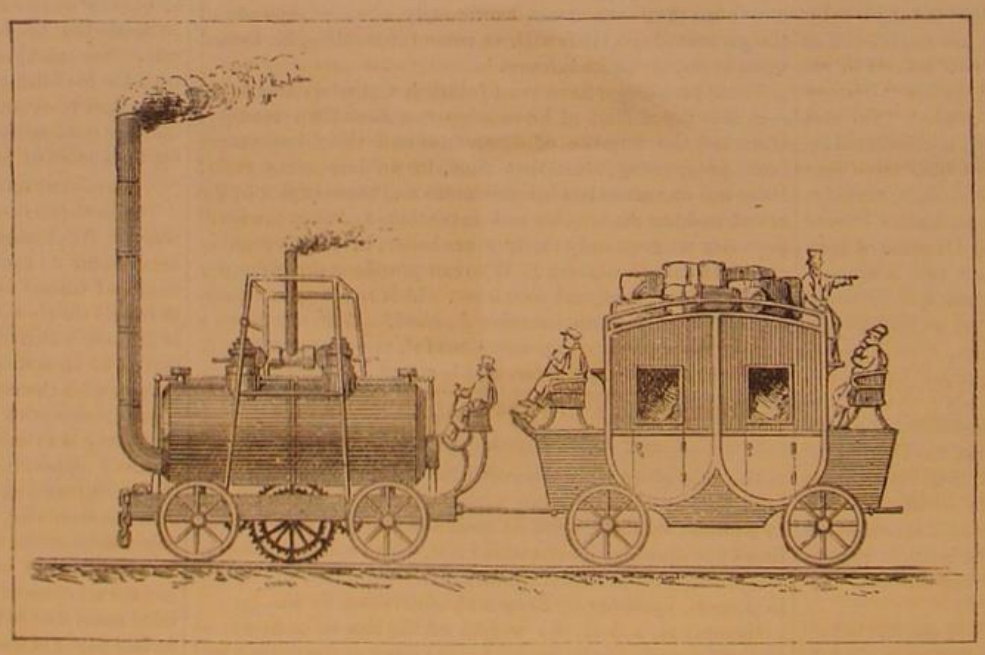
One of the most unpleasant circumstances of the hair cutting operation is caused by the short pieces of hair falling down the neck of the patient, creating irritation both to the skin and the temper. Mr. W. C. McIntire, of Washington, D. C., attaches, to a pair of barber's shears, an elastic hollow ball which is compressed by the operation of cutting; and a current of air, forced out from the ball, is directed along the edges of the blades and blows away the fragments of hair as fast as they are cut. The ball is taken between the thumb and fingers and slightly compressed, and then located between the handles; and when the pressure is relieved, the handles of the shears find their way into creases formed in



the sides of the rubber ball and hold it in position, while the ball, by its elasticity, forces apart the handles and opens the blades. The inventor claims that the improvement can be advantageously attached to shears for other than barbers' use.

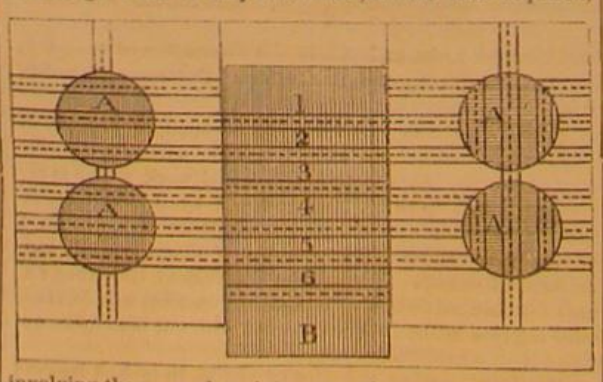
EARLY PLANS FOR RAILWAYS.

We recently referred to some of the curious pictures contained in the early numbers of the *Mechanics' Magazine*, and we now present another, being an illustration of the railway proposed in 1823, between London and Edinburgh. It will be observed that the track was composed of grooved rails, in the middle of which were teeth, and the tractive power was



PRIMITIVE RAILWAY.

obtained by cog wheels arranged on the locomotive. At suitable intervals, sliding tracks and turntables were to be arranged for the purpose of shifting the cars from one track to another. It was stated as an advantage of such a road that, instead of changing coach horses between London and Edinburgh some twenty-five times, as was then required,



involving the use and maintenance of more than 100 horses for each coach, the whole journey, with several coaches, would be performed in much less time, and with greater comfort to passengers, by means of a single steam engine.

IMPROVED FOLDING CHAIR.

A cheaply and easily made folding chair is shown in the engraving herewith, and is the invention of Mr. Charles A. Jackson, of Boston, Mass., who has patented it. A is the seat, B the back, C the front legs, and D inclined bars which, in conjunction with those portions of the side rails of the

back which extend below the seat, act as hind legs for the support of the seat when the chair is extended. The inclination of the back and seat can be varied, for which purpose notches are cut in the bars, D. It will be understood, from the illustration, that the chair, when not in use, can be folded up into a very small compass.

Manufacturing Paper from Wood.

Professor Heisch states, in the *Chemical Review*, that by Houghton's process for making paper pulp from wood, at least 80 per cent of the soda is recovered. He says: "What I mean is that, if you start with a solution containing 100 lbs. of real soda, after boiling the wood, precipitating the resin with carbonic acid, and rendering the liquid caustic by lime, you will have a solution containing about 83 lbs. of real soda, so free from resin as to be quite ready for a second boiling. The total loss, chemical and mechanical, is only about 17 per cent.

It will be some time before the salts of soda formed will accumulate in the solution to an extent to interfere with its use, and when they do so, the alkali can be recovered, by burning, far more advantageously from being comparatively free from resin."

Transparent Albumen Pictures.

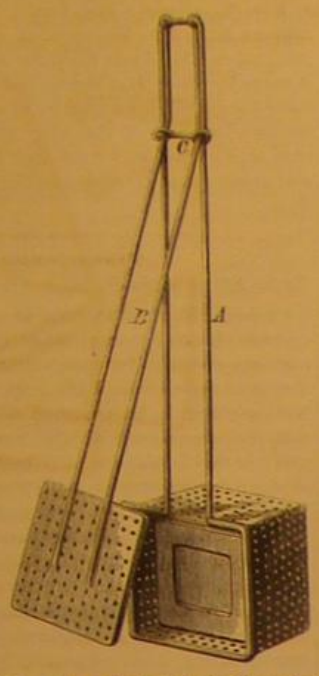
The use of transparent slides for magic lanterns makes it desirable to have a ready process for their preparation. G. Willis suggests the following: Make a solution of india rubber in benzole, of the consistence of ordinary collodion. Float a sheet of paper half a minute upon it and, after drying, albumenize in the usual way. Take the whites of eggs; for every egg add 7 or 8 grains of chloride of ammonia dissolved in little water; beat thoroughly and filter. Float the rubber paper on it in a warm place, taking care to avoid air bubbles. The paper dries rapidly, and can be preserved for a long time. The sensitizing and printing are performed as usual, only taking care to produce a much darker picture. The print is washed to get rid of the silver; it is then, before toning, laid on a glass plate and firmly pressed. After drying, the upper side of the picture is moistened with a tuft of cotton dipped in benzole; and after gentle rubbing, the paper can be removed from the plate while the picture remains on the glass. The gold toning and fixing of the picture is then performed, taking care to use a dilute soda solution, as one more concentrated attacks the picture. It must not be forgotten that an albumen picture on glass requires to be much stronger than a paper positive, and hence the necessity of a dark print. A transparency thus pressed is much finer than the slides taken in the usual way, and will bear magnifying without appearing granular.

The process has this advantage, that a supply of the rubber paper can be kept on hand, ready for sensitizing the same as ordinary albumen paper. The india rubber paper can be coated with chloride of silver collodion, printed, and transferred as above. Greater precaution is necessary in the latter case in toning and fixing, as the collodion print is more easily attacked than the albumen film; hence the albumen process is preferred by most photographers.

TO CEMENT GLASS ON BRASS.—A cement is used by Puscher which is particularly serviceable, says the *Druggist's Circular*, in attaching the brass mountings on glass lamps, as it is unaffected by petroleum and all of this class of burning fluids. It is prepared by boiling three parts of rosin with one part of caustic soda and five parts of water, thus making a kind of soap, which is mixed with one half its weight of plaster of Paris. Zinc white, white lead, or precipitated chalk may be used instead of the plaster; but when they are used, the cement will be longer in hardening. It has a great adhesive quality. The possibility of dissolving it to remove the mountings, will recommend it to many persons.

SOAP HOLDER.

Every one is familiar with the fact that in handling wetted soap it slips from the hand, flies just where it is not wanted to go and, in short, creates considerable annoyance. To obviate these difficulties is the design of the novel device herewith illustrated. It consists of a box of perforated metal provided with a detached cover of the same material. A wire, A, passes around the receptacle, and projects from it to form a handle. A bent wire, B, attached to the cover is hinged to the wire, A, and both wires are inclosed in loops formed in the ends of a yoke, C. When the latter is pushed down, the cover is held tightly against the box, and the soap which is placed therein is retained in position.



When the yoke is raised, the various parts appear as represented in our illustration.

When closed, with the soap on the inside, the box is dipped in the water and shaken until the requisite lather is obtained. It is then removed and placed upon the washstand.

This device was patented through the Scientific American Patent Agency, May 7, 1872, and is the invention of Mr. Jacob A. Camp, of Sandusky, Ohio.

The Vienna Exhibition.---Trials of Agricultural Machinery.

The trials of agricultural machinery will take place on the Leopoldsdorf estate, in the Marchfield, near Siebenbrunn, which is a government railway station situated at a distance of about eighteen English miles from Vienna, and, if necessary, also on the Guttenhof estate, likewise situated on the government railway, at a distance of nine English miles from Vienna.

The periods of the various trials have been fixed as follows:

A. *from the* 18*th to the* 22*nd of June.*

a. All hoes and such like implements will work in fields on which potatoes, turnips, and other cattle foods, and Indian corn are grown.

b. Also root-cutting, chopping, and crushing machines, kibbling mills, maize disgraining machines, and oil cake crushers, which are worked either by hand, winch, or by steam power.

c. Deep plowing in two year clover lands and manuring in fallow land will be done with steam plows.

B. *From the* 25*th to the* 30*th of June.*

All kinds of grass-mowing machines, hay turners, and hay rakes will be tried.

C. *From the* 14*th to the* 18*th of July.*

Thrashing machines for corn, wheat, and barley, straw elevators, corn-cleaning machines and sorting apparatus, worked either by hand, winch, or steam power, will be tried.

D. *From the* 21*st to the* 25*th of July.*

Will be tried:

a. All kinds of steam plow work.

b. Ordinary plowing on pasture land and in the field.

c. The work of sowing machines.

d. Harrowing and rolling.

The separate days on which these various trials in the field will take place, will be made known in due time.

The transport of the machines to and from the trial fields, as well as the motive power, fuel, and attendants, required for working them on the fields, must be provided by the exhibitors themselves.

A particular place will be assigned in the Exhibition grounds for repairing the machines and implements which may have been damaged in appearance, etc., during the trials, before they are brought back to their stands in the Exhibition. Without this renovation the machines that have been tried will not be allowed to be returned to their place. Should the necessary repairs be done carelessly or be neglected altogether by the exhibitor, it will be undertaken at his cost by the general manager.

All steam plows will receive

a. For deep plowing in two year clover land, 36 acres. (One German acre = 1·422 acres English).

b. For plowing in the manure, 30 acres.

c. 100 acres for stubble plowing.

d. 36 acres for the trial of weeding implements and machines, and

e. Appropriate spaces for steam harrowing and other work.

For practice grounds, about 10 acres will be allotted to each steam plow.

For plowing trials with ordinary plows will be assigned 13 acres of pasture land; about 50 acres of corn stubble field, and about 10 acres for plowing in the manure.

For testing all kinds of mowing machines will be available: 80 acres of rye field, 40 acres of wheat field, 40 acres of barley field, 12 acres of pasture land, and 30 acres of clover land.

For practice ground the exhibitors will have 18 acres of rye land, and an appropriate piece of pasture land.

For thrashing machines there will be provided:

4,000 }
2,000 } mandels (each mandel numbering 15 sheaves)
2,000 }

in order that each thrashing machine, and likewise the cleaning and sorting machines, may be able to work several hours.

The quality of the material of the machines, excellence of construction, the applied draft or steam power, the consumption of coal, the indications of the steam engines, the whole performance as to quantity and quality, will be set down in tables, and serve at the consultations of the jury as helps and guides for the award of the prizes.

A New System of Telegraphy.

A correspondent, J. H. M., asks, if the telegraph business of this country is to be controlled by the Government, would it not be well to have cables, consisting of hundreds of small insulated copper wires, laid along the roads leading from the principal cities, from which a number of wires could diverge to make connections with the villages and small cities along the route. The number of wires used in a branch connection should be proportioned to the size of the place with which communication was desired, and these wires should be controlled by a Government official in each city or village. Any firm or family in the city should be allowed, for a moderate payment (say $10), to have a wire from the store or house to the Goverment office, the business of the official being merely to connect the local wire with the wire from the cable leading to the place with which it was desired to communicate. This system, J. H. M. thinks, would make the telegraph an indispensable convenience in every house.

GROCER'S SAMPLE CASE.

Our engraving illustrates a new box or case to be used by grocers and others for containing spices or other goods, protecting them from injury, and also displaying the prices of the same. The box is provided with a suitable glass cover, which is slid into its place and held in the grooved sides. This can be withdrawn by pulling it toward one end of the case, or it may be locked by means of the slide or catch, A.

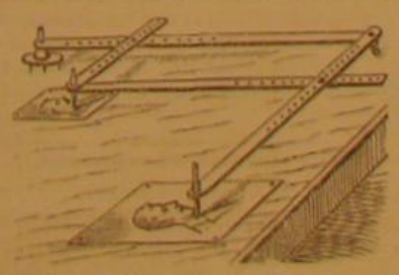
Fig. 2 *Fig. 1*

Fig. 2. An inclined plate is arranged with projecting arms, which enter sockets on either sides of the box, and serves to support a card suitably inscribed with name, price, or other information.

Patented through the Scientific American Patent Agency, January 14, 1873. For further particulars address the patentee, Mr. N. B. McCreary, Phelps city, Atchison Co., Mo.

THE PANTAGRAPH.

In response to inquiries for further information regarding the pantagraph, or instrument for copying drawings on an enlarged or reduced scale, described in a former number of this journal, we give herewith another engraving, which



shows its operation more clearly. The apparatus is very easily constructed from wood or metal. Some care should be taken in making the joints, in order that they may work very easily without shaking.

THE SPIRIT LEVEL.—The following is written on the back of the model of a spirit level, deposited in the Patent Office and patented by C. W. Evans, February 13, 1855: "What is the most effectual spirit level you ever saw? Give it up? Rum!"

SCREW DRIVER ATTACHMENT.

This is a convenient and handy little countersink tool, to be attached to an ordinary screw driver and remain permanently affixed thereto, each implement being as readily used as if it had a separate handle. The reamer or countersink is placed alongside the screwdriver, and a slot in its shank provides for its being slid down when required for use, and up out of the way when the screw driver is needed. The inventor, Mr. W. G. A. Bonwill, of Dover, Del., proposes to use his improvement in conjunction with gimlets and other tools in use by carpenters, the application of it to which will readily be suggested in practice; but it will be found in its most appropriate place on a screw driver, that the hole, after being bored, may be reamed before the screw is inserted. It is a neat and convenient arrangement and will find favor with workers in wood.

Medical Uses of Carbolic Acid.

1. It is not proven that carbol is a general disinfectant.

2. It is of the greatest use to disinfect wounds.

3. It accomplishes this by destroying pus, etc., and by preventing inflammation.

4. Its use in wounds moderates pain.

5. Its use on the skin relieves itching, and produces an anæsthesia sufficient for minor cutting operations.

6. It seems to be of use internally, in certain cases, in scaly skin diseases, and at least as a moderator of pain in cancer.

7. It has not proved of decided use in other diseases.

Correspondence.

The Japanese Show at Vienna.

To the Editor of the Scientific American:

For the last few days there has been on exhibition in Yedo, in one of the old mansions of the Ex-Daimio of Satsuma, the collection of articles intended for the Austrian exhibition. This collection, the first of its kind ever made by the Japanese to be sent abroad, deserves some notice; and as many of our readers will not have time or opportunity to visit the Vienna exposition, a sketch of the collection may not be without interest to them. To us, who have lived some time in Japan, and have done our mite toward helping the Japanese to civilize themselves, this exhibition in Yedo is an event of great importance. It is only eight months since that the Japanese government resolved to send a contribution to the Vienna exposition, and the work of collecting and preparing such a contribution was a new one; but the commissioners have been so tirelessly diligent that Japan's offering will occupy no mean place among those of other nations. The Mikado and the Imperial household visited the exhibition a few days ago, and his visit is thus described:

"His Majesty, on alighting from his carriage, was shown by the Vice President into the exhibition, and examined the first division of it, group by group, manifesting great interest, and asking a number of questions, which were answered by the Vice President and by Mr. Tanaka, a Japanese naturalist who has studied in Paris. The rest of the Japanese commission and the European staff attended His Majesty through his inspection of the rooms. His Majesty devoted much time to the examination of the minerals and geological productions collected from the several provinces and departments. After an hour and a half's visit, His Majesty retired to the private apartment which had been prepared for his convenience, and rested for half an hour. During this time the plans and photographs of the Vienna exhibition, the catalogues, and other papers connected with the Japanese department were laid before him. After partaking of some refreshments, His Majesty resumed the inspection of the remaining groups, and visited the articles prepared for the London exhibition. His Majesty then made a tour through the garden, and saw the collection of live animals which has been collected from various provinces of Japan, and then took his departure, attended to the entrance hall by the same officials who received him on his arrival.

Most of the contributions are made by the provincial or departmental authorities, or have been purchased by the commission; but some of the specimens have been sent in by private and official contributors. The exhibition has been enclosed in a large square, surrounded by gardens laid out in Japanese style. After reaching the large gate, the first thing the eye meets is a pair of enormous paper lanterns, with a diameter of at least twelve feet, painted with dragons in brilliant colors. The articles themselves are arranged inside the buildings, grouped in accordance with the classification of the Vienna exhibition; and although everything has not yet arrived, it is undoubtedly one of the most perfect and beautiful collections of Japanese products that has ever been brought together."

The first room was devoted to the mineral and mining products of Japan, which were rich in coal, copper, lead, silver and gold, and gave great promise of what Japan shall be able to do when a new system of mining is carried out all over the country. The iron ore, though abundant, consists chiefly of the magnetic oxide, and, considering the cost of fuel in Japan, is rather costly to smelt. If, however, coal beds continue to be discovered in as rapid a rate as heretofore, the

iron industry in Japan will assume vastly larger proportions than at present. Nine tenths of the iron used in the arts of Japan now is mined and fabricated in England. The geology and mineralogy of Japan are well represented, and the arrangement is all that could be desired. The collection of pearls which were ranged in small phials, and were from the size of a nit to that of a bean, showed clearly that this hitherto neglected branch of industry should be cultivated. It seems tolerably certain that the seas around nearly the whole of Japan produce pearls. Little attention has thus far been paid to this source of wealth. The display of raw silk, woven silk, dyed and figured crape, satin, and many different varieties of manufactured silk was very large. In addition to these, silkworms' eggs on cards, hundreds of boxes of cocoons, the *larvæ*, grubs and moths in all stages and of many varieties of these insects were exhibited. Even the "wild" silkworms, that produce a kind of rough silk that cannot be reeled, were exhibited in all their developments. Then followed silk reeling and silk weaving machines, raw silk or "cotton" silk, which is produced by forcing the worm to spread his silk over a flat surface instead of winding it into a cocoon. Every detail of the silkworm rearing and of the silk manufacture was thus fully exhibited. The collection, arrangement and quality of the *materia medica* and cereals of the country were most excellent. In wax, both vegetable and insect, Japan excels, and the display of ornamented candles was unusually good. In paint, lacquer and coloring materials, Japan can surpass the world if she will. There were all shades of the famous lacquer varnish, produced from the Japanese varnish tree, *rhus vernicifera*, which grows from 15 to 20 feet high and produces a white, cream-like sap, which turns black in the air. Further on the display of lacquer work, such as boxes, cabinets, and miscellaneous articles, numbering hundreds in all, were exhibited. The gold lacquer and inlaid work of all kinds will be highly admired. Some of these specimens are several centuries old; and in Japan, old lacquer is always sold at fancy prices. Of animal skins, there was a good assortment. And of fancy-painted leathers, very soft and smooth dressed leather, calf-skins, and made boots and shoes, there were enough to show what strides the natives, under foreign instruction and often by sheer imitation, have succeeded in doing. Leather had scarcely a name in Japan five years ago, but now leather workers are honored, wealth is being produced, new industries are springing up and the demand for leather is enormous. The government has its own tanneries and foreign shoemakers who instruct the natives. In bronzes, considering the capacity of Japan and the curious skill of her artists and molders in this line of work, the display was not large. Two of the vases, however, in steel and bronze were works of consummate art. In steel and iron, though the swords, needles, and saws challenged admiration of their purity, polish and temper, the collection showed the very backward state of the iron and steel industry of Japan. Not to detail to a wearisome extent, wood and stone carvings, colored stone, mosaics, basket work, tortoiseshell, horn and ivory inlaid work, ivory carvings, fans, silk flowers, toys, personifications (of character, rank, costume, history, etc.), in wax and papier maché, extremely fine, were all appropriately represented. An imitation human skeleton, neatly mounted, deceived even a skillful physician of many years' experience of Japanese and Chinese "humbugs." In cut crystal, a perfectly pure globe, seven inches in diameter, was shown, and several others four inches in diameter, beside all kinds of ornamental forms, and some uncut specimens of this mineral ice. In the peculiar gold and silver, inlaid, intaglio, metal, mosaic, cameo and chain work, the special fitness of the Japanese for delicate, nimble and cunning work was admirably shown. The glass industry in Japan as yet is in its babyhood. All the varieties of textile fabrics, hemp, cotton, etc., and what little machinery they have, were shown. And the paper whose softness and lightness are unrivaled, with their pulp, calendering, and drying processes were shown, and are slow enough in action to drive the owner of a steam paper mill mad. But wait a few years. Oiled paper coats, hats, clothing carpets, boxes, etc., wall paper in many varieties, (as on Japanese walls, made in squares of 18 inches) were in their appropriate places

From Yezo the specimens were numerous and of a highly interesting character, with many photographs of the Ainos, wild inhabitants now being civilized by the Colonization Department. These Ainos are hairy men in a very low state, who are supposed to have been the aborigines of Japan. In entomology, conchology, ichthyology, etc., the collection was good, but not what it might have been had more time been given, nor what it surely will be. The porcelain, which cost the Government $200,000, and was made especially for the Vienna Exposition, was characteristic and its decoration very fine. There seems to be no danger that Sevres or Dresden will lose their laurels in comparison, however. What is very commendable about the exhibition is that the Japanese, much against their first inclination, have been prevailed upon to send very much that will illustrate genuine Japanese life, customs and products. The collection will not only give the world's people, who go to Vienna and London, a good idea of the actual condition of Japan, and of the nation in its developing or transition state, but will also exhibit the actual needs of the country. A tolerably good collection of plants and live animals also accompanies the commission. Among the most interesting specimens of things purely Japanese are models of the great pagodas, temples, dwelling houses, and fireproof storehouses. In a future number I may speak of the structure of these fireproofs, and how they are made so, and of the pagodas and houses, and how it is that they have resisted the fires above and the earthquakes beneath during hundreds of years.

"From what has transpired, we cannot be wrong in already congratulating the Japanese Vice-President and commission on the success gained; and the establishment which His Majesty has visited on this occasion seems not only intended as a temporary erection, but for future exhibitions, and the specimens collected are proposed to become the nucleus of a permanent exhibition, on the plan of the English South Kensington Museum. The visit of the Emperor may be considered as laying the foundation of an undertaking from which, if it be properly managed, Japan will derive considerable advantages in the future."

It is with much regret that I find I cannot depict to my satisfaction the exhibition as I saw it with my own eyes.

Yedo, December 26, 1872. W. E. G.

Construction of Dwellings.

To the Editor of the Scientific American:

Having noticed in recent numbers of the SCIENTIFIC AMERICAN a number of communications in regard to the construction of dwellings, I send you a description of one which I propose to have erected for myself, hoping the suggestions contained herein will be of value to some of your readers. The method of construction is briefly as follows:

The foundation having been built in any approved manner, there is to be erected upon it a frame work composed of sills, studding, etc., the same as for an ordinary dwelling house. This being done, the entire frame is to be filled in with brick work only four inches thick, care being taken to have this filling flush with the outer and inner surfaces of the studding. The structure is then to be weatherboarded in the usual manner, and the plastering applied directly upon the inner side of the filling, it being understood that the studding is to be of the same thickness as the brick work. The sills will prevent dampness passing up from the foundations into the filling, and the external sheeting will exclude moisture from the joints of the same; thereby ensuring a perfectly dry and comfortable house. The filling, which can be composed of inferior material, will prevent rats and other vermin running through the house; and the said filling will also add greatly to the safety of the structure, as it is well known that the open spaces between the studding, weatherboards and lathing are simply flues which serve to conduct fire from the lower to the upper parts of the building with fearful rapidity. In case of an external fire, the weatherboards would consume but slowly, on account of their being backed up closely by the brick filling, which would prevent a rapid spreading of the flames.

As far as economy is concerned, such a building would be about as cheap as a frame house with double weatherboarding and lathing, and in some sections of the country, it would be much cheaper. The durability of the structure could not, it appears to me, be questioned, as the frame work would preserve the integrity of the filling and maintain it securely in position for an indefinite period.

Can you or any of your numerous readers see any practical objection to such a structure? J. H. L.

Cincinnati, O.

Using Corn as Fuel.

To the Editor of the Scientific American:

On page 16, of the present volume of the SCIENTIFIC AMERICAN, I find a paragraph with the above heading, and I wish to correct the impression, conveyed in that article, that western farmers are depleting their timber lands. I can speak for Iowa and Nebraska. I came to Tremont county, Iowa, in 1856, and at that time timber land was held at thirty dollars per acre, and prairie at from three to five dollars per acre. At this time timber land can be bought for from fifteen to twenty-five dollars an acre, and prairie is at least twenty per cent higher in price than forest. We have more acres of timber, and what we have is constantly improving since the fires have been controlled. The burning of corn in Iowa does not imply that the "wood land is sadly depleted," but it implies that we have millions of bushels of corn that we can neither sell nor feed to our stock. When spring opens, we shall still have several million bushels of corn on hand in this county, not reserved for our stoves but waiting for a market. Last summer I rode through a patch of corn containing at least eight square miles, all in one field, and it equaled the corn mentioned in "Corn as Fuel" in quantity and excelled in quality.

We have wood, we have coal, we have land as fertile and as easily tilled as any, east or west, and we can raise any amount of grain. What we need is a market. It takes about five bushels of corn to pay for sending one bushel to where it can be used. The railroads promised to help us if we would help them; but they have been an injury so far, and will be in the future unless controlled in some way.

H. D. I.

Singular Phenomenon.

To the Editor of the Scientific American:

On the evening of November 7, 1872, about 9.30 P. M., as I was walking upon the highway near La Grangeville, Dutchess county, N. Y., and carrying a light to direct my steps in the darkness, I observed on the instant that the light I was carrying was overcome by some more intense light, and instantly took a sweeping look overhead, expecting to see some large luminous body passing through the heavens. I did not catch sight of any such body; but in the southwest, at an angle of about forty-five degrees with the horizon, I saw what I at first supposed was the fiery train of a meteor, or something of that kind, intensely bright and apparently about equal in length to five diameters of the full moon when rising. The line of light, intense as it was, seemed to maintain its position and brilliancy for several seconds, and then seemed very gradually to grow broader, and proportionally to lose its intensity, and finally it seemed to drift like a luminous mist into the form of a sickle. At first I and my companion halted and stood for a short time to observe this strange but beautiful sight; and afterward, when I had continued my walk for a quarter of a mile or more, I could still see some remains of the misty drift. What I have endeavored to describe was witnessed by another gentleman who was going from the same meeting and in an opposite direction. G. P.

Transplanting Trees.

To the Editor of the Scientific American:

On page 132 of your current volume, I noticed an article on transplanting trees; and as I have had some experience and opportunities for observation, I will with your permission give my views. I not only agree with the writer that the top ought to be trimmed sufficiently to "preserve the relative proportion with the root," but I would go further and say that I have found it best to cut the top entirely off, at the point where you want your tree to branch, thus leaving only a straight pole. You will have a better looking tree, and in less time than if the limbs had been left on; and the chances of the tree's living are much favored by this method. Another very important matter is the time of transplanting. With the sugar maple, to which my experience has been chiefly confined, care should be taken that transplanting, and consequently trimming, should not be done while the sap will run, else, as is often the case with the grape vine, the tree will "bleed to death." I think the best time is when the leaves are just beginning to open, which is just after the flow of sap, and before any new growth has been made. In taking up the tree, preserve as far as possible all the fine fiberous roots; a long large root, destitute of fibers, is of very little account, and may be cut off, if troublesome to get out of the ground. All broken roots should be smoothly cut off before setting; and one other matter, very generally neglected but highly important, is to cover the roots with wet straw immediately on taking them from the earth, and to keep them so covered during transportation, and then taking out only so fast as you are ready to put them in their places. I would give very little for trees which had been carted several miles with the roots exposed to the sun and wind for a half day or more. The roots should not be exposed to rain to wash off what little soil may adhere to them, but should be kept, just as nearly as possible, in their natural condition, neither frozen, dried nor washed. It is best, if possible, to select trees that have not grown in dense thickets, but have had considerable exposure to the sun. Some recommend setting the tree out with its points towards the same points of compass as they were originally, thus exposing the same side to the heat of the sun; but I do not know that it is essential. They should be put at about the natural depth in the earth, and I think should be mulched slightly with some material that will allow the rain to pass through freely, but prevent the ground about the roots becoming too hard and dry. No manure should be used. I know a lot of yellow willows which were set a year ago with neither root or branch, being simply cuttings, six or eight feet long and from two to six inches diameter. They branched profusely and appeared to thrive; but this year will tell the story. Such practice would not apply to the sugar maple, however. M. A. G.

Electrical Disturbances.

To the Editor of the Scientific American:

In your journal of February 22, I notice an account of electrical disturbances on telegraph lines in Iowa on January 8, and I have frequently observed phenomena of the same description in Nebraska and Iowa. They always occurred during wind storms blowing from west, north west or south west, and generally with a change of temperature from mild to cold. My theory is that the cold volume of air rolls down from the Rocky Mountains over the Nebraska plains eastward, bearing with it the electrical condition of higher tension of that altitude. The velocity with which it is carried eastward, combined with excessive dryness of the atmosphere, prevents or retards its ready union with the opposite electricity of the earth, and it consequently takes its course through the best conductors it can find. The storm may move eastward as a cyclone and thus, through its possibly comparatively small area, not noticeably affect north and south lines, while it affects east and west lines as it moves forward.

I base this on the fact that these disturbances always occur during a wind storm from mountains, with decrease of temperature and dryness of the air. W.

THE DANGERS OF OCEAN TRAVEL.—A correspondent, W. F. G., points out the dangers of ocean-going ships, laden with material very easy to burn, even if not dangerous from spontaneous combustion; and he asks what would be thought if the railroad companies should build two story cars, the lower floor being devoted to highly inflammable goods and the upper floor to passengers? Yet, he says, this is exactly the arrangement on an ocean steamer. He suggests the employment of separate vessels for passenger traffic, and states that ships of higher speed than any now in use could be built specially for the purpose.

THE first regular bank was established at Venice, in 1157. The bank of Genoa was established in 1407; that of Amsterdam in 1609; England, 1694.

A New Gas.

To the experimental works at Battersea we were recently invited, says *Engineering*, to witness the process of manufacture of a new gas, and we there found, in a retort house adjoining the water company's boiler house, a bench of three iron retorts, set with a furnace in a manner similar to those used in ordinary gas making. From the boiler house a pipe is lead to the two lower retorts, to which steam is supplied, the steam being superheated on its way, and delivered directly on to a mass of highly heated coke and iron. The charge for each retort is 1¼ cwt. of coke and 1 cwt. of iron. From the two lower, the gas is led into the upper retort, which contains a charge of charcoal, and from which the mixed gas issues. The composition of the gas at the point of issue is hydrogen, carbonic oxide, carbonic acid, and sulphuretted hydrogen. The steam is thus thoroughly decomposed, and the result in chemical language is stated to be $H^2O + C = Co + H^2$, which constitutes what is termed heating gas, and which is well adapted for that purpose. Before it can be used, however, it has to be deprived of its sulphuretted hydrogen. This is taken out by passing the gas, after condensation and while on its way to the gasholder, through a purifier charged with oxide of iron. The gas is certified to be perfectly free from bisulphide of carbon, that *bête noir* of coal gas manufacturers. The carbonic acid and oxide are allowed to remain in the gas, the concurrent testimony of several medical and scientific men, including Dr. Frankland, being to the effect that the removal of the acid is unnecessary in a sanitary point of view, whilst the illuminating power of the gas is sufficiently high notwithstanding its presence.

The gas has now to be converted into an illuminating agent, and this conversion is effected by passing it through rectified petroleum spirit of the specific gravity of about ·680. This change from a heating to an illuminating gas causes an increase of 25 per cent in the volume of the gas, which passes on from the hydrocarbon spirit to the meter. The ultimate result of the manufacture is a gas containing 12 per cent of carbonic acid, and which, when consumed in an argand burner at the rate of 5 cubic feet per hour, is stated to have an illuminating power of 16·6 candles burning 120 grains of sperm per hour. The economy in labor is apparent at the works, where one man was barely occupied in attending to the setting of three retorts. The experimenters estimate the saving in labor, when working the process on a large scale, to be 29 men in 30; or, in other words, they state that one stoker can do the work of 30, the retorts yielding more than twice as much gas as in the ordinary process; and the retorts require to be charged and drawn but once in 36 hours, instead of every 6 hours as in coal gas making. With regard to cost, we have it on the same authority that the heating gas costs 7d. per 1000 feet only, and the illuminating gas 1s. 7¼d., or in round numbers 1s. 8d. per 1000 feet, inclusive of the cost of raising steam, materials, wages, and all the various items of wear and tear. A comparison of this price with that of ordinary coal gas shows very favorably for the invention, as at the present time, with gas coals at 26s. per tun, it costs 2s. 4d. per 1,000 feet. The new gas, therefore, possesses a great advantage over the other, where gas coals cost more than 20s. per tun. It is found that 1,000 feet of the heating gas will absorb 1½ gallons of the spirit, and that 2 tuns of coke will produce 132,000 cubic feet of gas.

The practicability and economy of the process having been thus far affirmed, let us now look at the question from another point of view; let us see how far this gas is likely to be affected by storage or transmission to great distances. In other words, is the product a permanent gas? This question is best answered by the statements made by the investigators who affirm that the gas is permanent, and that it can be conveyed to any reasonable distance without its character becoming altered. Theoretically, this affirmation is reasonable, inasmuch as the union between the lighter permanent gases, such as hydrogen marsh gas and carbonic oxide, and hydrocarbon vapors is very intimate. Then again, the new gas and ordinary coal gas being of nearly the same specific gravity, it should follow that to whatever distance the latter can be conveyed the former can be carried. What has really been done towards determining both these points is this: the gas has been stored over water in a holder placed out of doors for two months, and at the end of that time no deterioration of illuminating quality, nor any mechanical separation, could be detected by Dr. Louttit on a careful examination. As regards its conveyance, Mr. Quick and Mr. Spice had 1000 yards of 3 inch gas main laid on blocks on the surface of the ground at Battersea, the pipes being laid with a number of bends and curves, rises and falls, to represent what would occur in actual practice. The whole of the pipes were exposed to every variation of temperature, and throughout the experiments the weather was exceptionably cold and wet. The result, however, was that no perceptible loss of illuminating power could be detected, a proof of the permanency and retaining power of the gas. Moreover, the investigators submitted the gas to the severe test of a sudden reduction of temperature from about 60° to 30° Fah., without finding any sensible diminution of its illuminating power.

So far, then, everything has been done to elucidate the question as fairly and as practically as possible; and, notwithstanding a critical discussion, which took place at the inspection on Saturday, and which was courted, the fact remains that a sound gas is produced at a cost considerably lower than that of coal gas. The new gas manufactured at the experimental works is used for lighting the adjoining boiler and engine houses; it gives a pure light, and has a much less offensive smell than coal gas, than which it is said to be less explosive. The gas can be applied to heating purposes, and the pipes carried on to the illuminating burners, the gas on its way being passed through the spirit. There are many applications for such a doubly useful gas, and it now only remains for it to be put to the test of actual commercial manufacture to prove it either a success or a failure. In view of the results obtained up to the present time, and the care exercised in the development of the invention, there appears to be every probability that it will succeed. We may add that the new gas will be represented at the Vienna Exhibition, where plant is about to be erected for the production of 30,000 feet per day.

Chats with Sedentary People.

John Smith, a book keeper, asks what he shall do. Dyspepsia, nervousness and all that sort of thing have got hold of him. He has no time to get the fresh air, no time to exercise—no time for anything in fact; and would I advise him to change his occupation?

"John Smith, what time are you due in the counting room in the morning?"

"About half past eight."

"Could you put it off till nine?"

"Well, perhaps so, if I didn't let my work get behind hand."

"And you want to know whether you had better change your business? I advise you against a change. A man should not change his occupation lightly, and you, John Smith, need not change yours on account of your health. If your counting room is light, the business is a healthy one. Book-keepers may be as healthy as cartmen, if they are willing to embrace their opportunities. Now, listen to me.

You are occupied, say, eight hours a day as a book-keeper. More? Well, say nine hours. This leaves fifteen hours. You are in bed eight hours. Now, you have seven left for recreation, and yet, John Smith, you think you have no time for exercise and healthful amusements. Two hours are quite enough for the exercise and out-door life which will keep you in high health, and then you will have three hours left for social enjoyment, saying nothing of the entire day, Sunday. Let me tell you how to manage it, and I will premise that the advice I am about to give you is exactly adapted to half the population of this city.

1st. You must retire at nine o'clock every night.

2d. During the spring, summer and autumn you must rise at five o'clock. During the winter, at six o'clock.

3d. Beginning moderately, you will soon enjoy two hours of out-door walking and recreation before breakfast. Ninety-nine persons in a hundred, including both sexes, between ten and sixty years of age, will, if they begin the early morning exercise gently and prudently, within three months rejoice over a happy change in their health and spirits, and they will mourn over the great loss for so many years of those precious hours of the early morning."—*To-Day.*

Starch Sugar and Starch Sirup.

Before the Society for the Promotion of Trade in Prussia, Professor Dr. Weber gave a discourse on the manufacture of starch sugar and starch sirup. According to his assertions, agriculture has in latter times gained considerably in extent, and the production of starch and glucose has risen in an important degree. With regard to the preparation of glucose, he mentioned that the process usually practiced at present—heating a thin paste of starch with a little sulphuric acid, neutralizing the liquid with lime, and evaporating to the consistency of sirup, was discovered by Kirchoff in 1811, and that, by the introduction of the filtering process and employment of vacuum apparatus, it has now made important progress. In Alsace, special value is attached to the utmost purity of the products. The sirups made there are transparent, and without any after-taste. These superior articles are obtained by the most careful and repeated filtration of the liquors with animal charcoal. The results of the filtration processes differ more or less as dextrin remains in the liquid, fluid or solid products, sirup or starch sugar. The sirup is employed principally in Germany for the preparation of beer, and for adulterating the Indian sirup, and also honey. The purest Alsatian syrup is employed for confectionery and also for the making of liqueurs. Starch sugar serves as a substitute for wine must, and also for the making of sweetmeats. It prevents the crystalization of the sweet mass. Of late, large quantities of it have been exported to England and used for brewing purposes. From the purest sugar, the extensively used sugar color is prepared by heat.

With regard to the situation of the manufactories, it was remarked that this industry was developed first to a greater extent in those parts of Germany where the potato is specially cultivated. There are large manufactories of this kind in Brandenburg, Frankfort on the Oder, Kustrin in Silesia, and also in Saxony. At present the raw material (moist starch) is packed in bags and transported to manufactories in East and West Prussia. To the manufactories in Alsace is assigned the preponderance of the starch produced over those in the Vosges.

The ministerial director, Moser, remarked, in addition to this discourse, that the sugar color mentioned by the lecturer is as present much used by the French sugar makers for coloring raw sugar in order to make it appear of less value, according to the well known system of classification adopted in France for assessing the duties. Afterwards, on the exportation of the refined article, the duty is restored in proportion to the real percentage of sugar. The German, especially the Rhenish, refiners maintain that they are wronged by this process, as, on account of the very low duty on the raw product it is possible for the French refiners to bring the sugar into the market at a lower price than they themselves are able to do. In consequence of the complaints received, the Government is at present occupying itself with this question.

Mercury.

It would be difficult to say which of the properties of mercury first strikes us as its most remarkable peculiarity. That it is the only metal liquid at ordinary temperatures, is scarcely more noticeable than its great weight. Its singular mobility, to which it owes its common Saxon name of quicksilver, is but a consequent of the two first mentioned properties. Its chemical power of forming two series of salts, unlike in their reactions and in their physiological effects, is almost without a parallel. Its compounds are very sensitive to heat, says a correspondent of the *Boston Journal of Chemistry*, the iodide changing color like a chameleon. The sulphocyanide is used in making the curious but dangerous toy called "Pharaoh's serpents," because of the ease with which it is decomposed by heat. The one very unfortunate property is that it gives off diffusive vapors at all temperatures, even when frozen, which requires a cold of 40° below zero Fahrenheit.

Professor Hyrtl delivered a lecture on mercury in Vienna recently, when he exhibited the leg bone of a man, whose death had undoubtedly been hastened by mercury. On striking the bone heavily upon the table, out fell thousands of little, glittering globules of mercury—bright, metallic mercury,—which rolled about upon the black surface before him, collecting here and there into drops. This mercury had been absorbed during life, undermined his system, and finally proved fatal to him.

The mortality among those who work in quicksilver mines, or in the works where it is reduced, is known to be frightful. In the mines of Idria the men work alternately one month in the mines and one in the smelting house. Of 506 men employed there in 1858, not less than 122 were salivated, and even cattle in the neighborhood of the works were similarly affected.

The use of mercury for reducing gold and silver by the amalgamation process is also dangerous, unless great care is taken. The manufacturer of barometers and thermometers is exposed not only to the visible vapors of the heated mercury, but still more frequently to those which rise from the metal spilled on the floor and spontaneously evaporating. A Vienna professor of botany, while conducting a series of experiments on the respiration of plants, used mercury to close the bell jars and separate them from atmospheric air. The volatilization of this metal in his laboratory caused him a long and dangerous illness.

The latest method that has been proposed for rendering the vapors of mercury, ever present in a looking glass factory, less hurtful is chloride of lime. The chlorine uniting with the mercury forms calomel, which is not absorbed through the pores of the skin as the metal is. For washing the hands and clothing it is, no doubt, useful: but whether it will accomplish all that is hoped for it, remains to be tested by actual and prolonged use.

Ammonia in Suspended Animation.

We learn from Australian journals that the value of the injection of ammonia, as recommended by Professor Halford in cases of snake bite and suspended animation, has been again demonstrated. A lady in Melbourne recently swallowed by accident an ounce of Browne's chlorodyne, which is a mixture of chloroform, morphia, and prussic acid. When seen by her medical attendant, she was, as he imagined, on the point of death—cold, insensible to everything, and giving only occasional gasps as signs of breathing. Recollecting a former case in which a young man who had taken chloroform was revived after death had apparently occurred, the doctor mixed half a drachm of the liq. ammon. fort. with one and a half of water, and within the space of one minute injected the whole into a vein of the arm. In a few minutes the pulse returned, the breathing became natural, and by twenty minutes the whole body had regained its natural warmth; but perfect consciousness did not return for some hours afterward. The patient made a rapid recovery. Two further instances have also been reported in which the timely use of the injection saved the victims of snake bite from the death which threatened them.

A New Form of Fire Escape.

A correspondent, E. H., suggests the use of a pulley attached to the eaves of a building, over the sheave of which a wire rope is to run, one end of the rope being connected with a small windlass in the basement, and the other to a light iron box or frame. Firemen could travel up and down the side of the house, enter the windows of each floor, and rescue the inhabitants; and the windlass would be worked by men in the basement, and would be protected from danger from heat, smoke, and falling timbers. E. H. claims that his method would be far superior to ropes and ladders, of which women, children, and sick persons are too timid to avail themselves.

AT a recent meeting of the faculty of the Stevens Institute of Technology, Hoboken, N. J., resolutions of regret and condolence on the death of the late Professor Rankine were passed, and were then forwarded to the Council of the University of Glasgow and to the family of the deceased.

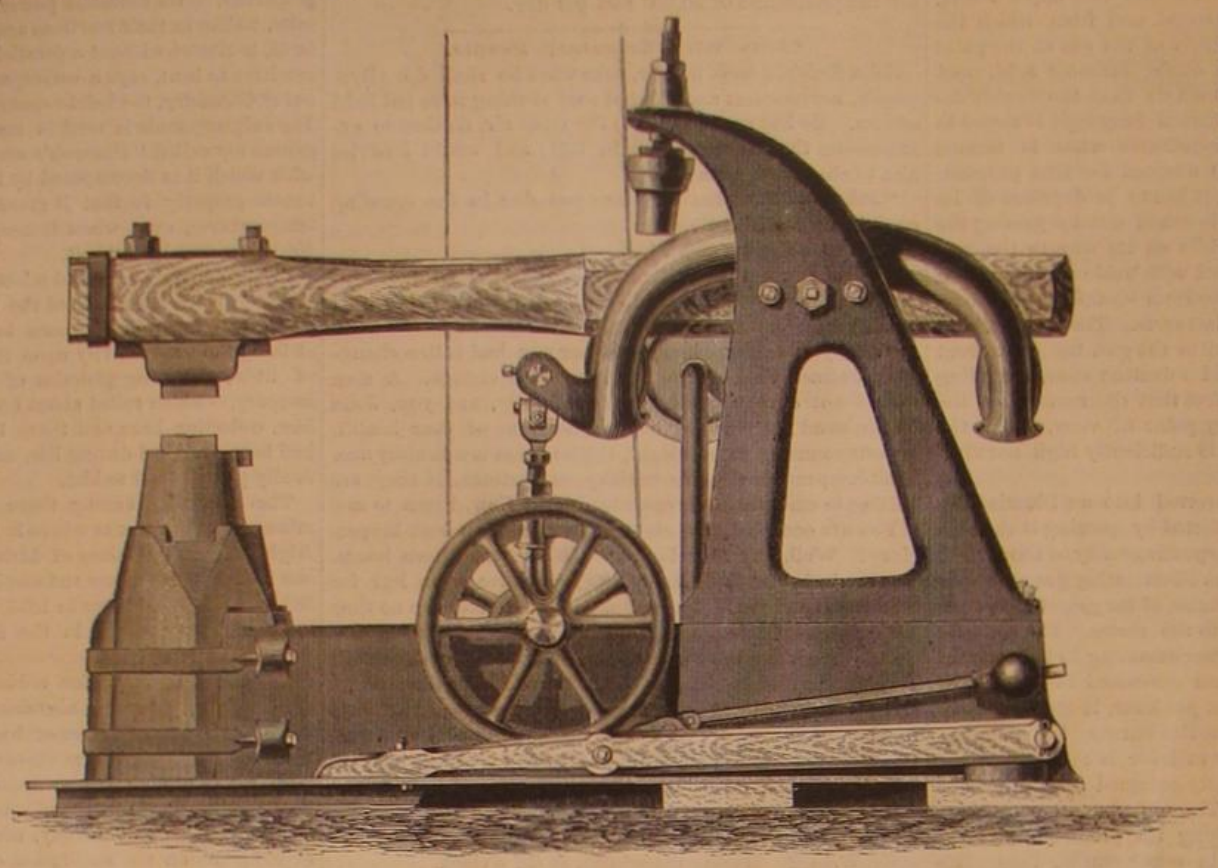
TOBACCO SMOKE.—Tobacco smoke does not contain, as it is often supposed, nicotine; but ammonia, pyridine, picoline lutidine, collidine, formic, acetic, propionic, butyric, valerianic, and carbolic acids, and creosote.—*Eulenburg and Voht.*

BRADLEY'S CUSHIONED HAMMER.

This invention, illustrated herewith, is a hammer claimed to be especially adapted to all work which requires a continuous, exact, positive, forcible, and yet elastic stroke. The anvil and anvil block are of cast iron, and are made separate and adjustable. The latter has a separate foundation independent of that of the main bed. The hammer is nicely balanced, swings upon two adjustable hardened steel centers, and is put in motion by a broad steel eccentric which operates in connection with the yoke and rubber cushions, and is adjustable and governs the length of stroke.

The cushion at the apex of the standard serves to assist the lower rear cushion in heavy work, and also to check its upward motion. It is claimed that no bind or friction can result from an unequal adjustment by the set screws on the top of the yoke, thereby twisting the latter as the universal joint connection regulates the result upon the broad eccentric below, leaving it to work free from incumbrance.

The power is applied and regulated by the use of a foot treadle running around the bed of the hammer, in such a manner that the operator can stand in front or on either side. A gentle pressure on the treadle brings the tightener in connection with the belt upon the pulley, and thus varies the stroke in proportion to the pressure applied. On removing the foot, the treadle flies up, bringing the brake upon the balance wheel, arresting it instantly, and leaving the hammer up, as it cannot stop with the dies closed.



BRADLEY'S CUSHIONED HAMMER.

The advantages claimed for this machine may be briefly summarized as follows: It is adjustable in line of action, length of stroke, rapidity of motion, and weight and force of blow, all of which may be varied and controlled at the will of the operator. It has been found well suited to the exceedingly difficult swedging of cotton spindles. Its cost of repairs is alleged to be small, and its durability great, while it is compact, portable, and has but little friction and no stubborn jar. The resting of the main bed and its uprights upon a foundation separate from that of the anvil relieves it materially from the concussion of the hammer. The force and power of the blow is greatly influenced by the reactive and united action of the cushions. So harmonious is this combined action upon the motion of the helve, that it is stated that an observer holding his hand upon the working parts when under the most rapid and violent movement can hardly identify the strokes of the hammer.

Further information regarding this invention may be obtained by addressing the Bradley Manufacturing Company, Syracuse, N. Y.

IMPROVED WASH BOILER ATTACHMENT.

Our engraving illustrates a device which may be placed in any ordinary wash boiler serving to clean the clothes by causing currents of hot water to pass through them in one direction. Figs. 1 and 2 are longitudinal and transverse sections of the apparatus, clearly showing its interior arrangements.

A is an oval rim, of a size suitable to fit within the boiler. Attached thereto are the two bottoms, B and C, the former of which is funnel shaped and open in the middle, so that the water above it may flow down into the space between the two bottoms. This space communicates with two boxes, D D, which are situated beneath the bottom, C, and in the sides of which are arranged valves, E E. The clothes to be cleaned are laid upon the rack, F. G G are hollow pillars, in the upper parts of which orifices are made.

The seeds being placed in the receptacle, H, heat is applied. The steam generated first closes the valves, E E, then, with the hot water, ascends the hollow pillars and, escaping through the apertures, falls upon the clothes. As soon as the pressure in the chamber, H, is diminished, the valves, E E, are opened by the weight of the water within the boxes, D D. It is claimed that, in this manner, a constant circulation will be maintained, and that the clothes will be rapidly, effectually, and economically cleansed without becoming injured or being unnecessarily handled.

Patented through the Scientific American Patent Agency, December 17, 1872. For further particulars address Messrs. Tinner & Tregear, Stockton, Pa.

Comedy and tragedy were first exhibited in Athens, 562 B.C

Method of Discovering Alum in Flour or Bread.

M. Buchner, says *Les Mondes*, in the course of recent investigations, has determined that a single drop of alcoholic extract of campeachy wood, placed upon pure flour or bread, causes a brownish yellow stain, and that if the flour contains alum in the proportion of one or two per cent, the color will turn to a grayish blue or violet gray. With one half per cent of alum, the tint is reddish yellow with a border of gray blue, and small blue spots can be discovered in the disk of color by examining it with a lens. One quarter per cent of alum is the limit of the reaction where the blue border is no longer visible, although the small spots are faintly discernible.

A New Method of Viewing the Chromosphere.

A paper on this subject was recently read before the Royal Society by J. N. Lockyer and G. M. Seabroke. An artificial eclipse is produced by covering the sun's disk by a disk of brass. It is, in fact, the replacement of the moon by another sphere or semisphere (or rather a disk, in this method). The idea occurred to both authors at different times. The image of the sun is formed on a diaphragm, having a circular disk of brass (in the center) of the same size as the sun's image, so that the sun's light is allowed to pass. The chromosphere is afterwards brought to a focus again at the position usually occupied by the slit of the spectroscope, and in the eyepiece is seen the chromosphere in circles corresponding to the C and other lines. A certain lens is used to reduce the size of the sun's image and keep it of the same size as the diaphragm at different times of the year; and other lenses are used to reduce the size of the annulus of light to about $\frac{1}{8}$ inch, so that the pencils of light from either side of the annulus may not be too divergent to pass through the prisms at the same time, and that the whole annulus may be seen at the same time. There are mechanical difficulties in producing a perfect annulus of the required size, so one $\frac{1}{4}$ inch diameter is used, which can be reduced virtually to any size at pleasure. The proposed photographic arrangements are as follows: A large Steinheil spectroscope is used, its usual slit being replaced by the ring one. A solar beam is thrown along the axis of the collimator by a heliostat, and the sun's image is focussed on the ring slit by a 3¾ inch object glass, the solar image being made to fit the slit by a suitable lens. By this method the image of the chromosphere received on the photographic plate can be obtained of a convenient size, as a telescope of any dimensions may be used for focussing the parallel beam which passes through the prisms on to the plate.

Complete Drainage of Dwelling Houses.

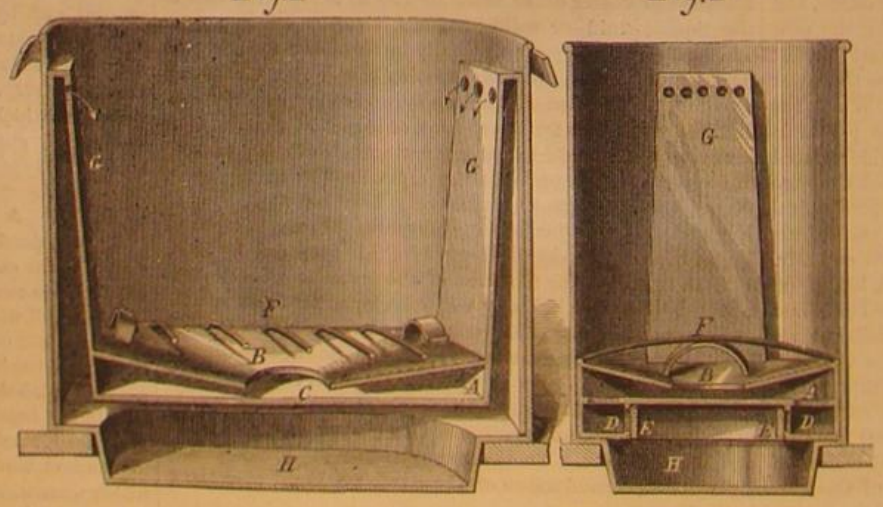
The importance of good drainage is advocated as follows, in the last issue of *The American Builder*:

Where the geological character of the ground is such that nature has not made ample provision for removing the surplus water at all seasons of the year, a builder cannot expect to have the advantages of a dry cellar and a dry yard unless a system of complete drainage is commenced below the foundation of the lowest stones or bricks of the cellar wall. Many builders have made the grave mistake of deferring all provision for drainage until after the superstructure was finished.

Very few builders, either in the country or city, can be induced to introduce a proper system of drainage beneath and around a dwelling, or a large barn. For this reason, the proprietor himself, or some competent representative, should supervise this important part of the building, as soon as the excavation for the cellar is completed. A deep ditch should first be sunk so that water will flow readily away from the cellar to some distant point, where it will mingle with some stream. Before any part of the foundation wall is laid, let a channel be sunk about three inches deep around the outer edge of the excavation, partially beneath the bank of earth, for receiving the water that would otherwise come in contact with the foundation wall and find a passage into the cellar. The most convenient way to sink such a channel is to make a sort of a rammer of a stick of hard timber. Should the earth be exceedingly compact, as the substratum is in many sections of the country, it may be necessary to use an old axe for cutting down the sides of the channel, after which the middle can be removed with a sharp pick. When the channel is completed, let two or three pails of water be poured into it at the highest point; and if it does not flow readily away into the ditch, let the channel be sunk deeper in places until the grade is uniform. Then let drain tiles two inches in diameter be laid with much care in the channel, and be covered with gravel. If the drain tiles are thoroughly burned, and if they are laid as suggested, the drainage will be complete as long as the building endures. One or two poor drain tiles, however, will spoil an excellent job, as they will disintegrate and obstruct the watercourse. After the foundation walls are carried up above such a drain, the excess of water in the earth, that would come in contact with the walls, will form direct passages through the ground to the tiles, and will quickly pass away without wetting the walls. By this means the earth around the building will never become excessively wet, even while protracted storms prevail; the walls of the cellar will never become damp or covered with mildew, and the cellar bottom will always be dry.

To keep the watercourse of the drain tiles always free from silt, the waste water from the cistern should be directed into the tiles, at the highest point of the drain. During heavy showers of rain, the tiles would be thoroughly cleansed of all silt, several times every year. But it is difficult to introduce such a system of drainage after a building is erected.

Fig. 1 Fig. 2



WASH BOILER ATTACHMENT.

Minnesota Tree Planting.

The Minnesota newspapers are calling upon the State Legislature not to adjourn without taking some action in the matter of appropriating a sum of money for the purchase of seed trees to be distributed to each town throughout the State. They especially urge that trees be planted on the prairies of the State, for the benefit of the farmers who fill up the broad stretch of land between the railroad and river, so that they may thus fence their roads and farms with forest trees. Already has this been done to some extent. The system has been adopted on all the lines of the St. Paul and Pacific Railroad, and already have many miles of trees been planted. The same course has been pursued by farmers in the neighborhood of Hutchinson, who have set out from 1,000 to 20,000 trees each.

BLASTING IN A COAL MINE—WAITING FOR THE BLAST. [See page 184.]

BLASTING IN A COAL MINE.

"Down in a coal mine" is a locality which, although immortalized in a popular air groaned out at the rate of some twenty times a day by wheezy hand organs under our windows, is not the most inviting place in the world to eke out one's existence. We descend the shaft with a disagreeable feeling of going, we know not whither, save somewhere into the depths of a black pit which yawns beneath us. Once at the bottom, there is a damp oppressive feeling in the air; the rock overhead drips dirty water down upon us, and occasionally an icy stream crawls down our back, sending a disagreeable shudder from head to foot. Of course we get bewildered; the light from the little lamp in our oil skin hat is very dim and smoky, and casts a sort of uncertain radiance for about three feet in advance, throwing great black shadows which leave us in a kind of unpleasant doubt whether or not we shall suddenly step into some abyss and disappear forever into the bowels of the earth.

We trudge through countless leads, now scrambling over timbers, then compressing ourselves into incredibly small compass in order to crawl through the narrowest of openings. There is a conglomeration of coal dust and mud under foot that sticks to our shoes like glue. We trip over the rails, and bruise every square inch of our bodies against the sharp angles of the rough walls, while our hands and faces, within a very few minutes, partake of the somber hue of our surroundings.

Soon we encounter a party of miners, rough hardy looking men, far healthier than we should believe would be the case with beings whose labor is carried on away from the light of day. They are preparing a blast, our guide tells us, and we draw near to watch the operation, but speedily retire in dismay at the apparently careless handling of the powder in close proximity to the unguarded flames of the lamps. The men manifest no concern, and all are coolly smoking or chatting.

Now, the charges are ready, and one of the miner's lights the fuse from his pipe. We scramble precipitately to a safe position in total disregard of either dirt, wet, or bruises; and then, in a state of suspense, we stop our ears and wonder whether the smoke will leave us entirely or only partially suffocated. The men lounge lazily out of the way, forming a little group by themselves—just as the artist has sketched them in the engraving—and puff quietly at their pipes.

A flash—then a deep muffled explosion, which echoes through the long caverns, and is followed by the rumbling and crashing of the falling *debris*—clouds of dense sulphurous smoke fill the chamber, rising up to the roof and curling away toward the shaft. We get down close to the floor with a handkerchief—a very grimy one by this time—over our nose and inwardly yearn for one breath of fresh air. Meanwhile the blasters wait until the smoke disperses, and the atmosphere becomes less stifling; then they resume work. Some pile the detached bits of coal in heaps, and others fill the tubs which travel on the rails in the foreground of our picture. Then the mules are signalled for, and we can hear the noise of their hoofs approaching, mingled with the sounds of blows and an alarming chorus of expletives on the part of the drivers. The animals are attached to the tubs, and, after arguing some time with their attendants, mule fashion, by drumming on the wagons with their heels, refusing to stir, or manifesting an unconquerable disposition to lie down, they are at length persuaded, through the agency of a club or by being banged about the head with a lump of coal, that resistance is useless, when they reluctantly start off on a slow jog trot. We follow them to the shaft, leaving the miners swinging their picks or hammering at their drills, apparently careless of the dark heavy atmosphere around them.

Cold Ablutions in Fever.

In a valuable article contributed to one of the French medical journals by Dr. L'Ambert, he presents the following conclusions concerning the use of cold ablutions in fever, as practiced in France: They are especially useful in typhoid and the eruptive fevers, and strongly indicated in malignant cases. They act upon the chief and most constant phenomena of these diseases, are especially anti-febrile, and reduce the temperature materially. They favor the re-establishment of a full, profound, regular perspiration; render the secretions more active; make the skin supple, moist and fresh; favor the outcoming of the eruption; allay cerebral and other nervous excitement, suppressing headache, coma, delirium and restlessness, and induce sleep; cause the pulse to fall eight to thirty beats. From two to eight hours is the duration of their action, the ablutions to be repeated two to four times in the twenty-four hours. They have no influence upon the length of the sickness, but render it milder, and are readily applied as cold baths or by wrapping the patient in a cold wet sheet.

Relics of the Mound Builders.

In making an excavation on the bank of the river at the Rockwood landing, Roane county, East Tennessee, a few days ago, says the Nashville *Republican Banner*, a human skeleton was exposed. The burial case was earthenware, of the same kind or character as that found in the mounds and along the river bottoms. From this fact it is reasonable to conclude that the skeleton belonged to the race of mound builders, as this kind of pottery is found in all the mounds of the country. This race was so far anterior to the Indian race that their oldest traditions give no account of them.

The skeleton was five and one half feet long. The bones were large and heavy. The arm bones were disproportionately long. The right one was broken near the shoulder, and was probably the cause of the individual's death. The most peculiar feature about the formation of the skeleton was that the arm at the shoulder connected with a short strong bone that was connected firmly with the sixth joint of the backbone, counting from the head.

The head was small and round. From the impressions in the soil, the hair had been thin and hung as low as the shoulders.

Photographic Reproduction of Diffraction Gratings.

Experiments made by Hon. J. W. Strutt, some months since, with a view to the production of photographic copies of diffraction gratings ruled upon glass, have given interesting and valuable results, of which he gave an account in a communication read before the Royal Society, June 20, 1872. The account is republished in the *Philosophical Magazine* for November, 1872. The ruled plates were laid upon glass plates sensitized in the usual manner, and the prints were made in the same manner as from ordinary negatives. Both wet and dry sensitive plates were used, with but little difference in the results. The photographic gratings have brilliant spectra, and were but little inferior to those ruled upon glass. In the course of the experiments, trial was made of plates covered with a film of bichromatized gelatine. The gratings thus made possessed a high degree of transparency, and were found to be better than the ordinary photographs; and although there was some uncertainty attending their production, the best obtained appeared to be even superior to the originals on glass. They give very brilliant spectra, and the definition of the lines is surprisingly good. They can be used very conveniently in an ordinary spectroscope, by putting them in the place of the prism. Gratings having 6,000 lines to the inch are now successfully made; and as their cost is trifling compared with that of the ruled ones, they will be much more accessible to experimenters. As the thickness of the glass upon which they are mounted is small, the absorption of the rays is very slight, and they offer considerable advantages in researches upon radiant heat, as they may replace to a large extent the costly and inconvenient prisms of rocksalt.

An Illustrated Daily Paper.

The *Daily Graphic* is the title of a new daily illustrated evening newspaper, which has recently made its appearance in this city. A daily paper with large engravings illustrating scenes of the day, such as the inauguration parade and scenes at the great ball, is a new feature and another advance in journalism.

The pictures are produced by the photo-lithograph process, one entire side of the sheet being transferred to stone, from which it is printed.

The initial numbers are well edited, but we could wish the illustrated portion better executed. Experience will probably remedy some of the defects. It is too early to venture an opinion as to the financial success of the paper, but the enterprise is laudable; and with $500,000 to back it (which we understand it has), we heartily wish the new comer every success.

NEW BOOKS AND PUBLICATIONS.

A TREATISE ON THE STRENGTH OF BRIDGES AND ROOFS, with Practical Examples, for the Use of Engineers and Students. By Samuel H. Shreve, C. E., etc. New York: D. Van Nostrand, 27 Warren Street.

In this comprehensive work, the author applies the simpler processes of algebra to the discussion of the subject of strains in single span trusses, and deduces many formulæ for practical application.

ILLUSTRATED SEED CATALOGUE AND AMATEUR'S GUIDE TO THE FLOWER AND KITCHEN GARDEN, FOR 1873. B. K. Bliss & Sons, 23 Park Place and 20 Murray Street, New York.

One of the handsomest of the many works of similar description that have come under our notice. It is lavishly illustrated, not only with excellent wood cuts, but with three double page finely executed chromos of groups of flowers. There is a large amount of valuable information for the horticulturist, besides the usual descriptions of plants, seeds, garden implements, etc. The book is mailed for the nominal price of 25 cents, which can hardly pay the cost of printing.

The second number of the PRACTICAL MAGAZINE has been forwarded to us by the American agents, Messrs. James R. Osgood & Co., of Boston. The handsome appearance and substantial character, shown in the first number, are well maintained. We observe that this number contains reproductions of engravings of Ladd's napping machine and the system of earthwork used by the Brooklyn Improvement Company, both of which were originally published in the SCIENTIFIC AMERICAN.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]
From February 12 to February 13, 1873, inclusive.

AUTOMATIC VALVE.—J. L. Kitson, G. W. Carr, Philadelphia, Pa.
LAWN MOWER.—E. G. Passmore, Philadelphia, Pa.
PROPELLER ADJUSTER, ETC.—J. M. Dodge, Newark, N. J.
SAIL SEWING MACHINE.—K. C. Barton, Philadelphia, Pa.
UTILIZING HEAT.—J. Kidd, New York city.
WASH BOILER ATTACHMENT.—C. Lawrence, New York city.

PATENT OFFICE DECISIONS.

HOSE COUPLING.—LAWTON AND BLISS.—EXTENSION.

LEGGETT, *Commissioner:*

This case falls at the first step in its consideration. It appears by reference to the rejected application of V. Fogerty, filed May 19, 1858, cited by the Examiner, that the device was not new at the date of the original grant of the patent. Yet the patent was not only granted, but it has been reissued, litigated, and sustained in Court. It is now for the first time suspected to be defective. These facts call for a close scrutiny and a careful comparison of the patent and reference, which I have made, and I fully concur with the Examiner's opinion that the two cases show substantially identical devices. Fogerty's application, it appears, was not before the Court. If it had been it must obviously have defeated the patent, for the reissued claims are exactly applicable to Fogerty's coupling as to the patentees. The only difference between the two devices is that the latch in one is held in place by a spring, and in the other by a screw; but the patentee does not limit himself to the use of a screw, and if he did it would be immaterial. The common screw and the common spring, when used merely for the simple function of pressing and holding a latch in place, are as perfect mechanical equivalents as it would be possible to mention. The extension must be refused for want of novelty in the device at the date of the grant of the patent.

IMPROVEMENT IN CULTIVATORS.—AUGUSTUS ADAMS.—APPEAL.

THACHER, *Acting Commissioner:*

Applicant presents two claims—the first for a draft hook of peculiar construction "as a new article of manufacture," and the second for what may be construed as a combination of this hook with several other devices.

The Examiner refuses to consider both claims in the same application, taking the broad ground that "an article of manufacture" must be covered as an entirety by a single claim, and that no other claim can be entertained in the same application.

It is a little remarkable that this position should be again assumed after the decision of the Commissioner in the case of E. R. Sumner, C. D. 1871, p. 180, in which this doctrine was strongly condemned in an appeal from this same Examiner, on nearly the same question. It is true that was not a precisely parallel case, but the principle announced undoubtedly applies to the present application, and should have controlled the Examiner in his action thereon.

The error is occasioned by a mistaken impression as to the phrase "article of manufacture." A strange hallucination appears to exist in the minds of many as to the effect of these words, and their presence in a claim is supposed, in some miraculous manner, to change the nature of the invention. This is all a mistake. The same rules apply in determining the patentability of an article of manufacture as in any other case—there must be the same evidence of invention, the same proof of novelty.

Suppose the words "article of manufacture" stricken from the first claim in this application and the device claimed simply as a draft hook, the nature of the invention and the character of the claim would not be changed in the least; but no one would then think of objecting to the second claim because the hook had been claimed as entirety in the first. This is precisely what the claim covers in its present form, and the error of the Examiner's decision is just as palpable in the one case as it would be in the other.

I remark in conclusion that the combination of parts mentioned in the second claim appears to be perfectly legitimate; but that, if any of these parts are not represented by the model, it should be amended by incorporating the missing devices. The decision of the Examiner is overruled, and he is instructed to proceed with the examination of the case.

SAW MILL CARRIAGES.—PATTEE VS. RUSSELL.—APPEAL.

THACHER, *Acting Commissioner:*

The facts which I think may be considered in proof in this case, from a just balance of all the testimony, are as follows: Russell made a model in 1865 which illustrates the invention, and laid it aside until February, 1871, when he put the invention in practical operation in a mill, and he filed his application for patent August 21, 1871. He also made another model in 1867, but this constituted no advance toward giving the public the benefit of the invention, and may be regarded as an immaterial fact.

Pattee completed his invention in 1870, put it in practical operation during that year in a lumber mill, (where it was examined by Russell,) and applied for his patent September 12, 1871, twenty-two days subsequent to Russell's application.

Upon these facts the Examiner of Interferences and the Board of Appeals have found that priority of invention is with Pattee, by authority of the law as laid down in Ransom vs. The Mayor of New York, 1 Fish, 272, and other cases in which a like doctrine has been announced.

"If the plaintiffs, after they had perfected their invention, unreasonably delayed their application for a patent, and other persons, before such application was made, actually perfected and applied the same invention to practical use, and gave the knowledge thereof to the public, and the plaintiffs, after the knowledge of such subsequent invention or discovery and its public use, failed to make objection and to apply without unreasonable delay for a patent for their invention, they cannot sustain their patent." (Ransom vs. Mayor of New York.)

There is no doubt but this is the law and that it governs the grant as well as the validity of patents. The only question is whether it applies to the state of facts in proof in this case. Here on the part of Russell, if the testimony he adduced is to be believed, is an invention completed and reduced to form in a working model, which clearly illustrates it, in 1865. He is engaged in business that affords every opportunity and offers every inducement to him to reduce it to practice and give the public the benefit of it; yet he suppresses it for a number of years, until finally he sees it constructed and put in public use by an independent inventor. He examines it carefully, inquires as to its efficiency, and for the first time appears to appreciate it, but still does not assert any right in it. During this period of delay it is shown that he was paid over seven thousand dollars in money, and no obstacle appears to have precluded him from seeking a patent or otherwise giving the public the benefit of his invention. To be sure, it appears that he ultimately preceded Pattee by a few days in his application for a patent, but it was more than a year after he was cognizant of the manufacture of the machinery for Pattee, and nearly a year after he had seen and examined it in public use in Pattee's mill. The fact that he was first in the Office by a few days should therefore have very little weight. In view of the preceding delay of several years, which is a circumstance of some importance, and his failure in fact "to give the public that consideration for the grant of exclusive privileges upon which all valid patents must be based," namely, knowledge of the invention, I think there was unreasonable delay after his knowledge of what Pattee had done.

Pattee, therefore, has been correctly held, upon the facts in proof, to be, in contemplation of law, the prior inventor. The decision of the Board is affirmed.

DECISIONS OF THE COURTS.

United States Circuit Court—Northern District of New York.

HARVESTERS.—WILLIAM A. KIRBY *et al. vs.* THE DODGE AND STEVENSON MANUFACTURING CO. *et al.*

WOODRUFF, *Circuit Judge:*

The complainants herein complain that the defendants have infringed and are infringing their rights as assignees of a certain patent granted to Byron Densmore on the 10th of February, 1852, for a new and useful improvement in grain harvesters, surrendered and reissued to the complainants January 28, 1862, and thereafter, on the 30th of January, 1866, extended for the term of seven years from the expiration of the first term, namely, from the 10th of February, 1866.

The defendants deny that Byron Densmore was the first inventor of the improvement described in the reissued letters patent, and aver that such reissue was fraudulently and illegally granted, and was obtained in order to include, and does include, things not invented by Densmore, and not intended to be patented by him, and such reissued letters patent are for a different invention from that originally patented, and are invalid and void.

They also allege that the improvement described in the reissued patent had, prior to February 10, 1852, been invented, and was known and used by other persons who are named in the answer. That it was described in certain letters patent also mentioned.

They also deny that they have made or sold any machines whatever containing the said alleged invention of the said Densmore, as set forth in the specification and specified in either of the claims of said reissued patent, and deny that they have in any manner whatsoever infringed the said letters patent.

The infringement alleged relates solely to the first claim in the reissued patent granted to the complainants, "as follows:

"Hanging the driving wheel in a supplemental frame or its equivalent, which is hinged at one end to the main frame, while its opposite end may be adjusted and secured at various hights, or be left free as desired, whereby the cutting apparatus may be held at any desired hight for reaping, or be left free to accommodate itself to the undulations of the ground for mowing, substantially as described."

My conclusions are:

1st. That if the claim of the patentee, in the reissued patent in question, be regarded as a broad claim to hinging the frame of the cutters to the wheel frame, and making it adjustable by changing the relative elevation of the two frames, the patentee was anticipated by McCormick, and the utmost that the patentee could claim was the particular or special arrangement of the two frames which he used.

2d. That if the patentee had invented, before or when his patent was granted, a means or mode of bringing the cutters to the ground so as to follow with equal approach to usefulness and practicability, been long before invented by McCormick, and that in this view, also, if such patentee had any claim, it is at the utmost to the special arrangement or position of the parts.

3d. That in fact, the patentee, when the patent was granted, had made no invention which permitted the cutters to vibrate so as to follow the undulations of the ground when in use, and showed no such invention or device by his specification, drawings, or model.

And 4th. That, in so far as the reissued patent claims or purports to secure such a device as is last named, it is for these reasons invalid.

The claim of the complainants, in their reissued patent, which the defendants are charged with infringing, has been above quoted; the second and only other claim therein is for a wheel, provided with a crank and lever at the outer end of the cutter bar to adjust the hight thereof, as described.

It is a remarkable fact that, whereas the original pattern related to other devices and with great particularity described them, and contained, in all four claims, stating severally what the patentee claimed as his invention and wished to secure by patent, the reissue makes no claim whatever to those devices. It abandons all of them, and sets up claims entirely new and relating entirely to other and distinct parts of the machine, which are for a totally different purpose, and possess wholly different functions. When to this is added that the new claims embrace what did not, in fact, appear at all in the specifications, drawings, or model of the original patent, and, if construed broadly, embraced what Densmore had not himself invented when that original patent was granted, and that if he had, in any sense, made the discovery, it was not new, it is speaking mildly to say that great suspicion attaches to the case of the complainant in any of its features.

The bill must be dismissed with costs.

David Wright, of Auburn, for complainants.
George Harding, for defendants.

United States Circuit Court—Southern District of New York.

MACHINE FOR STRETCHING HAT BODIES.—THE EICKEMEYER HAT BLOCKING MACHINE COMPANY *vs.* H. O. PEARCE *et al.*

BLATCHFORD, *Judge:*

This suit is brought on reissued letters patent granted to the plaintiffs, as assignees of Rudolf Eickemeyer, December 1, 1868, for an "improvement in machines for stretching hat bodies," the original letters patent having been granted to said Eickemeyer, February 28, 1865.

The operation of stretching a hat body in the machine is as follows: The former is first allowed to descend to such a position as to permit the hat body to be put on and drawn tightly over it. The hat body, wet with hot water or steam, is put on and the former is raised up by depressing the outer end of the treadle or lever. When the hat body comes in contact with the clamp ring the weight of the ring and of the attached head piece causes the ring to hold the hat body with sufficient firmness against the circular portion of the former to prevent it from slipping between the ring and the former, and the continued upward movement of the former, produced by a suitable pressure upon the outer end of the lever or treadle, brings the hat body into contact with the two series of rollers, which are thus made to press upon and stretch the portions of the hat body which are between the rollers and the corresponding ribs of the former into the recesses. Such portions are thereby stretched over the ribs. By this means the hat body is brought to a suitable shape for blocking and shaping the crown and brim of the hat.

The specification states that fixed round edged surfaces may be substituted for, and would be the equivalents of, the two series of rollers, but that the inventor prefers to use the rollers, as, by preventing friction upon the hat body, they prevent it from being torn in the stretching operation.

The principal ground of defense urged is that, before Eickemeyer made his invention, one John Hutchinson, at Matteswan, New York, invented and constructed, and successfully used, in a crude way, instruments for stretching the tips and the brims of hat bodies, which instruments had the same mode of operation as that of instruments found in the defendants' machines. The date of Eickemeyer's invention was the summer of 1864. The identical instruments which Hutchinson used are produced. They were used by Hutchinson in 1860. They are, and always were, detached parts, and never were organized into a machine working automatically.

The description given of the use of the devices is that they were tried to see whether they would block a hat or not; that they were not operated continuously; that sometimes Hutchinson would make an alteration, and then another trial would be made to see whether the alteration was any improvement; that but one brim stretcher was made, and that of wood, which was broken several times in operating it; that the tip stretcher was of wood, and was tried on a few tips, and was broken in use and never repaired; that Hutchinson had the idea of constructing a machine embodying the principle of such devices, but had no definite plan as to the appliances by which the machine was to work out such principle; that nothing was done toward carrying out such intention; that the devices were tried in 1860, prior to, but not later than, June; that they were then stowed away in a closet, where old books and papers were kept, in a factory where Hutchinson continued to be employed for two years afterward; and that they remained in that closet, unused, for three years and a half, and were then removed to another place, whence they were taken to be used as evidence in favor of parties defending this suit. These devices of Hutchinson amounted to nothing, and were practically useless, for the reason that they were not combined in an organized machine. They lacked the combination and arrangement of them which Eickemeyer made, and which secures circumferential equality of action of the stretching devices on the material and accuracy of operation, by means of the concentric approach to, and recession from, each other, of the ribs and stretching devices. The equable intervention of the ribs between the stretching devices is an essential feature of the patent, due to the mechanical organization. There is no such feature in Hutchinson's devices, because there is no mechanical organization capable of developing such feature. Whether the ribs and stretching devices in Hutchinson's tools will move concentrically or not is a matter of accident, and dependent on the skill of the person handling the tools, and the equability of intervention of the ribs and stretching devices is equally a matter of accident and skill in handling.

There is, therefore, nothing in what Hutchinson did that can interfere with the second and third claims of the patent, which are the only ones involved in this suit.

There must be a decree for plaintiffs for a perpetual injunction and an account of profits, and an ascertainment of damages, with costs, in respect to the second and third claims of the patent.

Geo. Gifford, for complainants.
C. M. Keller, for defendants.

Recent American and Foreign Patents.

Improved Tube Cutter.

Edward Manuel, Milwaukee, Wis., assignor to himself and George Guy, of same place.—The object of this invention is to produce a tube cutter which can be set to cut a tube from within, and the knife of which can be gradually forced out to finally cut entirely through the tube within which it revolves. Devices of this character have been made with a cutting tool or chisel arranged to project laterally through a slot in a tube, and made adjustable therein by means of a spindle fitting in said tube. This improvement relates particularly to a spring and ratchet connection between the tube and spindle.

Improved Machine for Pointing Pickets.

Alpheus B. Corby, Binghamton, N. Y.—This invention has for its object to furnish an improved machine for pointing pickets. The base or frame of the machine is made with an upwardly projecting part to receive the knife lever which is pivoted to it with a bolt. To the lever, near its pivoting point, is securely attached a knife, which is made with a concave or inclined edge, so that it may operate upon the picket with a drawing cut. The base frame is also made to receive the angular picket holder, which may be adjusted at such an angle with the plane of the knife as will cause the pickets to be pointed at any desired taper. In using the machine for pointing square pickets the holder is adjusted at the proper angle, and a gage is adjusted at the proper point. The picket is then placed in the angle of the holder and pushed down till stopped by the gage. The lever is then pressed down, cutting one side of the said picket. The picket is then turned one quarter of a revolution and a cut is made upon the second side, and so on, the beginning of each previous cut serving as a guide for beginning the next cut.

Improved Counter Gage and Shears.

Nelson Stow, Binghamton, N. Y.—This invention consists in applying to the ordinary shears or cutters used upon store counters a thumb piece and lever by which the movable cutter is easily opened and closed to make a cross slit or nip in the edge of fabric at the point up to which said fabric has been measured.

Improved Liquid Fuel Steam Generator.

Oliver W. Ketchum, Toronto, Dominion of Canada.—This invention consists in the method of burning liquid fuel, as coal oil or petroleum, under a pressure of air from one pipe that supplies the supporter of combustion and under pressure of air from another pipe upon the hydrocarbon which is used as the combustible. The air and the oil being forced together from different directions, are thus brought into contact, closely intermingled, and the combustion made complete, uniform, and perfect.

Improved Railway Snow Plow.

William Walker, Fort Bridger, Wyoming Territory.—This invention relates to a new machine for removing snow from railroad tracks, and consists in providing pivoted platforms with sides so hinged as to form extensions thereof when the platforms are tilted, and thus perform the office of chutes for delivering the snow at a suitable distance from the track. These hinged sides are held vertical and the platforms horizontal by the same means or devices. It also consists in combining said platforms and hinged sides with series of levers, whereby the tilting of the platforms and letting down of the sides are performed simultaneously, and finally in the use of a hinged check plate applied to the front of each platform for the purpose of yielding to the entering snow, but preventing the snow from falling out at the front end. The apparatus is attached to the front of a locomotive engine and pushed forward into the snow. When filled it is either drawn back to a convenient dumping place or immediately dumped on the spot by tilting the platforms and letting down the plates.

Improved Device for Pitching Boats.

William H. Richardson, Stillwater, Minn.—The object of this invention is to provide means for expeditiously pitching the seams of boats and marine vessels of all kinds, also the seams of floors or platforms when the same are to be made watertight; and it consists in a rectangular shaped vessel, open at the top, with a circular bottom. Beneath the bottom is the lamp chamber and lamp. A wheel which revolves in the vessel by means of a shaft is made in two parts, so that a rim of cotton is confined between the parts and forms its periphery. The diameter of the wheel is such that it runs near the bottom of the vessel. The pitch is kept in a liquid state in the vessel by means of the lamp in the chamber. A discharge tube is provided, made in two parts, the outer of which is curved and removable. On each side of the vessel are two more discharge tubes, which may be closed by the slides on the inside. A brush with a hollow handle or stem fits either of the three tubes mentioned. In using the article it is held by the handle and pushed along with the brush in the seam. If it is the deck of the vessel, the brush is attached to the curved spout or tube. If the side of the boat is to be pitched, the spout is closed and the brush is attached to one of the side tubes, the other side tube being closed by the slide. If it is the bottom of the vessel, then the wheel is employed, and the machine is run along with the cotton rim in the seam.

Improved Harvester Cutter.

Warren Wasson, Phineas F. Powers, and George W. Dungan, Genoa, Nevada.—This invention has for its object to improve the construction of harvester cutters so that they can be conveniently detached and attached, when desired, and will be securely held in place. The cutter bar is made in two parts which are placed side by side. The edge of one of the parts has a tongue formed upon it, and the adjacent edge of the other part has a corresponding groove formed in it, into which the said tongue fits. The heads have each a horizontal recess at each end, so that when a blank has been placed down over them the edges of the blank slots will be opposite said recesses. By this construction, when the two heads are carried in opposite directions by the movement that carries the parallel bars, the blank will be locked in place by the edges that enter recesses. Upon the rear side of the head is placed a lever or key which is so arranged with a pin that the latter will act as a crank or cam when the lever is turned in either direction to move the parts upon each other. Through the inner ends of the heads of the parts and lever is formed a hole to receive the box or bushing in which the end of the pitman works. In the rear part of each of the cutters is formed a rearwardly inclined slot to receive the rearwardly inclined square projection formed upon the rear part of the cutter bar. By this construction, as the lever is turned outward, the rear part of the cutter bar will be drawn inward and the forward part will be pushed outward, carrying the cutters with it, thus bringing the projections into the enlarged part of their slots and allowing one or all the cutters to be detached. The cutters are slightly curved or arched transversely, so that when lying free they will rest only upon their side edges. When the cutters have been arranged in place by reversing the operation above described, the cutter will be locked in place. The projections also draw down the middle parts of the cutters, so that their elasticity may take up any wear and prevent any rattling. A false or blank cutter is provided, which is slightly curved transversely and has a slot formed in it of such a size as to allow it to be slipped down over the heads when the lever has been detached, and does not interfere with the movements of the heads upon each other.

Improved Ironing Table.

Abraham Wechsler, New York city.—The object of this invention is to provide a table which is especially adapted for ironing shirt bosoms and other articles, and which, when not to be used for ironing purposes, can be folded together and used as a dining or kitchen table. The invention consists in having a table with a movable iron board fitted to support shirt bosoms in position for ironing, which board, when not required, can be withdrawn and replaced by an extension top, whereby the table is converted into a dining or kitchen table.

Improved Harrow.

Hiram Cartwright, Owatonna, Minn.—This is a double harrow, being made in two sections which are identical in form and size, and in themselves presenting no particular novelty. The sections are so arranged that their rear inner ends come nearly in contact, and so that, in being drawn forward, the entire ground covered by the harrow is operated upon. The sections being separately jointed to and connected with the draft bar, the harrow is very flexible and will conform to the inequalities of the ground, and is made to pass obstructions with great facility.

Improved Hand Corn Planter.

Louis H. Richards, Rising Sun, Md.—This invention has for its object to furnish an improved machine for dropping corn which shall enable the seed to be dropped uniformly, and any desired number of kernels at a time. The seed hopper is attached to a bar, and may be enlarged by suitable means to any desired extent without materially increasing the weight. In a slot in the lower part of the bar is pivoted a wheel in such a position that its upper side may enter and fill a recess in the bottom of the hopper. A cup is secured in a recess in the face of a wheel to receive seed from the hopper and discharge it upon the ground. The wheel is kept from carrying out any more seed than enough to fill its cup by the suitable cut off attached to the bar. Another bar is so arranged that its downward movement will revolve the wheel in such a direction that the cup will discharge its contents upon the ground. A handle is provided for convenience in carrying and operating the dropper. Suitable mechanism actuates an arm in the hopper to prevent the seed from becoming clogged, and to keep it stirred up, so that it will pass freely to the dropping wheel.

Improved Steam Plow.

Albert E. McGaughey, East Minneapolis, Minn.—This invention relates to a new arrangement of plows to be operated by steam power with the object of carrying on the operation with the smallest attainable loss of power. The invention consists principally in rotating the plows at once around a horizontal and around a vertical axle, and utilizing about one third of their horizontal sweep for active work in the ground, thus producing curved furrows. While in the ground each plow does not turn with its horizontal axle, but only on the vertical. At the end of each furrow the plow which made it is swung on the horizontal axle and thereby carried off the ground, making one entire revolution around the horizontal axle, and meanwhile about two thirds of a revolution around the vertical, before re-entering the ground. By this means great power in plowing is utilized. The invention further consists in such a connection of the horizontal plow pivots or axles with the pinions or wheels turning them that the turning will only take place after the completion of the furrows, and not during the making of them. For this object spring clamps are used.

Improved Ice Cream Freezer.

Georges Guinot, Milton, Florida.—This invention relates to a new apparatus for producing ice cream or other substances by the rotation of a cylindrical vessel within a congealing substance. The tub is provided with a false bottom in which a vertical central pin, carrying at its upper end a disk, is centered. This disk serves as a direct support for the freezing cylinder and has three holes formed in it for the reception of as many pins that project downward from the bottom of the vessel. Thus, when the latter vessel is placed upon the disk so that its pins enter the holes of said disk, the cylinder will be centrally supported in the tub, and will, when revolved, carry the disk around with it. The upper part of the vessel is furthermore guided or centered in an annular plate, which is secured in the tub. A handle actuating bevel gearing rotates within the tub. A vertical shaft or rod stands in the center of the cylinder and extends through the top or cover of the same into the cover of the tub, within which the squared upper end of said rod enters in such manner that it cannot revolve while the cylinder is being revolved around it. The rod serves to support a series of vertical scrapers which are set obliquely against the direction of rotation of the cylinder. The crank handle is revolved with suitable rapidity, and the cream thereby carried around, within, and by the cylinder, being meanwhile thoroughly and constantly plowed and displaced by the scrapers which remain stationary within the revolving cylinder.

Improved Railway Tank Feeder.

Augustus Grochau, Duluth, Minn.—This invention consists of a water tank with a piston floating therein upon the water, and a frame above the piston adapted for receiving a railroad engine and tender. These force the piston down by their weight, while the piston forces upward the water to the tender. The piston with the load on it is graduated in the time of its descent by a system of eccentrics and a regulating lever, manipulated by an attendant.

Improved Hub for Vehicles.

Howard M. DuBois, Philadelphia, Pa., assignor to himself and W. Filter, of same place.—This invention consists of a wood hub with a deep groove with sloping sides turned in at the center, in which is fitted a metal mortise ring in two semicircular parts, whose mortises are to receive the ends of the tenons; and over this another mortise ring, for the ends of the spokes above the tenons, is shrunk on so as to bind very tightly on the inner ring and secure that firmly in the groove. The said inner ring has ribs or keys extending transversely across the face, for which grooves or notches are provided in the inner face of the outer ring, in which the keys wedge hard when it is shrunk on. They also cause the mortises of both rings to coincide.

Improved Tool for Paring Horses' Hoofs.

John C. Johnson, Sulphur Springs, Ind.—This invention relates to a new and improved instrument for trimming the hoofs of horses preparatory to shoeing. The clamp bar has upon its end a serrated clamp block, which is held to the hoof with one hand, while the knife is operated with the other hand in paring the hoof. The clamp is attached to the shank of the blade by a bolt. The end of the clamp bar is forked so that the shank of the blade has play up and down on the bolt, and the bolt hole through the shank is somewhat larger than the bolt, so that the blade may be raised in position, as the case may require. By this means a right or left cut may be conveniently made with the single edged cutter.

Improved Water Heater for Steam Fire Engine Boilers.

Edward A. Russell, Milwaukee, Wis.—This invention is a water heater standing on the platform or coal reservoir of the engine, and is connected to the boiler of the engine by pipes and with a smoke pipe from its top to the chimney in the engine house, and is so arranged that the engine can be drawn out with the heater, leaving the smoke pipe standing in its place. The fire to heat the water being all the time ignited, and the heater being of the same strength as the boiler, it can remain in position and be perfectly safe while the engine is working.

Improved Tire Bender.

Joseph Tomlinson, Onslow, Iowa.—This invention relates to a new apparatus for bending wagon tires, and has for its object to permit in one machine the production of suitable circles to fit all sizes of wheels. The invention consists in constructing the tire bender of three rollers, which are adjustable toward each other, in order to vary the size of the circles in which the tire is bent in passing between them. The invention also consists in the application of lateral rotary guides which can be adjusted to fit tires of suitable width and to properly guide the same while passing through the machine.

Improved Bee Hive.

H. Peter Simmons, of Paterson, and Albert J. King, of Hudson, N. J.—This invention has for its object to improve the construction of bee hives, and it consists in the combination of rollers with the top of the hive and with bars provided with recesses for the same, for the purpose of locking the top in its normal position, and raising it off the base when it is to be moved laterally, also a strip secured to the central elevated portion of the bottom board in combination with the bottom bars of the comb frames, said strip and bottom bars being provided with beveled notches in order to keep the comb frames in proper position and to reduce the surface to which the bees might apply glue or propolis, and also suitable arrangements whereby the top may be moved over the comb frames, and allowed to drop into place without injuring the bees.

Improved Nail Plate Feeder.

Royal C. Grant, Middleport, Ohio.—The invention relates to those devices which are used to feed to a nail machine a plate from one end of which nails are successively cut. The invention consists in turning the nail plate over, or one half way round, so that there is only required a single cutter which is neither vibrated laterally nor has any motion outside of a single plane or direction. It also consists in the peculiar arrangement of mechanism by which the holder may be conveniently revolved from the same shaft that actuates the cutter. It consists, also, in a peculiarly constructed plate holder, which, by means of a recess and spring catch, is enabled to be attached to and detached from the carrier. It consists, also, in a spring lever and stud, or rack bar, for locking and unlocking the pawl-throwing-out mechanism. It consists, also, in a spring guide for the nail plate, whereby it is allowed to turn readily and also to adapt itself to plates of different width. It consists also in arranging the detent pawl beneath the feeding pawl so as to perform its own function as a detent and also when thrown out to carry the feeding pawl.

Combined Atmospheric Exhaust Pump and Funnel.

George H. Randall, Forestville, Md.—The invention relates generally to funnels through which liquids are poured into vessels, but more particularly to those used with sirup, molasses, and other viscous fluids. The invention consists in making funnels with an external sleeve closely joined to the funnel body, and extending down the nozzle for a sufficient distance to enable its end to reach within the jug, demijohn, barrel, cask or other receptacle for the liquid, and in connecting the chamber thus formed between nozzle and sleeve with an air exhaust pump.

Improved Broom.

James Standish, Eureka, Nev.—The brush holder or broom head is formed of sheet metal, and corresponds in shape to the top portion of an ordinary broom. The same is provided with a screw socket to receive the broom handle, and with a wedge block, by which the brush may be secured in the head. The block is adjusted by the handle when screwed out or in.

Insulated Battery Cup Holder.

James H. Thomas, Baltimore, Md.—Telegraph battery cup or tumbler holders have been provided with tubular or perforated shanks or stems for the purpose of conducting the moisture or overflow from the cup to the floor. Aside from certain other disadvantages resulting from this construction, the injury to both the battery and floor, or article which chanced to be placed in proximity, renders it highly objectionable. The object of this invention is to furnish an insulated holder adapted to remedy such difficulties; and, to this end, a saucer shaped or inverted conical holder is provided with perforations in the bottom and a chamber beneath the same, to receive a cup into which the overflow of the battery tumbler will pass.

Box for Preserving Cake and Bread.

Albert R. Ledoux, Cornwall Landing, N. Y.—This invention has for its object to furnish an improved box for preserving cake, bread, and other articles from becoming dry and being thus injured. The invention consists in placing a pan containing a moist sponge and covered with a perforated plate to support the articles to be kept moist within the box.

Improved Adjustable Journal.

Moses Jackson, Bavington, Pa.—This invention relates to shaft and wrist journal bearings, and consists in a mode of compensating for the wear by means of a right and left hand screw and tapering journal. A conical sleeve screws on a stem. The rounded or beveled end of the stem fits in a concavity of the washer, and both are radially grooved to prevent them from slipping on each other. The washer fits in the concavity of the sleeve, and is interposed between the head of a bolt and the head of the stem. A bearing washer has ribs or flanges which are set into corresponding depressions to prevent it from turning. The stem has exteriorly a right hand screw thread, while interiorly it has a left handed screw thread. The parts cannot become disengaged or even loose otherwise than by wear, owing to the reverse threads on the screw and stem.

Improved Bolt Cutter.

Joseph Tomlinson, Onslow, Iowa.—This invention relates to a new and very simple bolt cutter, in which a sliding jaw is used under a fixed jaw somewhat in the style of a monkey wrench. The two cutters have L-shaped cutting edges, so that they can cut from either the front or one side of the instrument. They can be reversed, if necessary, so that either side of the instrument may be used. This is an improved feature, inasmuch as it permits the application of the instrument close to the surface, and the cutting of bolts or pins that could not be cut so close by other means. By means of straps a lever is connected with the shank, so that, when said lever is swung, its connection with the shank and slide will cause the slide to move down or up, as the case may be, and to cut when the lever is swung down. This connection of the lever with the two cutters is one which gives great power, and allows the application of a hand instrument in places where such instruments were hitherto not found sufficiently strong.

Improved Fruit Jar.

Mrs. Ella G. Hallen, Carlisle, Pa.—The invention relates to fruit jars, and consists in a hollow glass stopper having a single central opening at the bottom, and in a jar having blown lugs on the inside and a plain ring on the outside.

Improved Cotton Press.

Robert Powers, Charleston, Miss.—This invention consists of a large revolving nut, through the center of which the screw works, confined between the cross bars in the top of the vertical press frame. The latter rises and falls by the turning of the nut, which is effected by a belt worked by a small pulley on a counter shaft, one end of which runs against the end of another shaft, which may be the ordinary band wheel shaft of a horse power for driving a cotton gin, and is to be provided with a clutch of any approved kind by which it can be readily connected to said shaft to be turned by it or disconnected. The two shafts have each a bevel pinion, near the ends facing each other, with which there is another pinion arranged in such manner on an adjustable support that it may be readily brought into gear with them. The aforesaid clutch is then disconnected, to reverse the motion of the nut and raise the follower, after it has been forced down to press the bale, by the direct action of the driving shaft on the counter shaft, through the medium of the aforesaid clutches.

Improved Cooking Utensil.

Joseph Mansfield, Jefferson, Wis.—This invention relates to a new case or inclosure for receiving and holding gridirons, and has for its object to permit a full control over the iron during the broiling process to prevent the escape of all the juice from the meat that is being broiled and the entrance into the room of smoke or gases from the fire. The invention consists in the arrangement of a supporting plate for the gridiron, and in the application thereto of a cover or covering attachment, whereby the gridiron is protected and the heat retained.

Business and Personal.

The Charge for Insertion under this head is **$1** *a Line.*

Notes & Queries

B. O. M. asks how to prepare calf skins for drum heads.

R. B. C. asks: With what force does iron expand when heated?

R. says: Please tell [me the cheapest cement for stopping the cracks in a leaking roof.

W. B. W. asks: Will hot lard or tallow draw the temper of a steel blade? May a knife be so spoiled in frying meat?

G. W. H. says: Can you tell me of anything that will color butter, without rendering it unhealthy or affecting its flavor?

J. M. L. says: I have about 20 barrels of dirty olive oil, gathered from journals of shafting. How can I clean it so as to use it again?

P. A. B. asks how to soften leather that has got hard, such as pump valves. He has tried oil, water, and kerosene, and neither will soften it.

W. E. G. asks: Does boiling pickles in a brass kettle render them injurious to health, and will a brass faucet in a vinegar barrel injure the vinegar?

W. E. G. says: One friend contends that coal, stone, iron, and other minerals were formed or made in their present state when the earth was made; I differ with him. Who is right?

R. says: How can I dissolve bones to be used as a fertilizer? I saw it stated somewhere that to boil them in lime and ashes in an open kettle would cause them to be easily pulverized. Please tell me the cheapest manner in which they can be pulverized?

J. B. M. asks: What is the result produced by hardening cast steel in water strongly impregnated with salt, and what would be the difference if sal ammoniac were used in place of salt?

I. M. I. says: What will be the resistance of the atmosphere to a flat surface containing one thousand square feet, moving at the rate of thirty miles an hour?

M. E. P. asks: What are the best materials for soldering iron and steel, and how are they used? How can I temper a large irregularly shaped punch and die without springing them?

J. H. S. asks: What flux is used in the manufacture of steel plow shares, where the wing and land side are so nicely welded together? I have tried pulverized borax with poor success. What was the cause?

S. asks: How can I make a red stain that will give, when burnished, a bright clear color? Aniline gives too dark a shade. How shall I go to work to make a burnish ink that will polish well?

J. A. W. asks: 1. How can I put a thin coating of gum on a small piece of leather, convex on one or both sides. The gum is to be as soft as that used for pencil rubbers. 2. How can I make a composition of gum and leather filings (leather sawdust or fine ground leather)?

L. M. L. says: I believe that limestone could be successfully employed for the production of steam in a furnace suitably constructed for the purpose. I would like to know if any of your readers can give me information of any experiments on the subject.

A. W. T. asks: What is the method of polishing or varnishing walnut picture frame moldings, used by the manufacturers thereof? The operation is very quickly performed, requiring but one day's time, and the polish is quite bright and durable.

J. S. B. asks: Can you advise me how to paint muslin or paper with adhesive, elastic, white and insoluble paint that will not crack or injure the appearance of the other side, without using gum or oil combinations? Can glue or starch paint be made elastic and insoluble?

J. B. asks for information in reference to mills for grinding spices, gum arabic, and substances which contain large proportions of oil. He has a burr stone, a cast iron and a steel mill, but they all gum up and are useless for pulverizing oily sticky substances.

W. B. W. asks: Will some one please give a cheap and simple plan for operating a horse hay fork, by which the load may be carried perpendicularly ten or fifteen feet and thence horizontally or at a little inclination for any required distance, and dropped at any point along the line, at the discretion of the operator?

J. T. T. asks for the best plan for hanging wall paper on a horizontal rough ceiling, so as to prevent the paper from breaking at joints. Which is the best width for the paper, 6 or 12 inches?

A. B. J. asks: Would the addition of oxygen to the usual air blast of a blast furnace lessen the amount of coal necessary to smelt a given amount of ore; if so, what proportion less coal could be used by increasing the oxygen, or even by using all oxygen for the blast?

W. B. W. says: A rope fastened at one end will support vertically a given weight. What is the comparative size of another, supported horizontally by its extremities and sustaining the same weight in the middle? Or, what is the comparative strain upon two ropes, sustaining an equal weight, the one supported vertically and the other horizontally?

W. M. remarks: E. H. R. says that the stoppage of the breath from any cause is immediately followed by insensibility, both of body and mind. That being the case, I would like to ask how it is that, if the head be cut off a chicken, the bird will plunge about, using both legs and wings violently for nearly five minutes, appearing to be in great pain. Surely decapitation must stop the breath.

W. E. G. says: Some of my friends contend that a ball shot from a rifle *or* pistol will penetrate deeper into wood or other objects at a distance of fifty paces than it will at ten paces; in other words, that the velocity of a ball increases up to within a certain distance. I differ in opinion with them; who is right?

J. C. B. asks: 1. Ought drinking water, standing in a pail, to be covered to prevent absorption of noxious gases in a room? 2. Is it true, as stated in Report of Agricultural Department, 1869, p. 364, that "milk and coffee, when mixed and taken together, constitute a new composition which is absolutely indigestible, nothing in reality but 'leather soup'?"

J. B. says: In walking through one of the rolling mills, I saw what is generally called a collar, that is, a piece of iron, coming out of the rolls, from some cause or other turned over the roll, instead of taking the usual course. The men working at the rolls at once commenced trying to slack up the screws, to extricate this ill formed piece, but failed in the attempt. Several others came with a long wrench, and then the screw could not be slackened until something like three quarters of an hour had been spent at it, and of course the iron was wasting in the furnaces during that time. Are there not holsters different to the ones with the screw on the top?

J. A. B. has sunk a well 4 feet in diameter to a depth of 60 feet; 50 feet through clay and 30 through gravel, without striking water; and he wishes to convert it, if possible, into a cistern. Can this be done by cementing the lower half (in the sand) or by applying a coating of tar to the kerbing, and nailing on securely tongued and grooved flooring, leaving the part through the clay with its present lining (kerbing)? What is the best way of making corners water tight? If these plans are not feasible, what is the best way to make a water tight cistern to keep water pure enough for farmyard purposes?

E. L. asks: Can some of your readers tell me how to mount the pollen of the "morning glory" on a portion of the calix of the same flower, so as to keep it looking fresh for future microscopical examination? I tried several times to mount the pollen by shaking it upon a piece of the deepest red of the calix, but the latter always shrunk or dried down in a few hours so as to spoil it. It makes a most beautiful object for the microscope, when freshly mounted.

C. J. asks whether the force of a permanent magnet is affected by electrical conditions of the atmosphere. "I have such a one, whose force, in sustaining weights suspended from the keeper by a basket, seems to be very variable and, possibly, depending upon electrical atmospherical conditions. Is this substantiated by any good evidence?" Answer: The best plan is for our correspondent to perform a careful series of experiments with his magnet and report the result. In this way, by a comparison of facts, we may build up a theory and finally establish a law. Whenever there is electrical disturbance, change the weights on the keeper and thus determine whether the strength of the magnet is increased or diminished, and see if the electrical changes stand in the relation of cause and effect.

C. W. H. asks if the pressure is the same in two steam domes, one the ordinary construction, the other separated from the boiler by a bottom diaphragm through which is a small orifice for the admission of steam. Answer: The pressure is the same in both.

S. asks: What is the best coating preparation for iron, to prevent rust or oxidation from exposure to water or moisture? Answer: In New York city the iron buildings are protected by several coats of oil paint. If the articles are small, varnish can be taken. A coating of paraffin will serve where the temperature remains low.

R. B. C. asks: What is the best solvent of caoutchouc, that will evaporate and leave the caoutchouc firmly adhering to the substance on which the solution is placed? Answer: The best solvent for india rubber is bisulphide of carbon, or benzole.

G. F. P. D. says: The need of ventilation is particularly noticeable during these long, cold winter evenings, when we are confined within the limits of four walls and require gas light, which I think is the chief cause of the vitiation of the air. The conditions are these: The room is heated by a low down grate (and by that only) and during the day the air is noticeably pure and unobjectionable; but after the gas has been lighted for an hour or two, the air has a dry and burnt feeling which is very disagreeable as well as unhealthy. I wish to ask if you can suggest a remedy. I have seen an advertisement, in some English publication, of a self ventilating gas burner, which carried off the products of combustion. Are such to be found in our American cities? How does the amount of carbonic acid and other impurities given off by said gas light compare with the exhalation from a human being, as far as the contamination of the air is concerned? Answer: Attempts have been made to carry off the products of combustion of gas burners by means of siphon tubes suspended over each jet. It worked tolerably well in public halls, but is hardly feasible for private houses. The only safe way is to have ventilators extending to the outer air in which an artificial draft is produced by a single burner. The products of the combustion of illuminating gas are chiefly carbonic acid and water; if the gas is impure, sulphurous acid is also formed. The exhalation from respiration, in addition to carbonic acid, contain organic matter and are far more unhealthy than the products of burning lights; both will prove fatal if pushed too far, so that it is only a question of quantity. All sitting and sleeping rooms should be provided with ventilators, the form of which must be determined by the position of the rooms.

G. H. H. asks: 1. If a ship is sunk in mid ocean or any where in very deep water, will it sink until it comes to the sand at bottom of the ocean? 2. Will a mast sink in the ocean or will it float on top of the water? Answer: The question of the ship revives a very old discussion. It is generally conceded that at great depths the water must become more dense than on the surface, and a point could be reached where the ship would have the same weight as the displaced water and in consequence would remain at rest in any position in which it was placed, the upward pressure exerted upon it being equal to its own weight. There must be a depth below which the ship would not sink. A mast will float until it is water-logged and finally ground up by the action of the waves.

R. M. S. asks: What three articles will dissolve iron, lead and copper the quickest? Answer: The best solvent is nitric acid aided by gentle heat. The operation must be performed under a flue, or in the open air, as the fumes are poisonous.

R. D. says: How many horse power will it take to blow a furnace for making pig iron from the ore with a capacity of 4, 6, 8 or 10 tuns per day, respectively? Answer: In such cases as *this*, consult a well known and experienced constructing engineer. Each individual example will require an engine precisely adapted to its work. The larger size would, we presume, require a 16 inch high pressure cylinder, carrying 60 or 70 pounds steam. The smaller might require 14, 12 and 10 inch cylinders.

J. H. M. says: On one shaft I have two pulleys 12 inches, and 6 inches respectively. On the other, I have one pulley 36 inches in diameter from which I belt to the 12 inch. I want to know the size of the other pulley on the shaft with the 36 inch pulley, so that the belt can be shifted from the 36 and 12 on to the 6 and the one required. Answer: The rule involves an awkward algebraic expression which requires too much mathematical work to be generally used. The quickest and most satisfactory way is to lay out the pulleys on the drawing board and alter the radius of the unknown one until it fits. See our reply to F. E. D. (February 22, 1873) for the easiest method for general work.

S. A. R. asks: What will remove sediment which has accumulated in pipes caused by the evaporation of caustic soda, in solution, the same being formed in layers on the inside of pipe and burnt on by the action of fire on the outside? This sediment or inside coating is known in chemistry as black ash. Answer: It would be necessary to know more about the composition of the sediment before prescribing a remedy. We generally understand by black balls or black ash the sulphate of soda (salt cake) calcined with lime or coal, as obtained in the manufacture of soda ash.

J. H. S. says: There is, in the capitol building at Washington, D. C., a round room, in the center of which is a series of circular shelves in the form of a pyramid, on which are placed a number of glass jars, from which numerous wires extend down to the floor. Please explain the object and working of the above apparatus. Answer: The jars compose the cells of the galvanic battery by which electricity is generated for lighting the gas jets throughout the building.

A. S. R. says: In telegraphic communication, does electricity travel, that is, does electricity generated in a battery in Washington go to New York when the Washington operator communicates with New York? Will you give the facts concerning the time required, if any, for electricity to travel a given distance? Is it a substance, and, if not, how does it make a hole through a quantity of solid paper when it passes through it? Answers: As physicists are still speculating about the nature of electricity, and have still to confess that they have no real knowledge of it, we cannot say whether there is any actual movement of electricity, from place to place. It is thought probable, by the leading scientific men of the day, that electricity is a kind of motion and not a material substance. This motion has immense rapidity. Wheatstone, a well known English electrician, found the velocity of frictional electricity, which is similar to the lightning, to be 288,000 miles a second. In the telegraph, the speed is vastly less, in consequence of the lower intensity of voltaic electricity, and of the resistance of the circuit. It may become exceedingly small, and even imperceptible, in some cases of high resistance. Wherever it meets and overcomes resistance, heat is developed, and where it has intensity enough to overcome any resistance, it breaks a path for itself. The hole in paper is either produced by this mechanical force or by the sudden and violent expansion of air or moisture by the heat produced.

R. says: A. and B. want to draw the dirt from the bottom of a well by horse power. Two pulleys are required. A contends that large pulleys, and B, that small pulleys, will run the easier. Which is right? Answer: The larger the sheaves, as a rule, the easier is the work done.

S. asks: Do the wheels of a car slide or slip on the rail in going round a curve? Answer: Yes.

D. W. asks: 1. Do steam ships on the ocean use fresh water or salt? If salt, do they neutralize the salt so as to prevent the incrustation of the boiler with salt? How much fresh water is the Great Eastern supposed to need per trip? 2. Is any compound known by which black or brown hair can be bleached or turned white or nearly so? If so, please give the recipe. Answers: 1. Engineers of our ocean steamers now usually fill their boilers with fresh water before starting on their voyages, and as their engines are now fitted with "surface condensers" almost invariably, they use no salt water at all. Loss of the fresh water by leakage is replaced by water distilled by apparatus with which every steamer is also supplied. The Great Eastern probably uses 7½ pounds of feed water per pound of coal, and at 15 tuns coal per hour, this would make nearly 115 tuns of water per hour or 2,700 tuns per day. In this case, salt water is fed into the boiler and it is prevented from accumulating by blowing out a certain proportion of the brine and supplying its place by the fresh water from the hot well. 2. We have a belief that white hairs are honorable, but have not felt sufficient enthusiasm in that matter to make the inquiries or investigations presupposed by our correspondent's question.

W. & I. say: We disagree upon a point. W. claims that even the very center particle of a revolving shaft revolves with the shaft. I claim that as the direction of the motion of the upper and lower sides of the shaft are opposite, the center must be a medium or changing point between the two directions of motion, and consequently must be still and does not revolve. Answer: The central particle turns on its own center. We prefer to give out time and space to those desiring useful information rather than to the decision of such questions as this.

H. D. asks: What causes a grindstone to burst, and is there any danger from one which is 5 inches in diameter and 1 inch thick? Answer: It is a well known law of nature that every moving body requires the exertion of a definite amount of force to produce any given change of velocity or a known change in the direction of its motion. Its effort is always to move in a straight line and at uniform velocity. This is due to the property called inertia, and the effort to resist any force compelling a body to revolve in a circular arc is called centrifugal force. In a swiftly revolving grindstone, this centrifugal force sometimes becomes so great as to overcome the force of cohesion which binds together the particles of the stone, and the grindstone bursts. We should not like to drive a grindstone 5 inches in diameter over 1,000 revolutions per minute, but should consider a good stone safe at that speed, and have seen them driven much above it.

G. W. would like to know what is the best way to compress oxide of magnesium in place of lime, for oxyhydrogen light. Answer: It has been done by means of the hydraulic press, and cylinders have been sawn from the compressed block; but it is apt to crumble and blow away, and is not so serviceable as the lime light.

S. C. D. says: Please explain the process for nickel plating, published on page 177 of your volume XXV. What is meant by "pure sulphate of the protoxide of nickel by crystallization with 300 parts, by weight, of pure ammonia to form a double salt?" What is meant by "ammoniacal solution;" is it aqua ammonia? Does "platinum positive pole" mean to use platinum for an anode? Is 1,000° Fahr. correct? Answer: The best salt for nickel plating was found by Dr. Isaac Adams, of Boston, to be the double sulphate of nickel and ammonia. To prepare this compound E. D. Nagel, of Hamburg, Germany, takes 400 parts by weight of pure crystallized sulphate of nickel which he dissolves in 200 parts of concentrated aqua ammonia; the double salt thus formed is subsequently dissolved in 6,000 parts of water and an extra quantity (1,200 parts) of aqua ammonia of specific gravity 0·909 added. The amount of water and extra ammonia to be taken ought to be determined by experiment. The object of the additional ammonia is to prevent the solution from becoming acid. An ordinary battery or small quantity may be employed, and, for the anode, platinum; for the cathode, it is usual to take a bar of cast nickel. Dr. Adams found the best temperature to be 100° Fahr. His process was patented March 22, 1870.

J. D. sends a mineral specimen found in coal and asks what it is. Answer: The mineral you send is iron pyrites, and not quartz, as you suppose. It is of no special value.

O. C. H. says: I am doing a little lumbering and am interested in your answer to B., page 74, present volume. Would you be kind enough to give the answer in figures? Answer: The cubic contents of a stick of timber 8 inches square at one end, 4 inches square at the other, and 24 feet long, in cubic feet, is: $\frac{1}{3}[(\frac{2}{3}\times\frac{2}{3})+(\frac{1}{3}\times\frac{1}{3})+(\frac{2}{3}\times\frac{1}{3})]=6\frac{1}{3}$, and $6\frac{1}{3}$ feet, cubic measure, being multiplied by 12, gives 74 feet, board measure.

T. C. says: How is coal smoke generally burned, and what per cent of the coal is lost in smoke? Would there not be less danger of burning out a boiler, if the coal were fired in 2 or 3 different paces under the boiler, instead of firing in the usual way at one end of boiler? Please give your opinion. Your opinion is good stock in this part of Kansas. Answer: It affords us great pleasure to learn that our opinion is such "good stock." We shall hope to keep it well "above par." The direct loss, in heating effect, by smoke is rarely very large. Burn it by allowing a stream of air to enter through a large number of small holes in the furnace doors and have a good combustion chamber behind the grate bars. Probably the usual method is, on the whole, the best plan of firing.

G. R. says: We have, in connection with our boiler, a smoke stack which has three elbows, a part of which is built up a hill on the ground. In order to give the fire place of the boiler more draft, we desire to put an air blast from a fan either into the smoke stack or fire place, and desire your opinion as to which is best. If turned into the fire place from the ash pit, we suppose it would be necessary to close the latter with plank. Answer: Enter the blast at the ash pit, closing latter carefully. In using it, always be careful never to leave ash pit closed for a moment, when the blast is not on, as it may melt down the grate bars.

G. M. says: I have two water gage glasses; one is on the boilers in the usual way, and the other is carried from the boilers to the engine room, distant about 40 feet. This one I cannot get to work right. First I ran a ¾ inch pipe from near the bottom of the boiler that I might get the water as free from agitation as possible; then I ran a ½ inch pipe from the top of a steam drum above the boilers, the two pipes joining at the gage glass in the engine room, which I had carefully levelled from the other gage glass on the boilers. But I could not get it to work well. The water seldom came into the glass, and I could not get it to rise to the same level as in the boilers or to remain steady. I then removed the ¾ inch pipe which I had near the bottom of the boiler and put it on a level with the water pipe belonging to the gage that is on the boiler. I also removed the ½ inch pipe from the steam drum and put a ¾ inch pipe on the top of the boiler. But that has done no good, so that the water gage in the engine room is no good to me, nor has it been since I put it up. Can you tell me what is wrong? I would mention that the water pipe where it leaves the boiler drops down to the floor and then rises up to the glass in the engine room; has that got anything to do with it, or has condensation in the steam pipe? Answer: We suspect the trouble to be either condensation in the steam pipe or the formation of a "trap" by some bend in that pipe. The pipe conducting the water is probably all right. Make the steam pipe as large as cost will allow, with no bend in which water can settle, and cover with felting. If the gage can be made to work at all, it will work then, we suspect. Run the levels again to be certain that the gage has been set at the proper hight.

W. R. S. says that J. L. B.'s information as to putting glass jars on a wet cloth while filling with hot fruit is worth the price of our paper for a whole year to any housekeeper. "But a more convenient mode to fill fruit jars is to use a damp twisted rag long enough to reach around the jar. This makes a sort of handle by which the jar may be held while the hot fruit is poured in; and it is equally effective in protecting the jars while standing on the table. It has occurred to me that a strip of copper made in such a manner as to clasp the jar firmly, and having a suitable wooden handle, would protect the jar quite as well as the wet cloth, and be much more convenient. I believe I never broke a test tube over a spirit lamp when using a test tube holder. This subject evidently has something to do with the conduction and perhaps the radiation of heat; and it will allow of much investigation."

T. F. asks: Suppose that B. invents a machine, exhibits a model and drawings to a few friends, and gets them to sign a paper saying that they saw it at a certain date, but is unable to go any farther with it. Four or five years afterwards, a man, who has never seen or heard of B, invents and patents the same thing; can B use or sell his invention? Answer: B may use the invention, but is liable to a suit from the patentee. B's defence is prior use, which, if proven, will prevent his being mulcted in damages. But it does not possess B with any claim to his opponent's patent. B should apply for a patent and have interference declared. If B proves to have been the first inventor and has not acquiesced in the sale of the patented article for more than two years prior to his application for a patent, the Commissioner will grant him a patent, with which he can go before the courts and have his opponent's patent decreed invalid. After these proceedings, B, being the lawful patentee, can use and sell; and he can prevent the first patentee from doing either.

C. H. S. asks: Is there any process known, by which corn meal and spring wheat flour can be kept from heating and consequent souring, without destroying its essential qualities, as is done by kiln drying? Answer: By using air pipes so as to introduce air into the mass of flour, you can prevent heating and souring.

W. G. W. asks: How can I get or prepare the white paint used to color boxwood for drawing on? Answer: Moisten the block with water, and rub with enamel off a common card.

H. T. W. says: 1. I want to make a pine bath tub to be used without a lining. It will be made tight jointed, of course. What material can I use for an inside coating, something penetrating, to render it water tight and prevent all soakage? 2. Is whiting as good or better for first coat of wood house, than yellow ocher? 3. What is the better kind of timber for flooring next to yellow or southern pine, to be oiled and polished? 4. In what manner must a floor be oiled and polished so that it will always be clean and bright and not gum up or become begrimed? Answers: 1. Cover the inside of the tub with hot paraffin. 2. Whiting is probably as good as ocher for the purpose mentioned. 3. Walnut. 4. Use linseed oil and polish by hard rubbing with canvas.

J. C. R. asks for explanation of the diagram of a pantagraph, published on page 99 of our current volume. Answer: See the reply to S. A. T., on page 155, and page 179 of this issue.

A. J. B. asks, among other questions: What did Blanchard invent? Answer: A nail making machine, a shaping machine of universal application, an eccentric lathe, and other contrivances too numerous to describe. We are unable to give information as to the leather machinery.

J. D. asks how to mend rubber boots. Answer: See page 155 of our volume XXVI. For other information, ask the photographers of your neighborhood.

W. T. B. says, in answer to J. A. P. who asked for the best preparation for filling the holes and seams in burr stones: As you cannot readily find any thing hard enough, after it is dry, to wear equal to the face of the stone, or that will stay in the smooth scaly holes for any time, I think it quite as well to use nothing. But on the skirt of the stone, where the seam is large and runs near the edge, just feather-edge it, on the work side, like the furrow.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On an Improved Steam Engine for Yachts. By H. S. T.

On the Construction of Cheap, Safe and Durable Dwellings. By J. H. L.

On the Acid Relation of the Elements. By W. C.

On the Revelations of Science and Theology. By A. L. L.

On the Boiler Question. By C. P. E.

On Devices for Warming and Cooling, and Other Mechanism. By E. B.

On the Manufacture of Combs. By E. H. B.

On the Prismatic Railway. By E. C.

On the Elements of the Universe and their Relations. By E. D. S.

On Fog Trumpets. By E. H. K. B.

On the Reasons why Great Fires are Difficult to Control. By S. P. G.

On the Possibilities of Producing Perpetual Motion. By L. R.

On the Practice of the Sand Blast Proces for Engraving. By W. A. M., Jr.

On the Bursting Strain of Cylindrical Boilers. By B. B. V.

On the Strain in Cylindrical Boilers. By R. S. F.

On Heat Phenomena. By J. R.

On the Polar Sea. By J. H. F.

On Trade Unions. By A. M. D.

[OFFICIAL.]

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APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed, and are now pending, for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

24,094.—HEATING FEED WATER.—J. F. Brooks. May 7.
24,162.—PLATFORM SCALE.—F. M. Strong & T. Ross. May 7
24,192.—EDGING BOOT SOLES.—M. Wesson. May 7.
24,257.—SEAT FOR CAR.—T. T. Woodruff. May 14.

EXTENSIONS GRANTED.

22,901.—WATER WHEEL.—J. Temple.
23,085.—LAMP.—E. J. Hale & C. H. Chandler.
23,105.—STEAM VESSEL.—J. Montgomery

DISCLAIMER.

22,902.—WATER WHEEL.—J. Temple.

DESIGNS PATENTED.

6,412 to 6,415.—CARPETS.—J. Fisher, Enfield, Conn.
6,416 to 6,424.—CARPETS.—O. Heinigke, New York city.
6,425 to 6,428.—CARPETS.—H. Horan, Newark, N. J.
6,429 & 6,430.—CARPETS.—L. G. Malkin, New York city.
6,431 to 6,435.—OIL CLOTHS.—C. T. & V. E. Meyer, Lyon's Farms, N. J.
6,437 to 6,448.—CARPETS.—E. J. Ney, New York city.
6,449 & 6,450.—CARPETS.—H. Nordmann, New York city.
6,451.—SEWING MACHINE FRAME.—J. O'Neil, N. Y. city.
6,452 to 6,454.—CARPETS.—J. H. Smith, Enfield, Conn.
6,455.—OTTOMAN.—J. D. Ladd, New York city.

TRADE MARKS REGISTERED.

1,130 & 1,131.—CLOTHES WRINGERS.—Bolley Washing and Wringing Machine Co., Woonsocket, R. I.
1,132.—PLUG TOBACCO.—Earickson & Harris, St. Louis, Mo.
1,133.—COAL OIL.—W. A. Kowalski, New Orleans, La.
1,134.—SAUCE.—J. K. MacGowan & Co., Philadelphia, Pa.
1,135.—PAINT.—Prince's Metallic Paint Co., Weissport, Pa.
1,136.—TOBACCO.—Walker, McGraw & Co., Detroit, Mich.
1,137 to 1,139.—TOBACCO.—Allen & Ellis, Cincinnati, Ohio.
1,140.—WHISKIES.—Flack Brothers, Canton, Md.
1,141.—BOOTS AND SHOES.—Burt & Mears, New York city

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This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

Construct a neat model, not over a foot in any dimension—smaller if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

To Make an Application for a Patent.

The applicant for a patent should furnish a model of his invention if susceptible of one, although sometimes it may be dispensed with; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should besecurely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

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Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of fomer, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing MUNN & Co., 37 Park Row, New York.

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On the first of September, 1872, the new patent law of Canada went into force, and patents are now granted to citizens of the United States on the same favorable terms as to citizens of the Dominion.

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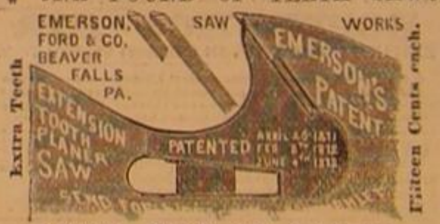

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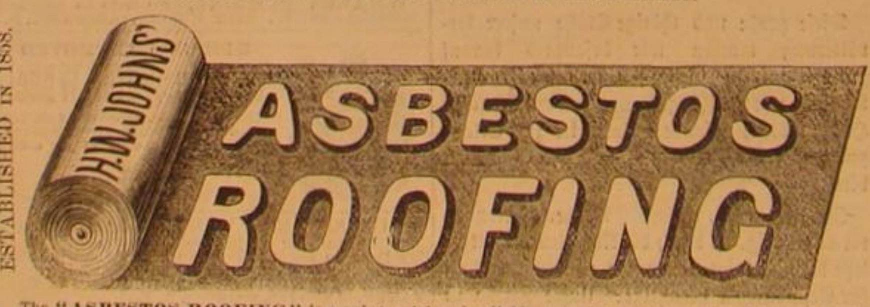

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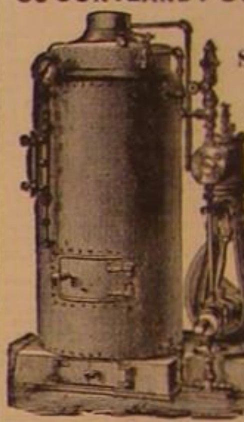

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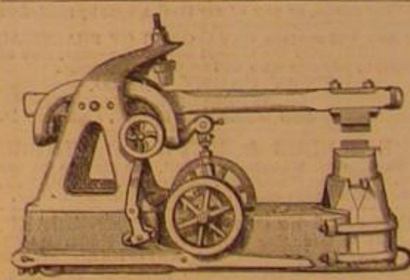

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