[For the Scientific American.]

IRON SHIPBUILDING AND AMERICAN COMMERCE.

BY PROF. HENRY E. COLTON

Whatever force the many reasons assigned for the decline of the American shipping interests may have possessed, there is no doubt that the introduction of iron as a material for the construction of the hulls of vessels has been the great cause Very soon after the discovery of the process of puddling iron and rolling it into plates, we are told that some bold experimenter formed a rude canal boat from those plates; it was not, however, until 1837 that any actual experiment of the new material was made on the ocean. At that time, a vessel of about 270 tuns was built of iron, at Liverpool, and made a trip to Rio de Janeiro, returning with a cargo of coffee dry and safe. Previous to this the possibility of putting together plates of iron into shape for vessels' hulls had been demonstrated on the Thames, on various canals in England, and even for a coasting vessel. The building of the ironsides in 1838 was, however, not the actual commencement of the use of iron, previous operations had been mere experiments. Naturally the innovation met with much opposition. It might do in smooth water but that it would never stand the strain and rough waves of the ocean was the opinion of a large majority. Fairbairn, in 1849, writes that he had up to that time built 100 vessels with iron hulls, which had proven successful, but complains that the British commercial authorities have made no actual recognition of their good qualities and superiority over wooden vessels. It was not until 1854 that the English "Lloyd's" deemed them of sufficient importance and value to merit a rating by rules and regulations. Now it is but rarely a vessel is built of wood in England, and then only some small craft for river or coast service.

In 1838, we have seen that there was only one shipbuilding firm bold enough to build an iron ship for venture on the ocean. Now there are on the Clyde (Glasgow) alone 37 such firms which in 1868 turned out 26 iron paddle steamers, 77 iron screw do., 1 composite do., do., 44 iron sailing vessels, 9 composite do., and 13 wood do., and 61 iron barges, etc.; on Jan. 1, 1868, they had on hand orders for 57 iron screw steamers, 11 paddle do.; and 26 iron sailing vessels, 12 composite do., and 11 wood do. The same year there were 14 firms operating on the Mersey (Liverpool) which, in 1867, launched 32 iron steam and sailing vessels, and had then on the stocks 18 more, also built a number of iron barges, etc. On the Tyne (Newcastle) there were about 20 firms who built, in 1867, 81 iron ships. There are also at Southampton a number of iron shipyards, but not so briskly employed. The London yards are almost deserted.

The greater proportion of steamers in the above is noteworthy, as also the great excess of screw propellers. Of the English tunnage, more than one third is steam. In 1867 it contained 2,808 steamers of which 1,896 were iron, 877 wood, 28 steel, 4 iron and steel, 3 composite. Of these 1,564 were propelled by paddle-wheels, and 1,244 by screws. Exclusive of inland river, and lake craft, the steam tunnage of the United States does not amount to more than about one third that number, and of them hardly 50 are iron, and many of these are old blockade runners captured during the war, built for that purpose and poorly adapted to ordinary traffic.

Without hulls of iron the introduction of the propeller screw would have been of little moment. No such immense lengths of steamers as now cross the Atlantic, in such rapid time, could have been built of wood and driven by the screw. The great advantages of economy of space and fuel which its use gives would have been lost to the commercial world. Hence we now but seldom see any steamer intended for freight or the general passenger traffic constructed with the side paddle wheels, and even the rather aristocratic French line have had all but one of their side-wheel steamers changed to propeller screws. Such having been the perfection acquired in machinery and model that equally as, or more rapid time, is now gotten with them as ever with side-wheels.

The superiority of English vessels of the present day, therefore, exists in the material of construction, the more general use of steam, and the substitution of the propeller screw for the side-paddle-wheel. With our characteristic energy and enterprise we will soon regain all we have lost in the commercial line, and even ourstrip our neighbors across the water, if we adopt the improvements which they so forcibly present to us. The English "Lloyd's" has rules for rating and insuring iron vessels dependent upon *thickness* not strength of material, and as the average American iron will bear a strain about one third greater than the average English, in building a ship of iron of the same thickness we are using at least one fourth more weight than necessary to make a vessel of equal strength with one constructed in England. Hence to build a ship by their rules we have a greater expense for material. Some modification of this system is evidently necessary for vessels at least in our own trade. They took the models of our fast clippers from us, and we may by energy and perseverance be able to bring them up to a higher standard of material or different rules for construction.

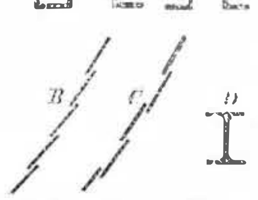
Our registry laws require that all vessels to be capable of registry shall have been built in the United States. These might be modified so that all vessels now owned here be allowed registry, which privilege to end as soon as American ownership ceases; but we are sure no American mechanic, manufacturer, or inventor would be willing that vessels built and owned abroad should be brought in on the same footing and have equal privileges with those the result of our labor and capital.

Another resolution of the N. Y. Chamber of Commerce proposes to admit free of duty all iron and other material used in building ships. We shall not discuss this as it involves the political question of free trade *vs.* protection; but, leaving out of the idea of its injustice to other manufacturers who might claim that they in this dull time were not making as much profit as before the war, we do not believe that in that admission is the radical cure of the diseased commercial interests of our country. The true remedy and that which will enure to the benefit of all Americans is the building of steamers and sailing vessels of iron, on the best models, with the best machinery, of our own material, with our own work men, and our own capital. Learn all we can from abroad and improve that knowledge. It should not be said that the nation of mechanics which has produced the steamboat, the telegraph, the sewing machine, the reaper, the monitor, and hundreds of other new ideas that have astonished the old world, is behind in the construction of an economical marine engine, the arrangement of a boiler or the model of a ship, and it will not be so said a few years hence. In this nation of active thinkers a want is no sooner stated than hundreds of minds are at work to supply it.

The needs of the shipbuilding interests are the adaptation of machinery, still further if possible, to the construction of iron ships; a boiler and engine which will give a fair average speed with a consumption of 10 to 20 tuns of coal per day; these with the conjunctive use of steam and sail will accomplish all we need to manufacture and run vessels cheaply. Models unsurpassed for beauty or utility we have already. It is evident, however, that in the struggle for economy of construction the future shipyards of the United States will be where there is least freight on coal and iron, and cheapest living expenses. Our observation and experience lead us to believe that outside of Government work, the well paid American laborer does more work, dollar for dollar, than the poorly paid Englishman.

The advantages of an iron vessel are: A greater amount of cargo can be carried on a less draft of water; they will last for 20 years if well made and rate A 1; and so far as any one knows for 50 years, as vessels are now running in good order which were built by Fairbairn in 1840-42. The only deterioration is the oxidation of the metal, and careful painting every six or twelve months will in a measure prevent this. Further, that whether so cheap now the time will come when no wooden vessel can compete with them in any item. Taking into consideration their durability, they are cheaper now. An iron vessel may be beached or sunk and not be materially injured. Two instances of this have lately occurred—the *San Jacinto* beached on Hatteras, and the *Circassian* on Long Island shore. The first is already making her regular trips, the other soon will be. Every reader is acquainted with its advantages as a material for ships of war.

There is a variety of ships now being built in England called composite. The ribs, braces, and all framework are of iron, the sheathing plank of wood. They find great favor with some, as the wood may be sheathed with copper, hence furnishing a bottom better than any paint for a long voyage. They have disadvantages which we shall not here discuss.



The ribs of iron vessels have three shapes, as at A, in the diagram. The standards and braces are usually shaped as at D. The iron planking is put on, as at B, by some builders, but that is more generally abandoned for this style, shown at C. The last is called gutter built, the former clencher built.

At the Atlantic Iron Works, Boston, a number of iron vessels have been built. The Novelty Works, New York, have built several—two of them good sized ocean propellers. Several yards in this city built monitors during the war. One or more have been built in Buffalo. But the chief iron shipyards of the United States and in fact only those employed extensively for that work, are at Chester, Pa., and Wilmington, Del. There is not a month but one or the other of these yards turn out a steamer, and they claim that they can build vessels within five per cent of the cost in England.

These yards are now very active, several river steamers are on the stocks, the Philadelphia, N. Y. & Boston Nav. Co. have fifteen steam colliers contracted for and being built, a large iron steamer for the Old Dominion Steamship Co., to be finished by spring, several propellers for Mr. Lovillard a few side-wheel steamer just finished for Mr. Clyde, and others spoken of. These yards have turned out beautiful models, both for river and ocean service.

The day of wooden ships has passed and the present stock must at least be replaced by iron built crafts. Such a course with proper management will give us eventually the supremacy of the seas and add another triumph to the superiority of our material, skill, and labor.

Two Curious Needles.

The King of Prussia recently visited a needle manufactory in his kingdom in order to see what machinery, combined with the human hand could produce. He was shown a number of superfine needles, thousands of which together did not weigh half an ounce, and marveled how such minute articles could be pierced with an eye. But he was to see that in this respect even something still finer and more perfect could be created. The borer—that is the workman whose business it is to bore the eyes in these needles—asked for a hair from the monarch's head. It was readily given and with a smile. He placed it at once under the boring machine, made a hole in it with the greatest care, furnished it with a thread, and then handed the singular needle to the astonished King.

The second curious needle is in the possession of Queen Victoria. It was made at the celebrated needle manufactory at Redditch, and represents the column Trajan in miniature. This well-known Roman column is adorned with numerous scenes in sculpture, which immortalize Trajan's heroic actions in war. On this diminutive needle; scenes in the life of Queen Victoria are represented in relief, but so finely cut and so small that it requires a magnifying glass to see them. The Victoria needle, moreover, can be opened; it contains a number of needles of smaller size, which are equally adorned with scenes in relief.

[For the Scientific American.]

ALBUMEN.

BY C. WIDEMANN.]

The consumption of albumen as applied to different purposes is enormous; in calico printing alone for fixing on cloth the new aniline colors, Alsace, in France, alone uses 150,000 kilogrammes, or about 330,000 pounds a year of egg albumen, representing 37,500 eggs or the product of 250,000 hens. It is also used extensively in photography; a photographer in this city uses four barrels of eggs a day, the yolks of which are sold to the surrounding hotels for cooking purposes.

It is manufactured thus: The white of the eggs are desiccated to assure their preservation and also to reduce the bulk so as to facilitate their shipment, with little expense, to this country. The process of desiccation is as follows; namely, the egg is broken, the white separated from the yolk; in winter or spring by the cold weather the white is left to remain five or six days in cans, when it is beaten with a wooden "spatula" and filtered through a piece of linen in order to retain the impurities and the sperm, it is then desiccated by pouring the liquid thus prepared in very flat dishes, generally of zinc placed on cast-iron tables, heated by steam to 30° Centigrade. To facilitate the separation of the dry albumen from these dishes they are, before being used, rubbed with a greasy rag.

Every dish generally holds from one to two quarts of egg white, and after two or three days' desiccation the albumen is ready to be packed; 24 dozen eggs yield about 12 quarts egg white, 8 quarts yolk yielding a little over two pounds of dry albumen.

This operation is performed to better advantage, both as to quality and yield in the months of March, April, and May during the summer months the eggs are more expensive, and the quantity of the albumen less.

A great many substitutes have been employed to take the place of egg albumen, among which I shall mention the serum of the blood and the spawn of fishes—I mean the eggs laid by the female fish in large quantities at a certain time of the year after the process of fecundation.

The albumen is easily obtained from the serum of the blood, and answers very well as a substitute for egg albumen in calico printing.

In separating the liquid in which the clots of blood are seen floating 10 to 15 hours after the animal was killed, a a light yellow liquid is obtained, which is then allowed to stand for 6 or 10 hours more. This second liquid is decanted from its precipitate which has been formed during this operation, and is then dried in the same manner as egg albumen at a temperature of 40° Cent.; if the serum had remained colored after the second precipitation it must be treated with a small quantity of isinglass, which has the property of separating all impurities by a veritable coagulation; all these operations are carried on in deep dishes; the clear liquids thus collected are desiccated as above.

The albumen from the spawnings of fishes can be obtained from the dry spawn as it is usually found in the market or from the fresh spawn taken immediately from the fresh fish and from the salted fish.

To use dry spawn, it is first ground into a coarse powder, then washed with water; this water is left to settle so as to allow all the impurities to collect at the bottom of the vessel, decanted and desiccated at 40° Cent. in the usual way.

Generally the albumen obtained from the fresh spawn is of better quality than that obtained from the dry or salted spawn, though it takes more care to separate the blood and certain greasy or oily impurities from it. It is desiccated in the usual way.

In operating with salted spawn it is thoroughly washed to eliminate the salt, then ground and dissolved in water, and treated as above.

A very large quantity of albumen is used in this country; there is a little egg albumen made in the West, but very irregularly; as for the blood albumen it is all imported

Egg albumen brings in the market from $2 50 to $2·75, gold, the blood albumen from $1·25 to $1·40, gold, per pound.

As a general rule the blood in this country is considered as a waste; even in the large pork slaughter houses of the West it is lost, and very seldom used, even as manure, though being one of the best of fertilizers.

The reason I believe why blood albumen is not manufactured in this country is that there is no regular central slaughter house, every butcher having the right to kill his own meat, and so it has been difficult for those who have thought of establishing an albumen manufactory or Prussiate manufactory to collect a large quantity of blood with little cartage expenses.

But now that New York possess "Communipaw," I do not see, as the expenses of getting up such a manufacture are very small, why the calico printers and others using albumen continue to supply themselves from abroad at such high figures.

THE Amazon River drains 2,500,000 square miles, and is navigable 2,200 miles from its mouth.

Planing, Tongueing, and Grooving Machine.

Our engraving is an excellent representation of one of the most important and complete machines of its kind now in existence. The amount of careful study and inventive skill which have been expended in bringing it to its present improved form, is indicated by the fact that it has been the subject of no less than nine distinct patents, the earliest bearing date April 13, 1852, and the latest July 24, 1866. Each of these patents covers some important advance on the previous construction of the machine, and as it is now presented to the notice of our mechanical readers, it is perhaps safe to say that its capacity and working efficiency are exceeded by no other planing machine in maket.

A machine of this kind—supposed to be the largest ever made—capable of planing stuff thirty inches in width, is in operation at the piano factory of Steinway & Sons, in this city; and from personal inspection of this machine, and other smaller ones in full operation, we are confident that everything claimed for it is fully justified by facts.

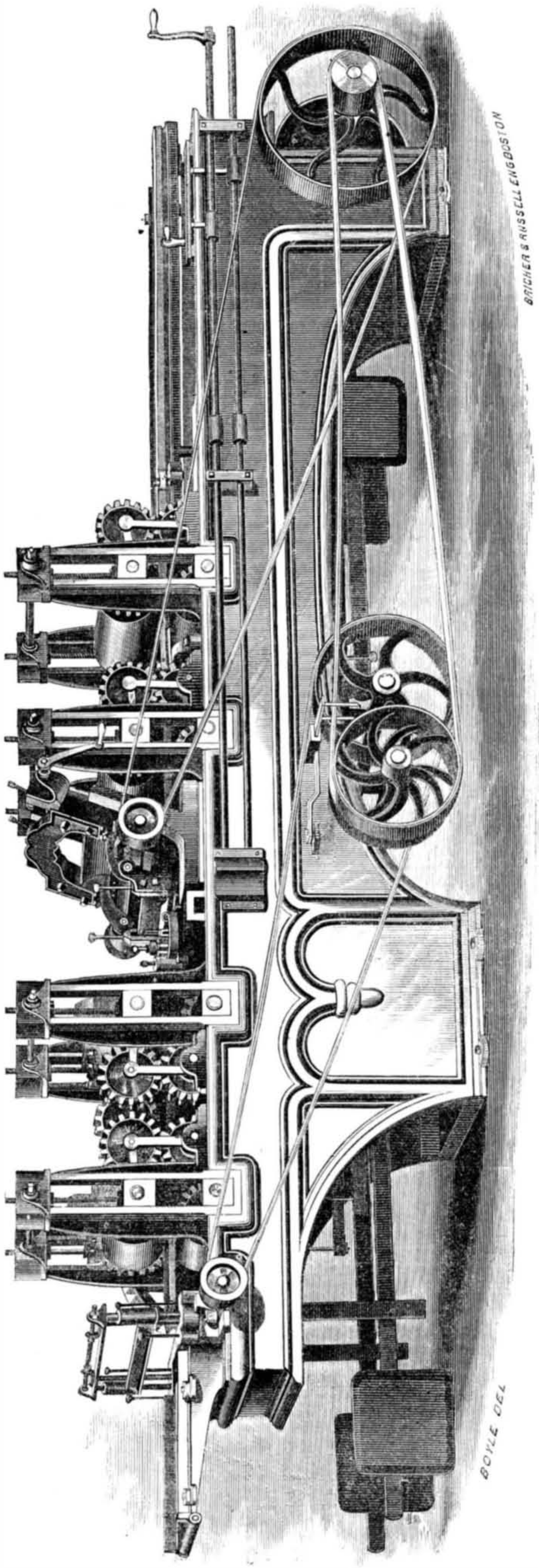
It is claimed that for dressing all kinds of lumber and for performing all the various operations for which it is adapted, this machine stands without a rival in Europe or America. It has been the effort, in perfecting the machine, to construct all parts in the most simple manner, to avoid complications, and to make all parts easy of adjustment. At the same time strength and durability have been constantly kept in mind.

Six sizes are made, with four, six, and eight feed rolls. The lighter machines weigh about 4,000 lbs., the heaviest about 11,000 lbs. This large machine works stuff from 2½ up to 30 inches in width, and from half an inch up to 8 inches in thickness. The engraving is that of the No. 1 machine having eight feed rolls. The frame is 17 feet long.

Among some of the most important improvements on this machine, and exclusively claimed for it, may be mentioned that the feed rolls are geared at both ends (Fig. 2), thereby making a very strong and even working feed, which is very important on machines of this class. The gears at each end of the feed rolls are connected with rails running across the machine, and are also made fast to the frame on both sides; thus preventing any cramping of the gears.

The links connecting the expansion gearing are made of wrought iron instead of malleable iron, as is the case with many other machines.

Where gears are used on only one end, a lifting action is produced which causes the board to be fed through in an oblique direction. This difficulty is avoided by gearing the feed rolls at both ends, causing an equal pressure on both edges of the board, feeding it through

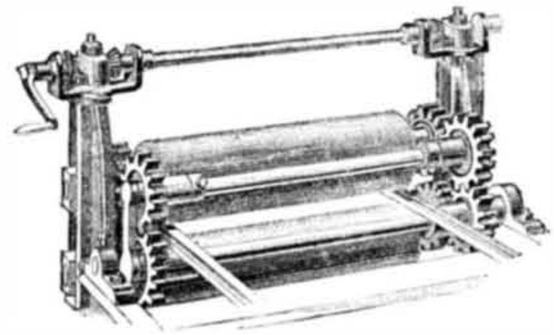


WOODBURY'S PLANING, TONGUEING, AND GROOVING MACHINE.

straight; the gears wear even, and are more than twice as durable.

Another improvement is the hinged presser bar (Fig. 3) which works close to and directly in front of the upper cutters, and which prevents the tearing and splitting of the lumber when cross-grained, or when hard wood is worked. This presser bar is provided with suitable weights, so that it readily yields to inequalities in the thickness of lumber.

FIG. 2.

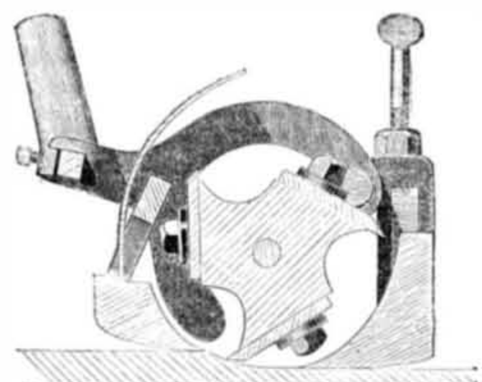


METHOD OF GEARING FEED-ROLLS AT BOTH ENDS.

Another improvement is the double adjustment of the "matcher frames" across the machine, which enables the operator to work narrow stuff on either side of the machine or on the center; thus using the full length of the knives. This adjustment is very simple.

The machine is provided with a scale and rails extending from the cross screws to the front end of the machine, so that the operator can adjust the matcher heads anywhere without stepping away from the "work-end" or front of the machine

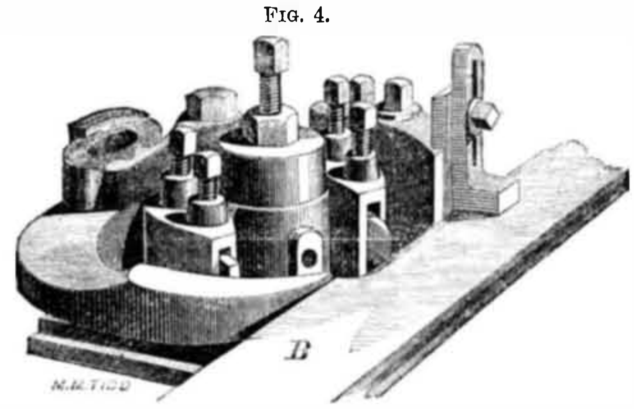
FIG. 3.



SECTION OF TOP PRESSER-BAR.

The "chip-breaker" or "clip," is hinged on the side cutter-head frame (Fig. 4), working on the same principle as the top-presser bar, which prevents all splitting of the edges of boards; and, holding the "stuff" close by the cutters, enables the machine to be fed, it is claimed, twenty per cent faster than any other machine, and at the same time to do its work better.

FIG. 4.

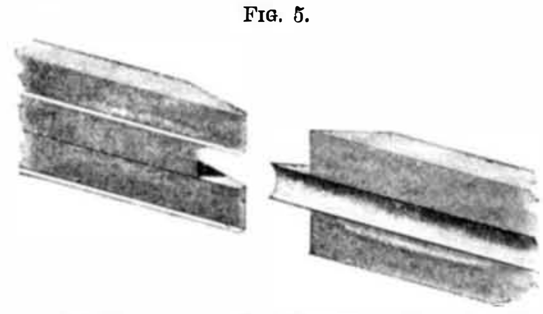


CHIP BREAKER SIDE HEAD.

Fig. 5 represents the tongueing and grooving cutter for the side cutter head.

The under cutter-head is attached near the end of the machine so that it is easily accessible for changing or sharpening. It is also provided with suitable adjustable "rest-bars" or bed plates.

FIG. 5.



TONGUEING AND GROOVING CUTTERS FOR SIDE CUTTER HEADS.

Fast and loose pulleys are used on the feed shaft, being much preferable to a solid clutch on a heavy machine, and much more durable. The feed rolls and presser bars are all weighted, an improvement over the rubber springs used on other machines.

The machine is provided with patent self-oiling boxes on all the journals; the latter being thus fully protected from the dust, and requiring very little attention to keep the machine in perfect order.

The machines have also a swivel guide for matching tapering lumber. This is connected with any sized machine in a strong, substantial manner; and with this attachment the machine will work stuff tapering six inches or more in a length of ten feet. The bed plate directly under the upper cutter head is a false plate so that it can be easily removed and dressed over in case it becomes worn out of true.

This machine has received first prizes wherever exhibited for competition.

These machines are now running in many of the first class mills in all parts of the country, and the one above mentioned just put up in Steinway & Sons' manufactory will repay a visit to see.

For further particulars address S. A. Woods, sole manufacturer of Woodbury's patent planer and matcher, 91 Liberty street, New York, and 67 Sudbury street, Boston. [See advertisement in another column].

MANUFACTURE OF COTTON SEED, COTTON SEED CAKES, AND MEAL.

BY C. WIDEMANN, CHEMIST, PARIS, FRANCE.

No. II.

It was at first proposed—and it has been tried by many—to work cotton seed along with linseed, so as to obtain an oil, which, in being boiled with oxidizing agents, would replace for painting purposes the linseed oil, and, being cheaper, would be used extensively. This has been dropped at the present time but will no doubt be taken up again.

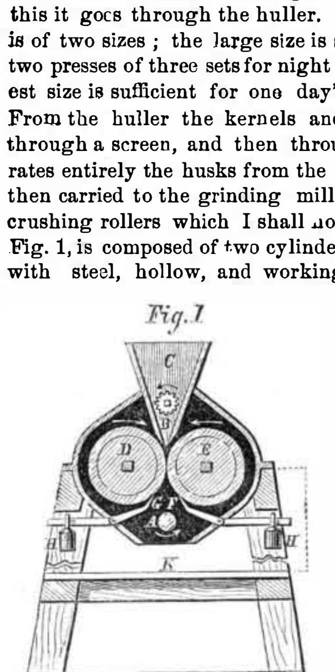
It is very difficult to ascertain the exact yield of oil produced, and this yield varies a great deal according as the seed is of better or poorer quality and richness, according to the weather of the season in which it has been sown, dry weather giving a smaller seed but richer in oil. From my own experience I shall take the following figures:

For 2,000 pounds cotton seed, or 1 tun, cotton from the last ginning, 21 pounds; husks, 979 pounds; meal, yielding from 32 to 36 gallons of oil. 270 pounds; cakes, at 7½ pounds per gallon, 730 pounds. Total, 2,000 pounds.

Let us take now the seed at the entrance of the oil mill. As it arrives in the bags it ought to be immediately unpacked and aired by shoveling it from one place to another, and this should be done very frequently as the fermentation sets in very rapidly. This is known by putting the hand in the seed; if heat is felt the seed has to be worked as quick as possible, and in every case removed and cooled by airing. It therefore requires a large store room to manage it properly. The average weight of one bag is 92 pounds, and the average work done by a good pressman and a Taylor's press, for ten hours' work, is 250 bags or 11½ tuns. Generally oil mills work night and day, as there is a great advantage in not letting the presses and mill cool down.

The cotton seed to be freed from the foreign matters it may contain, is passed in through a screen; a large cylinder made of wire cloth, the holes being sufficient to let the seed escape and retain the foreign substances. It is next carried to the top of the building where it passes through the gins. After this it goes through the huller. The huller generally used is of two sizes; the large size is sufficient for the supply of two presses of three sets for night and day labor. The smallest size is sufficient for one day's work with two presses. From the huller the kernels and husks are passed again through a screen, and then through a blower, which separates entirely the husks from the kernels. The kernels are then carried to the grinding mill and are passed through crushing rollers which I shall now describe. This machine, Fig. 1, is composed of two cylinders in cast iron, D E, covered with steel, hollow, and working at equal speed, with a distance between them which can be regulated at will. One of these cylinders receives motion and transmits it to the other by a pinion. A hopper of wood, C, is kept full of seed, and feeds the rollers by means of a little fluted wooden roller, B, the acceleration of which is regulated at will.

Fig. 1

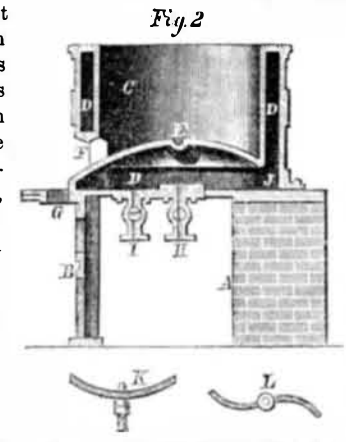


A machine of this description, the cylinders 26 inches in length and 6 inches in diameter, with a speed of 40 to 50 revolutions per minute, crushes per day 12½ bushels of seed and supplies two pairs of mill stones. It is worked by one horse power. I say mill stones, because the seed was formerly passed under double upright millstones so as to grind the kernel thoroughly; but this has been abandoned by most manufacturers as a good crusher answers the purpose sufficiently well, especially if the distance of the two rollers is well regulated. The crushing is then perfect and the meal comes out sufficiently fine. This is tested by grinding it between the teeth. If fine enough it must be perfectly free from perceptible grains. It is next placed in the heaters, and upon this operation depends both the yield of oil and its quality. In Marseilles, where labor is cheap, the meal is first pressed cold, as the oil obtained thus is very fine, possessing a very sweet taste, like olive oil, and may be used like the latter for the table. Oil designed for the table ought to be expressed cold. After the cakes are reground, the meal is heated and repressed. The second yield of oil is of inferior quality to the first yield.

In this country, where labor is high, manufacturers prefer to obtain at first as much oil as they can with the least handling possible. As I said, the meal is placed in the heaters after grinding; these heaters are constructed in different ways. I have seen some made of a large table heated by steam, with iron rings four inches high placed concentric to each other, and a stirrer in the center worked by power from the steam shaft above. Only a small portion of meal is heated at a time, I should say enough to fill a press bag; but I am not satisfied with these heaters as they present too large a cooling surface to the air.

The best heaters are those attached to the presses, and they heat for the 15 boxes of the three sets of presses. They are made of cast iron. The whole apparatus, Fig. 2, is supported by brick work, A, and by a cast iron support on the other side of the frame, B. C is a cast iron basin with a convex bottom, at the middle of which is a receiving hole, E, to receive the stirrer, K. D is a steam jacket. This basin and steam jacket are cast in one piece and fixed on the platform, T, by means of bolts. The steam is admitted to the steam jacket through H, the condensation water escaping through the pipe, I. A sufficient quantity of meal being introduced into C, the stirrer is set in motion and the steam let in; and when the temperature of 82° to 88° Centigrade, or 180° to 190° Fahrenheit is obtained, the gate, F, is opened, a bag placed at the entrance, G, and the meal is then let into the bag.

Fig. 2



The bags are made of a certain kind of woolen duck, manufactured expressly for that purpose. The best woolen yarn is used for their manufacture, and only two parties make them in this country. The cloth is about 32 to 34 inches wide, and is sold by the pound at a price running from $1·10 to $1·40. The weight of a yard of the cloth generally used is from 1 pound to 1 pound 4 ounces, and it can be used as well for linseed as for cotton seed. The bags are made in the mills by the pressmen themselves, and sewed on a wooden pattern to fit the squeezers. The old bags are sold at 6 to 8 cents per pound when they are quite out of order, as they can be repaired and are repaired with the same yarn they are made of by the pressmen, or women engaged for that purpose. A great saving could be made in cloth if parties would manufacture them as nearly as other bags, instead of in the coarse way they are now made in the mills.

The bag being properly filled, that is to say, not quite to the top, it must be thrown in double to close it in the squeezer, the meal being well distributed all along it. The squeezer is then introduced in the box of the hydraulic press, Fig. 3. The squeezers, Fig. 4, are made of horse hair cord and covered with leather, to which a handle is riveted. The rivets ought to be of iron, as copper is very soon oxidized by the action of acid fats. These squeezers are quite expensive, and are sold from $26 to $28 a piece. They last one year and a half to two years. They are easily repaired, but have to be kept in good order and cleaned as soon as the dust, or meal, and other impurities have begun to adhere, by hammering them with wooden hammers. I shall not describe the presses as they are nearly like all other hydraulic presses, differing only in some improvements of the packing of the plungers, in the adaptation of check valves, etc. The pressure must be one and one half tuns to obtain a good cake, or 85 pounds per square inch. The cake must not be more than half an inch thick or very little over, and should weigh from 7 to 7½ pounds. The presses, when charged, are left for twenty minutes and then the squeezers are taken out.

Fig. 3.

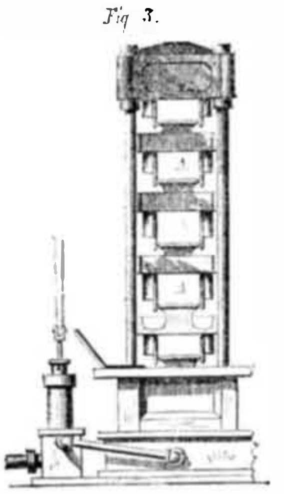
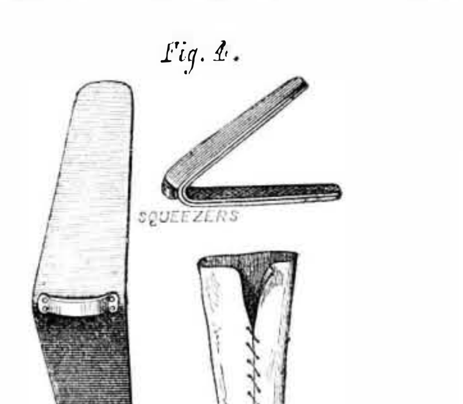
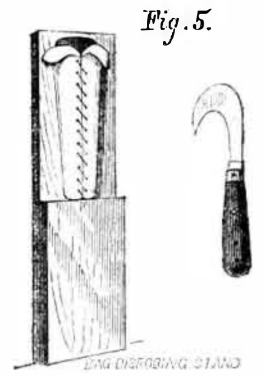


Fig. 4.



The cake is taken out of the bag by setting the bottom of the bag against a board and turning it inside out. The cake is carried to a special room, where a man with a kind of half circular knife, Fig. 5, trims the edges and cuts the top and bottom. Sometimes the cuttings are reground and repressed, as these parts have never been as well pressed as the middle part. The trimmed cakes are then placed on frames upon their edges, and left to dry; care being taken not to have them put too close to each other, so that the air may have free circulation all around them. Cakes would soon decay through the action of the moisture remaining in them. It is very important the meal should retain its temperature, and some works to that end have had iron pipes passing behind and between the sets, so as to heat the whole structure. It is always observed that the set near the heater yields a larger quantity of oil than the last set. This is a consequence of the heat communicated to the press from the heater.

Fig. 5.

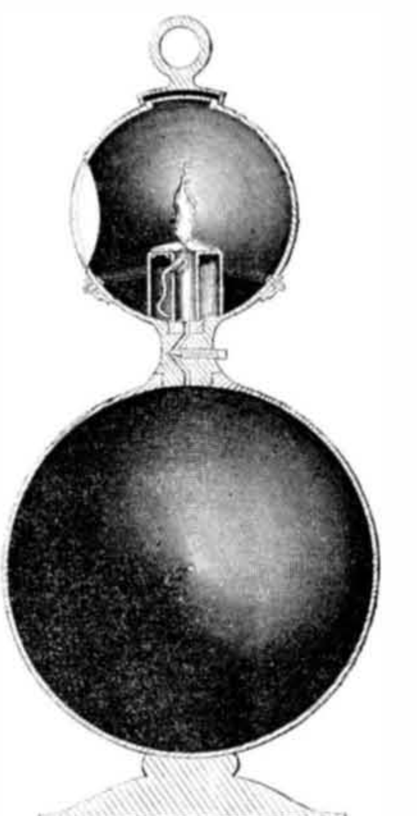


Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Safety Lamp for Miners.

MESSRS. EDITORS:—The SCIENTIFIC AMERICAN of September 25, 1869, contains an article on the Avondale disaster, and a notice of a lamp recommended by W. H. Bessemer. I inclose a drawing of a lamp made by me as far back as 1829 on the same principle as that recommended by Mr. Bessemer. From my knowledge of miners I have always considered that there could be no safety while they had the control of the



lamps. I therefore made one like the drawing, part of which I still have. The globe containing the condensed air is 10 inches in diameter, the lamp 6 inches, with a joint made tight by leather (better rubber), and locked; the lamp was made to burn the oils common in those days, and would throw the light a great distance, so that it might be placed in safety and yet give a better light to the miner than the Davy. At the top was a piece of wire gauze for the exit of the products of combustion; the whole was made of copper.

The miners of those days thought themselves quite safe with the Davy, and all I got was the name of a schemer, and sundry lectures on my folly, when, soon after, leaving England, I had other things to attend to.

I could never get anybody to see any good in my invention. Perhaps I have been too far ahead of time, as many explosions have been required to prove the Davy not altogether safe. FREDERICK LEAR.

Willsborough, Mo.

The Wandering Jew, or Cow Killer.

MESSRS. EDITORS:—My attention has been arrested by the article bearing the above title, on page 43, current volume of your journal. Both names are new to me, having never heard them applied to an insect, which, by the description is clearly that of the large red stinging ant, a species of *Mutilla*, a genus among the order of *Hymenoptera*.

Thomas Say describes six species found within the United States, while thirty-eight species are noticed in Rees' Cyclopedia. They are solitary in their habits. The females are always found on the ground, abounding mostly in hot, sandy situations. The males resemble other sand wasps, being pro