Manufacture of Extract of Indigo.

To make what is generally called sour extract of indigo, mix 5 lbs. of best Bengal indigo in 30 lbs. of strong oil of vitriol. Let it stand five days; then put it in a tub and add 40 gallons of boiling water to it; then filter while hot through strong felt cloth. The filters are usually made this way: A frame like a table top, 8 yards long, 2 yards wide. This frame is divided into four filters. Pieces of wood across are put on the top and made to fit the holes (the shape of bowls, with small holes perforated in them); then the felt cloth is put on the top, and the liquid is put on the filter and filtered through. The sediment at the top is used to color pottery molds; that which runs through is put in a tub, and 40 lbs. of common salt added. Digest for six hours; then put on the filters again for four or five days. That which drains through runs away into the sewers; that on the top of the filters is the extract. For these proportions the extract should weigh 80 lbs. This is sour extract of indigo of commerce.

FREE EXTRACT.—To make free extract of indigo, put 100 lbs. of the sour extract in a tub, 12 gallons of water as well. Neutralise the acid in the extract with strong soda ash liquor until it is free from any sour taste; then put on the filters for six days. It should weigh 100 lbs. when it comes off. That is free extract of indigo of commerce.—*Chemical News.*

PUBLIC BUILDINGS IN BRUSSELS.

The Belgian capital contains, without doubt, more fine public buildings than any other city of its size: and its bright appearance, and the general aspect of brilliance and gaiety of its inhabitants, have gained for it the name of "the miniature Paris." A new boulevard, which traverses the city, is now completed; and the principal building situated on it, the new Exchange, was opened last year with a grand ball, at which the King and Queen and other celebrities were present, in all some 3,500 persons, so that, although the floor of the great hall occupies some 4,000 superficial yards, the dancers were much cramped for room. M. Léon Suys is the architect of the building, which was begun in 1868. It is 300 feet long by 150 wide; it is rectangular shaped, and its principal façades open on the Boulevard Central and the Rue du Midi. The style is mixed, the architect has united the types of various ages, iron is found in complete harmony with stone, and the result is a splendid hall of commerce, a saloon which can at any time be converted into a theater, one of the most capacious concert rooms on the Continent, and a trophy of almost dramatic elegance. The sculptural ornamentation is very rich. The frontispiece of the great peristyle represents the city of Brussels, surrounded by groups of allegorical figures—Industry, Agriculture, Peace, Navigation, Painting, Free Trade, etc. Many other groups to sculpture decorate the outside of the building, which is surrounded by a large dome, culminating in a gilt spire. The immense cupola, says *Harpers' Weekly*, from which we extract the engraving, is supported by twelve Corinthian column in reddish gray stucco, while the galleries rest on columns imitating dark red porphyry. The floor is a masterpiece of mosaic work, executed by Italians. The sun burners, by which this magnificent structure is lighted, are composed of 1,400 jets of gas.

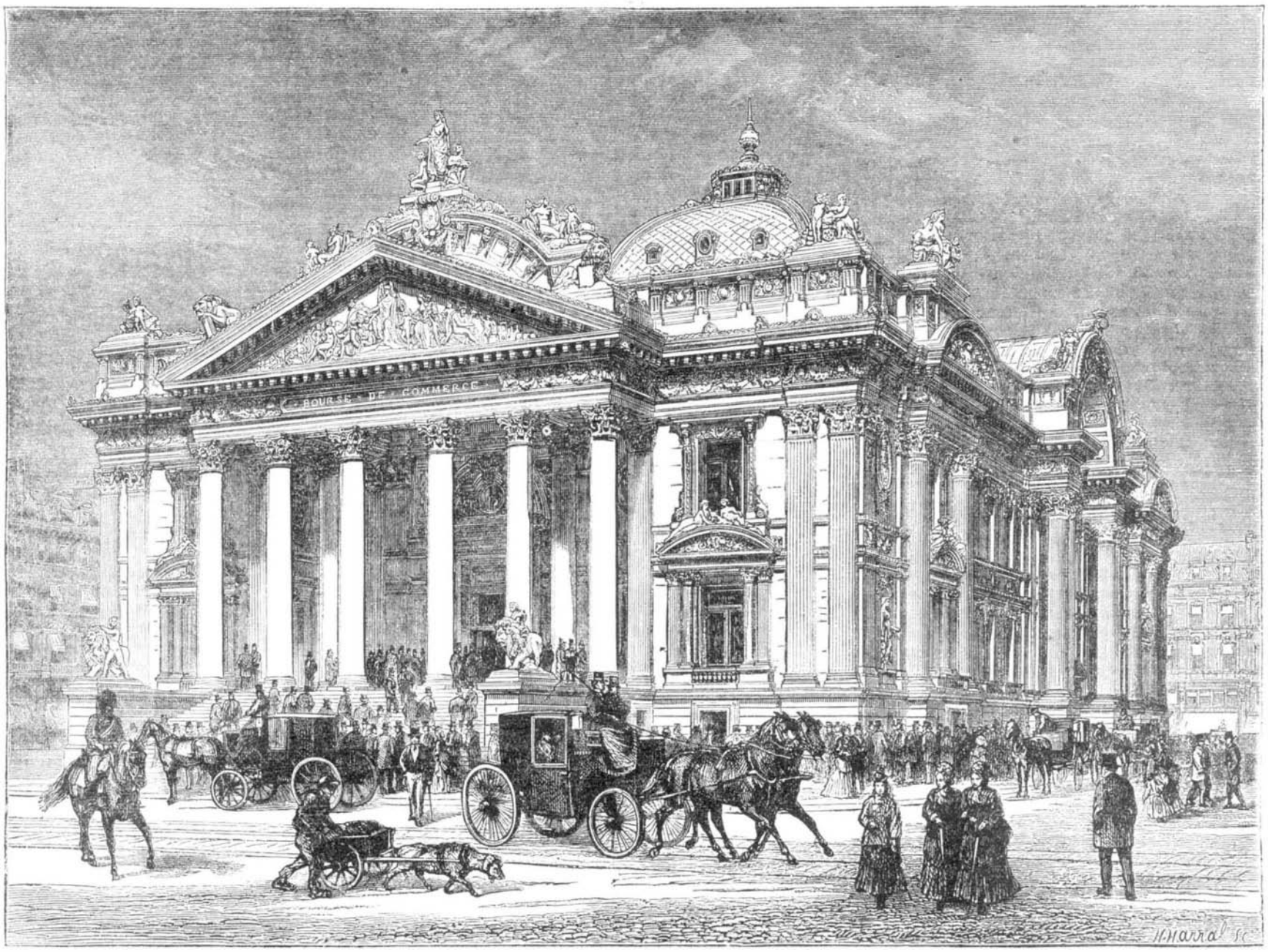
Solders and Soldering.

Continuing our remarks on this subject (see page 112), we have now to speak of hard solders and of the methods employed to solder other metals than tin, lead, and zinc. Probably the most important of these methods is that known as brazing, that is, the process employed for uniting pieces of iron, steel, copper, etc., by means of a solder consisting of brass, or an alloy of copper and zinc in different proportions. This solder is technically termed strong or hard solder. In workshop parlance, this is denominated spelter, a name which in commerce is used to designate the bars or ingots of cast zinc, as received by the metal merchant. Although this use of one name to indicate two very different things is at times confusing to the tyro, there is little fear that he will be misunderstood in the workshop or by tradesmen if he asks for his hard solder under the name of spelter. It is of far more importance, however, to remember that, for some kind of work, commercial spelter is not so well suited as other brasses; for it ordinarily consists of equal weights of zinc and copper, and in certain cases it is advisable to use a harder solder than is obtained by these proportions. The admixture of copper and zinc produces a series of alloys differing considerably in their qualities; and when tin is introduced, the increase or decrease of the zinc and tin produces a compound metal, the properties of which are widely different according to the relative quantities of the ingredients used in its production. Spelter when home made is best prepared by melting the copper and zinc in separate crucibles, the copper being in a crucible large enough to hold the zinc as well. When both metals are thoroughly melted, the zinc is poured into the copper crucible, the two being stirred well, so as to ensure thorough admixture, when the alloy is poured out on to a bundle of birch twigs or pieces of coarse basket work, supported over a tub of water, the object being to obtain the solder in form of fine grains with an irregular crystallization. If, when taken from the water, the spelter is not sufficiently uniform in size of grain, it is sifted through a sieve, and the large particles are crushed in a cast iron mortar or any suitable appliance, and again passed through the sieve, for fineness and uniformity of size are essential to the accomplishment of some examples of brazing in a thoroughly satisfactory manner. The manufacturers of the hard solder, however, usually cast it into ingots, delaying the cooling in order to develop as much as possible the crystalization, which is found to facilitate the subsequent crushing and sifting of the spelter. The flux used in nearly all the operations performed with hard solder is borax—the biborate of soda—which not only prevents the surfaces of the metals from becoming oxidized, but also exercises the remarkable property of dissolving any oxide already there. In some cases the flux can be dispensed with, but the pieces to be joined must be filed perfectly bright and clean, and care taken to melt the solder as quickly as possible when heat is once applied. The handiest way is, however, to dissolve the borax in water and add the solder, forming a paste which can be easily spread on the surfaces of shapes to which the drier powder would not readily adhere. For many jobs, however, it will be sufficient to merely crush the borax, which contains in its uncalcined state a considerable quantity of water; and for others it will be best to use merely a solution of borax.

The ordinary proportions of the constituents of hard solder are usually stated to be:

	Copper.	Zinc.	Tin.
Hardest	3	1	—
Hard (spelter)	1	1	—
Soft	4	3	1

and softer still is no longer a brass, but an alloy of tin and antimony (2 to 1). By the rough and ready processes of the manufactories, however, these proportions are probably never very accurately observed; and a variation of a few parts per cent is, perhaps, of little moment, when copper and zinc alone enter into the alloy. Thus, for solder for iron, the zinc may be present in the proportion of from 33 to 50 per cent, though the harder solder (that with least zinc) is to be preferred. For soldering brass and copper, the ordinary spelter will answer for common work; but where, as in the case of, say, microscope tubes, it is desirable that the solder should be as nearly as possible of the same color as the brass, the proportions of zinc must be increased or decreased, according to the paleness or yellowness of the metal to be soldered. In a similar manner, it is often advantageous or advisable to study the hardness of the solder, and to keep the zinc as low as possible to secure fusibility, without running the risk of damaging the article to be soldered. Thus for brazing tubes of pure copper, the zinc may be as little as 25 per cent, or even less; or a solder composed of copper 7, zinc 3, and tin 2, may be employed. For uniting brass tubes, that are to be afterward bent and hammered over the soldered portions, an alloy of brass 77·5, zinc 22·5, will be found to yield better results than other hard solders; but if the tubes are thin, and have to be soldered to flanges or pieces of stouter substance, it will be advisable to add a little tin—from 2 to 5 parts—in place of a similar quantity of zinc. Where, however, a large amount of work has to be done with the same kind of brass, the very best solder that can be had is to take the scraps of the metal itself, and add zinc in the proportion



THE NEW BOURSE AT BRUSSELS, BELGIUM.

of 20 per cent, thus producing an alloy whose fusion point is sufficiently removed from that of the metal to be soldered to avoid risk of damage; and yet it approaches so closely to it as to insure perfect union of the solder and the brass. A fine, hard solder, for joining small and thin pieces of copper or brass, consists of copper 86·5, zinc 9·5, tin 4. It is a light yellow in color, and is easily reduced to a fine grain, resembling filings; but it speedily oxidizes when heated, and should be well mixed with borax, unless it is completely surrounded by the fire. A solder for pure copper is made by mixing lead and copper, in proportions varying from 16 to 25 parts of the former to 100 of the latter. These are prepared by first melting the copper, and then the lead in a separate crucible. Add the lead as soon as melted, stir quickly, and pour out, either into ingot molds or on the bundle of birch twigs over the water tub. These solders can be used without borax, for brazing copper.

Solders for gold necessarily vary with the quality of the gold they are required to join. For 18-carat and upwards, the usual solder consists of gold (18-carat) 9 parts, silver 5, copper 5, and is best when made from filings of the components, melted together. Gold solder, termed one fourth, consists of gold 3, alloy 1; one third. of gold 2, alloy 1; and one half, of gold 1, alloy 1. The alloy is generally composed of 2 parts of silver to 1 of copper; but in one half solder the silver and copper are in equal proportions. A solder for the commoner articles of gold is make by fusing gold 3 parts, silver 2, copper 1½, together, and then adding ½ a part of zinc. Stir and cool immediately. This solder will flow at a comparatively low temperature. A soft gold solder is composed of gold 4, silver 1, copper 1. A solder for articles of 12 to 16 carats is made of gold 2 4 parts, silver 9, copper 6, and brass 3, the latter being a more convenient way of adding a small quantity of zinc than by putting that metal in its uncombined state into the crucible containing the molten metals. The brass, however, should be added when the others are melted.

A hard solder for silver consists of silver 66, copper 23, zinc 10; and being more fusible than "middling hard" solders for copper, it does well for brazing the finer articles in brass and steel. Silver solders are composed of 5, 3, and 2 parts of silver to 1 of brass, and are called respectively one sixth, one fourth, one third. The alloys should be melted several times in order to secure homogeneity, and are best when they are subsequently laminated into thin strips, which are granulated into spangles ready for mixing with the borax. A white solder for silver is made of equal parts of silver and tin. If an article of silver is to undergo several soldering operations, it will be necessary to employ the richer or less fusible solders, first, so as to avoid displacement in the subsequent applications of heat. There are other silver solders which are found useful in certain kinds of work. One of these is generally used for plated ware, and consists of silver 2 parts, bronze 1; another of silver 4, bronze 3, and arsenic 0 25; or equal parts of silver, bronze, and arsenic may be used. A solder consisting of silver 2, Dutch gold 1, and arsenic 0·5, is also found valuable; but in all these, the arsenic must be added after the fusion of the other metals. The button is to be drawn out under the hammer, or laminated and cut into shreds or spangles for more complete incorporation with the borax. A solder for German silver is easily made by melting scraps of the metal to be soldered, and adding an equal weight of molten zinc to them in the crucible; but this alloy is more ductile the smaller the proportion of zinc is. For general purposes, however, 5 German silver to 4 zinc will be found best. This should be cast into plates, cut into pieces, and pulverized.

For articles of aluminum bronze, three solders may be tried; but the proportions vary with the nature of the work and the number of operations the article has to undergo. A hard solder for aluminum bronze is expensive, containing about 88 parts of gold, 6 of silver, and 6 of copper; a "middling hard," about 54 gold, 28 silver, and 18 copper; and a "soft," 14 parts of gold, 57 silver, 15 copper, and 14 brass—the latter being added for the sake of the zinc it contains.

For soldering platinum, pure gold is generally used, but sometimes about a half per cent of an alloy of platinum and iridium is added to it

It should be remembered that all solders deteriorate by remelting; and though waste scraps may be added to a new melting, if the work is of a particular kind, care should be taken that none of the scrap metal has been previously remelted. In some cases it is necessary to remelt alloys several times, in order to secure homogeneity; but when once that result has been obtained, further remelting will only tend to destroy the properties of the solder. In a future number we will give a few details of the process known as autogenous soldering, or, in shop parlance, burning, which, in certain cases gives a superior appearance to that obtained by soldering, and, under special circumstances, is the only suitable method of uniting metallic surfaces.—*English Mechanic.*

Magnetic Railway Rails.

M. Heyl, engineer of one of the German railways, in a recent report upon the special section under his charge, calls attention, to the development of magnetism in the rails. He says: "I have observed that all the rails are transformed at their extremities, after they have been placed in position a few days, into powerful magnets, capable of attracting and of retaining a key or even a heavier piece of metallic iron. These rails preserve their magnetism even after they have been removed, but they lose it gradually. When in position, however, the magnetism is latent, only becoming free when the chairs are removed and disappearing again when they are replaced. Hence it is necessary to assume that two opposite poles come together at each junction, and that each rail is a magnet, the poles being alternately reversed throughout the line. This production of magnetism in the rails examined is undoubtedly attributable to the running of the trains, and to the shocks, friction, etc., thereby produced. The hypothesis of electric currents, induced or direct, must be rejected, since it is negatived by experiments upon the subject made with suitable apparatus. Although the interest attaching to the fact above stated is at present purely scientific, it is not impossible, says the *Franklin Journal*, that the magnetism thus developed may exercise an influence actually beneficial upon the stability of the roadway, increasing the adherence to the rails and the friction. It is possible, also, that the magnetic currents may be stronger at the moment of the passage of the trains, than either before or after. If this be so, the observations may acquire a still higher practical importance.

Pneumatic Tubes in London.

In addition to one line of 4½ feet pneumatic tubes for the transmission of large packages, mail bags, etc., there is in London an extensive system of small tubes in operation, for the sending of telegraph messages. The small tubes are from 1½ to 2¼ inches in diameter, are under the control of the Post Office department, they are divided into some twenty sections, and their aggregate length at the present time exceeds seventeen and a half miles. The messages are enclosed in carriers which are driven through the tubes by an air exhaust or air pressure, produced by six air pumps worked by three fifty horse engines, located at the central station. Where the length of the tube does not exceed one mile, the carrier goes through in about 3 minutes; but longer tubes require much more proportionate time.

Iron pipes, as well as lead, have been tried; but the result of experience is greatly in favor of lead. No deterioration is experienced in the lead pipes, and they are easy to maintain. With the iron pipes, however, the case is different; oxidation of the iron takes place, and, the interior becoming rough, the carriers are rapidly destroyed. The maintenance of an iron pipe is therefore found to be very expensive.

Provided due care is exercised in the construction of the work, interruptions of the service are of very rare occurrence. When the carriers occasionally stick fast in the pipes and cannot be moved either by compressing or exhausting the air, it is necessary to flood the pipe with water, and so force the carrier past the obstruction by an increased pressure.

All tubes are now fitted with a small pipe, by which water may be admitted if necessary.

The lead tubes are manufactured in as long lengths as possible, the 2¼ inch tubes being in lengths of about 29 feet.

Each length is laid in a wooden trough as soon as manufactured, so that it may be handled without fear of bending.

A tightly fitting polished steel "mandril," attached to a strong chain, is then drawn through the entire length of the pipe. This operation insures the pipe being smooth, cylindrical, and uniform throughout. It is necessary that the mandril should be lubricated with soft soap, so that it may not injure the pipe in passing through it.

When laid, the leaden tubes are protected by being inclosed in ordinary cast iron pipes, so that the sinking of the ground, etc., may not injure them

The process of laying and jointing the tubes is as follows:

The leaden tubes, drawn and smoothed as already explained, are delivered from the wooden troughs to the trench prepared to receive them.

The iron pipes are then drawn over the lead, leaving enough of the leaden pipe projecting to enable a "plumber's joint" to be made.

A strong chain is then passed through the length of tube to be joined on, and a polished iron mandril, similar to the one before mentioned, being heated and attached to this chain, is pushed half its length into the end of the pipe.

The new length of tube is then forced over the projecting end of the mandril, and the leaden tubes (the ends of which have been already cut flat by an apparatus made for the purpose) then butt perfectly together, and a plumber's joint is made in the usual manner. By this means the tube is perfectly airtight; and the mandril keeps the surface of the tube under the joint as smooth as at any other part of its length.

After the soldering process has been completed, the mandril is drawn out by the chain attached to it; the next length is drawn on, and the process repeated.

Where it is necessary to deviate from the straight line it is essential that the tubes be laid in a circular arc, whose radius shall not be less than 12 feet. The same care is necessary in entering the various stations, otherwise undue friction will arise, and curves would be introduced which might cause the carrier to stick fast

Snail Culture in France.

Frogs, horses, and snails—the first are an odd but toothsome dainty, which epicures, in this country as well as elsewhere, dearly prize; but horses, and especially snails—these are articles of diet which the enlightened American republic has yet to be educated to relish. Hippophagy, we have repeatedly explained, is as common in Paris, or nearly so, as the eating of beef; and the worn-out steed finds his way to the abattoir as readily as the milkless cow or stall fed ox. Hence, as a mere *bonne bouche* he has palled on the Gallic taste, educated by swollen geese livers or decayed salmon roes; a new dainty has been sought for, found, and the basis of the new industry which the production has developed is snails. There is nothing peculiar about the mollusc. It is the every-day slimy little object of which one finds thousands in gardens, vineyards, and woods. Switzerland and the provinces of Burgundy and Provence are the places of its cultivation. Throngs of women and children scour the country, collecting the snails in immense numbers, and depositing them in little tracts of land, enclosed with simply a trail of sawdust. This last the snail despises; he cannot cross it, and avoids its vicinity as a matter of preference. Therefore, for his confinement it is as good as a stone wall. After incarceration for two or three days, he is permitted to starve, and then the plot is laid out in patches of turf intersected by paths of sand. Above boards are hung to serve as shelter for the snails, which instinctively gather in large groups. The food provided consists in aromatic plants, such as mint, or lettuce and fragments of vegetables. This is fed to them three times a day in enormous quantities. At the end of eight days, the snails become quite obese, and besides have attained a very succulent flavor. Then comes another period of starvation for several days, after which transmission to market follows.

Gourmands, it is said, prefer the snail when taken wild, so long as the capture is made at a particular period. After the eggs are laid in May, the molluscs conceal themselves under stones to avoid the autumn frosts. There they become perfectly free from excretions, and, drawing themselves into their shells, close up for the winter. It is when they are collected in this state that their flavor is said to be best.

Waste of Stock.

We quote the following from our excellent cotemporary *The Carriage Monthly*; it contains, not only good advice to carriage manufacturers, but hints equally applicable to nearly all branches of trade:

In all manufacturing operations there is a liability of waste to a greater or less extent, and the profits of business are increased or diminished with the care and judgment exercised in the use of the materials employed in the articles manufactured. It is the same whether the article which we consume is high or low priced. To the carriage manufacturer this item of waste is a serious thing, calling for the greatest scrutiny upon his part. He has four departments to look after, a practical man to only one; if he be a smith or a painter, he can see where to save in his branch much better than in the branches he is not familiar with, and he has, therefore, to trust to his employee, or foreman of the department. Where is the greatest waste, may be asked: is it in the wood shop, paint shop, or trimming shop? The waste may be larger in quantity in the first named, as in this department much waste arises from want either of skill or care, or both, in selecting planks or panels, from which to cut pieces for a given purpose. The lumber itself may not be in such a shape as to cut to advantage, or in such position that a proper selection cannot be made without great waste of time. Pieces left after cutting from a board or plank, which are not wanted at that time, are thrown to one side or in the waste corner, to be cut up for firewood; and when small pieces are wanted for a given purpose, a whole plank or board is cut into, and thereby possibly spoiled for larger work to which it was adapted. The person who has the marking out of the wood work should have a place for small pieces, so that, when required, they can be easily procured without waste of time. Small savings help to make large profits. In the smith department, a great saving can be made, as in coal: using care, in cleaning off the forge, to select all the good coal from the cinders. In separating the scraps of iron, keep each class of iron scrap by itself. The care of loose screws, bolts, nuts, rivets, washers, etc., (which, in a factory running a half dozen fires, would, in the course of a year, make a very startling amount) greatly adds to the profits.

We come now to the paint shop, where the materials are very expensive and deteriorate very fast. In this department is to be found the greatest waste; the employee seems to give no thought that every ounce of paint wasted is so much money out of his employer's pocket. How often is the most expensive paint thrown away? A spoke, or we may say a wheel, has been repaired and painted over, and is to be striped with a carmine stripe; color is mixed up, which, in quantity, is sufficient to stripe a dozen wheels; when the wheel is striped, the color is laid on the shelf or bench, where it soon becomes dry and unfit for use, and it finds its place in the slush tub. Did you ever take a thought as to how many dollars that slush tub costs you? It is a mixture of all kinds of paints, from the expensive carmine to the cheapest venetian red; also, there is varnish of every grade, japan, oil, turpentine, and *time*. Can you form an estimate of its cost? I trow not; if you could, it would startle you; you would not believe that hundreds of dollars are wasted yearly in this tub. We now stop and look at the trimming shop, for there is waste here as well as in the other departments. We see cloth piled up on the shelves, varying in price, and leather of all kinds necessary. You may say there is no waste here: look under the bench; we see pieces of top and dash leather thrown together, pieces of cloth thrown in any place except the bench. These pieces can often be used up to advantage. P. Aste, in his articles on buggy tops, tells us where to put our pieces of enameled leather; other pieces can be used for curtain straps; and of what cannot be used in the shop, part can find a ready sale to the manufacturers of infants' and children's shoes, and the other can be used by the manufacturers of Prussian blue.

These facts are worthy of the thoughts of the manufacturer, and the foreman of each department. Look well to the small pieces, for they are like the small opening in the hour glass; but a grain of sand passes at a time, yet it is but a short time ere the last grain has passed through. We may not notice the small drippings from a barrel; yet if allowed to drip, it will soon be empty. It is not what we waste today, but what we waste every day that absorbs our vitals.

New Microscopic Telescope.

Mr. C. B. Boyle recently exhibited before the photographic section of the American Institute, in this city, a new optical instrument, which he called the microscopic telescope. It consisted of two parallel telescopes, about three feet in length and two inches in aperture, connected with hinges at the ends, and separated to the distance of the eyes by an adjusting screw. In order to produce the effect of the microscope, he places, before the object glass, prismatic lenses of about three feet focus, so that, when these lenses are in position, an object three feet in front of the object glass will be seen with both eyes distinctly, and magnified according to the power of the eye piece.

CURIOUS FACTS ABOUT SPONGES.

With this instrument, although but lately completed, he has already made one curious discovery—that no matter how long a sponge may have been used, no matter how long it may have been kept dry, its life is apparently restored when it is wet. The sponge being wet with warm water and placed in a warm room, the extremities of the sponge, after a little while, appear to be alive, and reach out like so many snakes. The longer they are, the greater the motion. He had observed that wetting the sponge with salt water seemed to increase the motion. Nearly half of all the slender points seemed to come to life, but after they become dry the motion ceases.

He has put upon a sponge all sorts of dust, so that they should be under the same circumstances as the pores of the sponge, but nothing but the pores of the sponge appeared to be in motion. Under the instrument, the sponge has no longer the appearance of a sponge; it appears like caverns, rocks, etc. These moving parts, when caught with pliers, would pull out a portion of the sponge. When there is much water in the sponge, they seem to be satisfied, but it is as the sponge is drying gradually that they appear to have life.

The power of this instrument was forty-two diameters.

IMMENSE PHOTOGRAPHS.—There are now on exhibition in Paris says the *Revue Industrielle*, the two largest photographs which have been made since the introduction of the art. One of these photographs represents the principal façade of the new Opera, the other one of the bronzes—the Departure, by Rude—of the Arc de Triomphe de l'Etoile. Each of the prints measures four feet three inches in length and three feet four inches in hight. They were obtained in one single piece, by well known processes, and with the aid of a large and specially constructed camera.

DECISIONS OF THE PATENT OFFICE.

BEFORE THE BOARD OF EXAMINERS-IN-CHIEF. PRESENT: MARCUS S. HOPKINS, R. L. B. CLARKE, CONCURRING.—APPLICATION OF MILLER T. GREENLEAF AND GEORGE Q. ADAMS FOR A PATENT FOR A CAR COUPLING.

In this case the Examiner admits that the patents of England and Thompson do not present the structure claimed. They do not show the transverse link stop, and are, therefore, not in point. The rejected cases of Jones and Mallory, however, completely answer the claim presented, and in the case of Mallory this is admitted by the applicant in argument. But the point is made that a rejected and abandoned application is not sufficient in law for the defeat or the denial of a patent. This is a legitimate point to make, and the issue it raises is not to be avoided by this Office.

The Supreme Court of the United States, in the case of Brown *vs.* Selby (O. G., Vol. 6, No. 12) held that "the mere fact of having unsuccessfully applied for a patent" could not take a case out of the category of unsuccessful experiments. This was a case in which a rejected application was invoked to defeat a patent. It had been rejected, withdrawn, and never renewed. After discussing evidence introduced with respect to the making and using of a machine by the rejected applicant, which machine was held to have been an experimental one, the court said: "Were it not for the application for a patent, it (the machine) would justly be regarded as an abandoned experiment. Can the fact that such an application was made, and afterwards voluntarily withdrawn, make any difference? We think not." Thus it appears the Supreme Court gave no weight whatever to a mere rejected and abandoned application, in the absence of independent proof sufficient to defeat the patent in question. The force of the application as proof of prior invention was one of the issues before them, and they decided it definitely.

In the case of the Northwestern Fire Extinguisher Company *vs.* the Philadelphia Fire Extinguisher Company (O. G. Vol. 6, No. 2), a rejected application which had not been withdrawn or formally abandoned, but which was probably an abandoned application by operation of the 32d and 35th sections of the Act of July 8, 1870, was invoked to defeat a patent, or one of the claims of a patent. The court gave the subject elaborate and learned consideration, and distinctly held the application, of itself, although accompanied by model and drawing, not to be effective proof of prior invention. But proof having been offered and complete working apparatus having been exhibited to show, that the invention was actually perfected and used in public at the time of, or prior to, the filing of the rejected application, that application and the drawings with it were admitted as evidence tending to explain the invention, and strengthen the other evidence of the fact of the real making of the invention.

The language of the court was that rejected applications "lack the essential quality of a publication, in that they were not designed for general circulation, nor were they made accessible to the public generally. They were placed in the custody of the Commissioner of Patents, not that they might thereby become known to the public, but for the special purpose of being examined and passed upon by him.

"Although they might incidentally become known to any one whose researches in the Patent Office might disclose their existence, they are not, therefore, published within the meaning of the Act of Congress.

"But it is said they establish the fact of invention, and so disprove the novelty of an invention subsequent in date. It is needless to refer to authorities to show what is so well settled, that a written description of a machine, although illustrated by drawings, which has not been given to the public, does not constitute an invention within the meaning of the patent laws. It may be so full and precise as to enable any one skilled in the art to which it appertains to construct the machine described; but until it has been embodied in a form capable of useful operation, it has not attained the proportions or the character of a complete invention. However suggestive and valuable it may be as an untried theory, it is ineffective against the practical and useful product of inventive skill."

In the case of the Lyman Ventilating and Refrigerator Company *vs.* Taylor (O. G. Vol. 6, No. 2), the above decision was cited with approval, and the court held that an alleged invention, as exhibited in a rejected application merely, must be laid out of view as an objection to the validity of a patent.

The court said: "As regards anything shown in the original application of Fairbanks, made in 1846 and rejected and withdrawn in 1847, it is well settled that a written description of a machine, although illustrated by drawings, which has not been given to the public, does not constitute an invention within the meaning of the patent laws. Evidence that such a description was made does not show of itself a prior invention. Such a description has not the same effect as a printed publication. It lacks the essential quality of such publication; for even though deposited in the Patent Office, it is not designed for general circulation, nor is it made accessible to the public generally, being so deposited for the special purpose of being examined and passed upon by the Patent Office, and not that it may thereby become known to the public. Although it may incidentally become known, the deposit of it is not a publication of it, within the meaning of the statute or the law. Moreover, although the description may be so full and precise as to enable any one skilled in the art to which it appertains to construct what it describes, it does not attain the proportions or the character of a complete invention until it is embodied in a form capable of useful operation."

The same was also held in different jurisdictions, with respect to the same subject matter, in the cases of Lyman *vs.* Myers, and the Lyman Patent R. Co. *vs.* Oswald. It is clear, we think, that a rejected application is not a publication. It does not necessarily make an invention known to the public, and cannot by presumption of law be assumed to do it. If through it, as through any other medium, an invention has actually been made known to the public, proof of that fact would bar the grant or destroy the validity of a patent. But it would be the proof, and not the rejected application, as such, that would have that effect; for such an application is not proof of either reduction of an invention to practice, or of its public use. Without proof of the making and using of what it may describe and illustrate, it is clear, we think, in the light of the above mentioned decisions, and of a sound interpretation of the statute, that a rejected and abandoned application is not sufficient to defeat a patent; and we see no sound reason why it should be held sufficient to warrant the denial of a patent. The abandonment of an application by operation of the present statute, or otherwise, we think, by no means necessarily works the abandonment of the alleged invention it purports to describe. For it necessarily follows that, if a rejected and abandoned application is not sufficient, in the absence of any other evidence, to establish the making of an invention, it cannot be sufficient to establish the abandonment of an invention; because an invention cannot be shown to have been abandoned until it is first shown to have been made. In fact, the court decisions above cited go directly to this point. Some of the abandoned applications invoked in those suits were abandoned by the voluntary acts of the parties, and some, it would appear, by the operation of the act of 1870. Now if the abandonment of these applications worked the abandonment of the alleged inventions they purported to describe, the courts must have held the patents before them invalid, on the ground that the inventions had been abandoned to the public and become common property. They did no tso hold, and we are left no other conclusion, either from the decisions referred to or from the language of the law, than that the abandonment of an application is but the loss of the applicant's remedy by that particular proceeding, with costs, and nothing more. A consideration of what an application is would seem to make this clear.

When an alleged inventor duly files an application for a patent in this Office, he thereby institutes a legal proceeding for the purpose of securing an alleged right. It is essentially an action *in rem*. The abandonment of the application is merely the abandonment of that proceeding—the abandonment of his attempt by due process of law to make his alleged inventions patent. It is the same as if he had sustained a nonsuit in a trial at law. Another proceeding may be instituted, that is, another application may be filed; and unless there be proof (aside from the abandonment of a former application) that the invention in itself has been abandoned, we presume a patent would have to issue. Were the mere abandonment of the application to work the abandonment of the invention to the public, this consequence might follow. If an inventor made an assignment of his invention or of an interest in it, before application for a patent, or before a patent had been obtained, as frequently happens, the title to the invention, or part of it, would be in the assignee; yet, if the inventor failed to complete his application or neglected to prosecute it, and it became abandoned, the assignee would thus be deprived of his interest in the invention: for the invention cannot go to the public and still the title to it subsist in an assignee. The statute specifies the abandonment of the "application" *only*, as a consequence of delay to prosecute it, and it would be strange if that consequence were also, by presumption of law, to include the invention. An inventor should not be held to be in a worse position by merely having attempted to make an invention patent, than if he had never made such an attempt. There is ample scope for a remedial and beneficial operation of the statute without such a construction of it. For instance, before the act of 1870, if an application for patent was filed, it might be delayed in its prosecution for years, and finally go to patent, and the patent would be valid, even if, pending the application, the invention had gone into general use by the public. (Jones *vs.* Sewal, O. G. Vol. 3, p. 688, and cases there cited.) The fact that the applicant continued his claim in the Office was sufficient to save his rights, unless it could be proved that by some act of his own he voluntarily relinquished them to the public. But under the act of 1870, providing for the abandonment of an "application" by mere delay to prosecute it, more than two years' public use of an invention *after* an application has been filed and not duly prosecuted, may evidently work abandonment of the invention, as well as *before* filing an application. The reason is that, when an application has been rejected and abandoned, the thing it may describe and illustrate is in substantially the same condition as if no application for patent for it had ever been filed. The application has become a nullity, and the section of the statute providing for the abandonment of an "invention," by public use of it *before* application has been made for patent upon it, will begin to operate just as if there had not been an application filed. Thus by the present law inventors are spurred to diligence in making their inventions patent (which the law favors), not only by a liability to forfeit the benefit of their applications, but also by a liability to forfeit their inventions, through public use, after their applications have been filed and become void.

But the evils, if there really be any, which may follow a radical change in the adjudications of the Office, with respect to the holding of rejected and abandoned applications a bar to the grant of patents for the devices they may describe and illustrate, must not be left out of view in this connection. There are thousands of these applications now in the Office. It is probable that most of them have been legally rejected, and that the references upon which they were rejected might now be cited as a sufficient answer to new claims made for the devices they comprehend. But it may be that some of them have been improperly rejected. It is only such of them as have been that need be considered; for within the files of all the others will be found a citation of legal references to anticipate, which references may be used again to answer all subsequent applications for the same things. But it may be suggested that the models or drawings of rejected applications in this Office are accessible to the public, that they may be inspected, and that the persons may thereby obtain suggestions of the inventions they illustrate, and procure patents fraudulently. If, however, the fact in any case appear that an applicant is not an *original* inventor, that is good ground for refusing him a patent. If it does not appear, fraud cannot be presumed against him. He must swear that he is the *original* inventor before he can have a patent, and that is all the precaution the law at present institutes. An anticipation of possible fraud will not justify a refusal to allow inventions to be made patent that have never yet been made so, or otherwise fully communicated to the knowledge of the public. The fact that the public may learn of them through the accident of their display here (for there is no law requiring them to be displayed, and whether they ever are or not depends upon the will of the Commissioner) is no sufficient reason to deny patents, in the absence of proof that the alleged inventions have gone into public use and become common property. When this fact is ascertained in the Office, a patent will not be allowed, and where it is judicially ascertained out of the Office, after a patent has issued, the courts will declare the patent void. We apprehend, therefore, that no harm can come to the public from making patent things which, so far as this Office can duly ascertain, have merely been wrongly withheld from patent. Such things the good of the public demands should be made patent, and the more of them there are the stronger is the demand. Making them patent is the means provided by law "to promote the progress of the useful arts." So far as applicants themselves are concerned, he only who prosecutes his rights in the manner marked out by law until they are lawfully *secured*, is entitled to any consideration. He who duly makes the invention patent to the public is entitled to reward, and he who fails from neglect is not. The law, we repeat, always favors the making of all new and useful inventions patent, and an invention is new, in contemplation of law, until it has been made patent, or described in a printed publication, or completely embodied in operative form and conferred upon the public, in this country.

We have then this case to meet. Supposing it to have been ascertained, to the satisfaction of the Office, that an abandoned application was unlawfully refused to be admitted to patent, we must refuse a present applicant permission to make the alleged invention patent, merely because of a wrongful and unlawful refusal of a former application that has become void, or else we must now permit the alleged invention to be made patent as the law contemplates. Can there be any doubt as to which is the proper course? The former application is now but a mere unpublished description and illustration of the invention. As we have already seen, it is not evidence of the perfection of an invention such as the law acknowledges. Until it has reached the perfected state of an actual grant, or patent, the benefit, for which a temporary monopoly is allowed by law, has not been conferred upon the public by the applicant. Until that time, a rejected and abandoned application stands in the same category, so far as the legal effect to bar a patent is concerned, with an unperfected experimental machine. It exhibits, in contemplation of law, merely an inchoate invention, not made public. Like an expired caveat, it is an imperfect manifestation of an embryonic device, and, like an expired caveat, it should never be invoked to obstruct the promulgation of a perfected invention.

But if any real evil is imminent, from the discontinuance of answering applications for patents in this Office by other unanswerable applications, then it can no doubt be easily avoided when it actually arrives. An act of Congress providing for the publication of rejected applications, or declaring the display of rejected models here for a limited time equivalent to publication, would be effectual. We see no reason for our continuing an unlawful course from any apprehension of evil to come from a lawful one.

These are our opinions, and we are urged here, with much apparent force of reason, to pass our judgment upon this case without regard to what has heretofore been done in the Office in like cases. We must consider whether we ought to or not; and we have held this case under advisement for some time, in order, if possible, to correctly ascertain our legal obligation in the premises. It is true, no doubt, as maintained in argument, that the whole country, including the tribunals in the Patent Office, must follow the law, as uniformly constructed and applied by the United States Courts. It is also true, so far as we are aware, that there have been no recent decisions of the Commissioner (made since the foregoing court decisions were announced) that require us to hold that a rejected and abandoned application is sufficient in law to defeat an application for a patent. Yet for a long time it has been customary in the Office to reject applications for patents, upon reference to rejected and abandoned applications; and we must consider whether it is expedient, and our official duty, in advance of any action by the Commissioner upon the subject, to undertake to change this course for ourselves, even though we hold to the opinion that a change is now necessary to bring our action into conformity with the law, as of late judicially interpreted and declared. There is not the slightest conflict, of which we are aware, under the present law, between the board and the Commissioner as to our jurisdiction; but as the subject has not been judicially passed upon, and as the point is involved, it is proper for us to now to consider it.

(To be concluded in a future issue.)

Recent American and Foreign Patents.

Improved Fastening for Railroad Rails.

John L. Stewart, Ellicott city, Md.—The object of this invention is to provide a fastening for railroad rails, in which the use of the ordinary spikes is dispensed with, and the devices so constructed that, the greater the pressure upon the rails, the tighter they are clamped. It consists in a grooved base plate attached to the ties and containing sliding boxes, which boxes are held in place by keys engaging with undercut ledges in the said base plate. The said boxes contain pivoted hooks having a horizontal groove in the lower part, in which rests a bearing plate which supports the rail. Beneath said bearing plate is a cushion of rubber, so arranged that, when compressed by the bearing plate from the weight of the train on the rail, the hooks are made to clamp the rail more tightly.

Improved Machine for Making Fence Pickets.

Isaac Levy, Ellaville, Fla.—The invention is an improvement in the class of machines wherein revolving and vertically adjustable cutter heads are employed for dressing the heads of the pickets. The improvement relates particularly to the construction of the sliding or reciprocating table and an attachment thereof, for supporting and clamping pickets of different lengths.

Improved Door Mat.

Orrin Rice, Adrian, Ill.—The sheet metal plate is perforated with holes, and the tufts of corn husks are inserted through them, one end of each tuft being drawn through one of a pair of holes, and the other end through the contiguous hole, so that the free end portions of the tuft will project on the opposite or face side of the plate, and the middle portion will project on the back of the plate. The ends of the several tufts are then cut to a uniform length, and the mat is complete.

Improved Cherry Pitter.

William B. Knapp, Tecumseh, Mich., assignor to himself and Frank Bumann, of same place.—This cherry pitter is formed of a tube, open at both ends, having a knob placed at one end, and teeth formed upon its other end. The cherry is pressed against the toothed end of the tube, which causes the pit to drop through the tube into a receiver, leaving the cherry whole and ready for use.

Improved Handle for Child's Carriage.

Charles F. Lauer, Pittsburgh, Pa.—This is a metal handle for children's carriages, having a concave T-shaped piece for attaching it to the wood frame by which the carriage is propelled. The T piece is so contrived that it applies to the cross piece and one of the shafts at their junction, and also serves to re-enforce and strengthen them, besides attaching the handle, thus uniting two pieces in one, and saving labor and material in the making.

Improved Atomizer.

Charles E. Robinson, Brooklyn, N. Y.—This invention relates to certain improvements in burners or atomizers for oil-burning furnaces. It consists in the combination of a tubular valve, a stem valve contained inside the tubular valve, and a valve seat, so constructed and arranged that the jets of steam and combustible liquid issuing therefrom form two hollow cones intersecting and inverted with respect to each other, so as to insure the thorough mixture of the two elements. The invention further consists in the combination with the said valves and valve stems of their respective feed pipes, and also in the adjustment of the valves.

Improved Oil-Burning Apparatus.

Charles E. Robinson, Brooklyn, N. Y.—The object of this invention is to provide a means for supplying petroleum or other liquid hydrocarbon to oil-burning furnaces. It consists in a large supply tank provided with a steam heating coil, a feed pipe extending below the surface of the oil, and a pipe for admitting direct steam pressure upon the oil for forcing it out, in combination with an oil reservoir communicating therewith by means of a valve, and provided with a level gage and inlet pipes for the oil and steam.

Improved Book of Letter Sheets.

Henry S. Jackson, New York city.—The object of this invention is to provide convenient means for leaving memorandum in the absence of persons called upon, and for preventing trouble and delay in writing notes on various occasions; and it consists in a book having the leaves gummed for sealing, with perforations across the leaves to allow each leaf to be easily torn off.

Improved Lamp Burner.

James Curzon, Darien, Conn.—This is a burner of two wicks, having the wick tubes bent longitudinally, either their upper parts or throughout their entire length, and so arranged as to form a star or similar shaped light.

Improved Bed Pipes for Lead-Corroding Houses

Peter H. Decker, Morsston, N. Y.—This invention has for its object to furnish ventilating or bed pipes for causing a uniform circulation and the same degree of heat through all the corroding pots of all the tiers of the stack. The invention consists in pipes made tapering and provided with blocks in the interior of their lower parts, with holes in the lower and upper parts of their sides, and with caps at their upper ends. By this construction the passage of the vapors from the lower to the upper pipes induces a draft from each tier of pots.

Improved Fire Box Attachment to Steam Boilers.

John Lee, Hazleton, Pa.—The object is to protect the rivet joint from the direct impingement of heat, so as to avoid the weakening of the seam joint without diminishing the fire surface. This is done by a seamless hollow casting, having projecting tubes which may be forced through and held tightly in holes of the boiler, while they may be readily removed by driving a punch passed through the outer holes. The latter may be stopped by detachable plugs.

Improved Thread-Winding Guide.

Eugene L. Manchester and John A. Bolen, Springfield, Mass.—This relates to the thread-winding guide used in thread mills for guiding the thread and laying it on the spools. It consists of a wheel in that part of the guide which is employed for laying and compacting the thread on the spool. The object is to substitute rolling for sliding friction, and thereby economize in the cost of guides by largely lessening the wear.

Improved Ruffler.

James McCullough, Aspinwall, Neb.—The essential feature of this invention consists of the ruffling pawl or plate, mounted so as to work on a pivot, and connected to the bell crank, by which it is worked in such manner that the friction due to sliding in ways is avoided. It is so actuated that, in pushing the cloth forward, it presses harder as the resistance increases, and in drawing back it rises off the cloth and moves back easily; and it also acts as a guide to control the cloth and prevent the ruffle from working laterally out of the ruffler.

Improved Self-Closing Hatchway.

Samuel Lawrence, New York city.—The covers of the several floors are connected. To the upper covers are attached cords which are secured to counterpoised levers. This construction throws the levers back when the covers are raised, so that they will be out of the way of the carriage. To the inner ends of the levers are attached cords, which join a single cord which passes down along the side of the hoisting rope, and its lower end is attached to the carriage. To the cord, at suitable distances apart, are attached rings, through which the hoisting rope passes, so that, when the carriage is raised, the cord may gather in loops. By this construction, as the carriage is raised, the weights raise the covers, so that the carriage does not come in contact with said covers. As the carriage in its descent approaches the bottom of the well hole, its weight tightens the cords, draws down the levers, and raises the weights, allowing the covers to close gradually by their own weight.

Improved Bottle Stopper.

Charles De Quillfeldt, New York city.—A stopper-carrying yoke is pivoted at some distance from the ends of a wire lever frame, swinging in eyes of a wire band attached to the neck of the bottle. The elastic stopper is made with disk-shaped base and cylindrical shank, perforated for the passage of the yoke, and is tightly secured to the bottle by a sleeve-shaped and flanged cap piece. The closing of the stopper is performed by guiding the base part into position on the mouth, and swinging the lever frame down.

Improved Sewing Machine Caster.

John H. Plank, Bloomfield, Iowa.—This invention consists in combining a lever with the socket plates which receive the feet of the sewing machine legs. Said lever is pivoted and otherwise so arranged that, by a movement thereof, the casters of one end of the socket may be lifted off the floor and the support of the machine transferred to the legs, to hold the machine firmly against shifting about while being used.