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HAMILTON'S MACHINERY FOR SAWING SHIP STUFF.

Fig. 1.

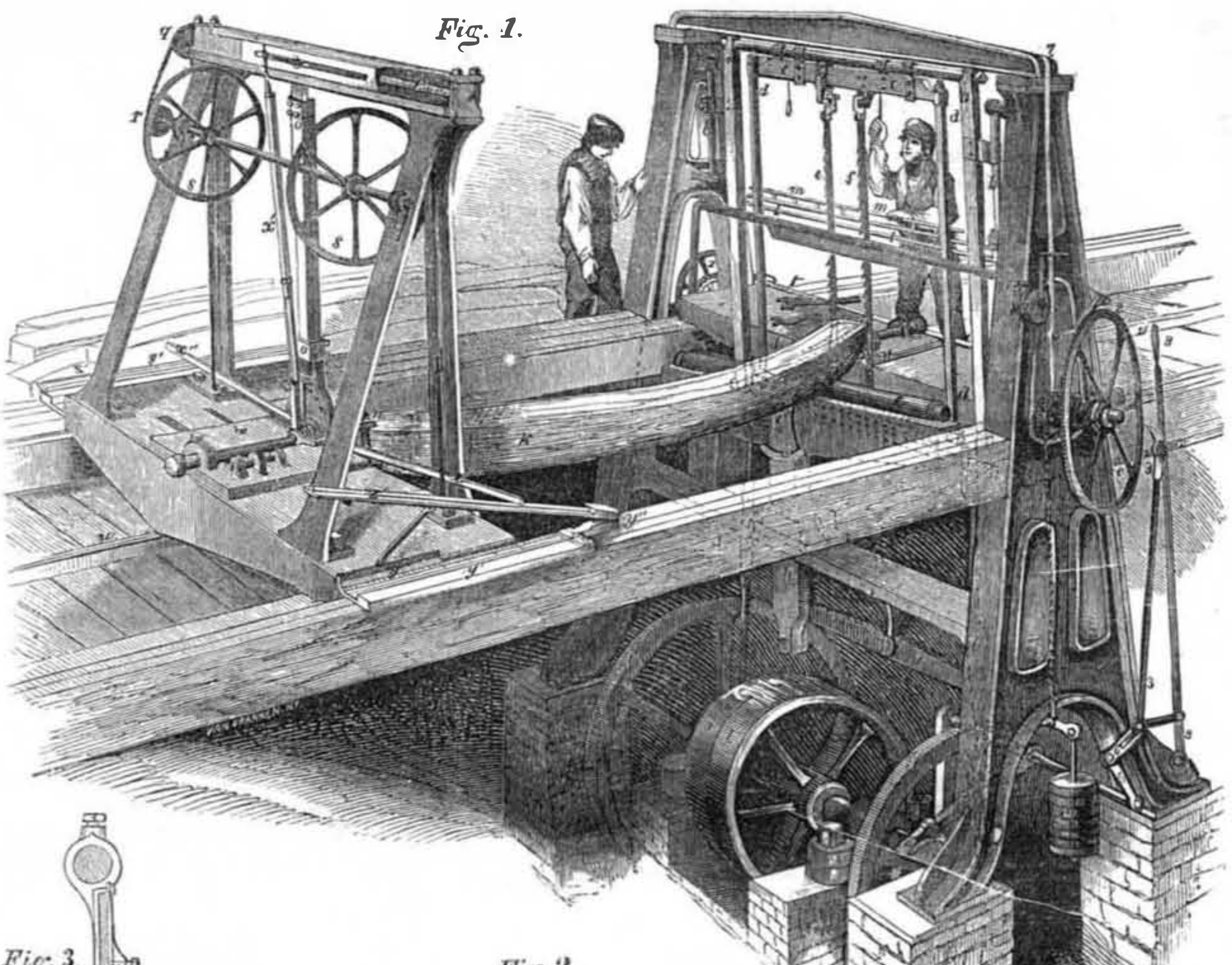


Fig. 3.

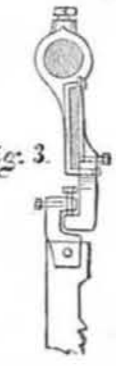
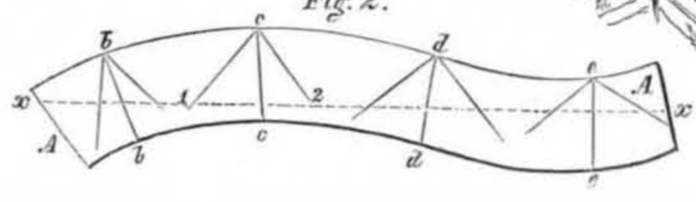


Fig. 2.



Machinery for Sawing Ship Stuff.

We present our readers this week with a perspective view of a mill, for sawing ship timbers, and other like stuff requiring to be sawed in curved and beveled lines. The machinery is the invention of J. Hamilton of this city.

We cannot explain the mechanism of this invention better than by conducting our readers to the hand saw-pit, and, after first pointing out the perfect ease with which the saw is there guided into any required curve, the absence of any undue straining of the saw blade, which is merely stretched in a frame of the lightest timber, the comparative indifference where the points of support may happen to be placed, to show that precisely the same operation is to be performed by the unfailing action of macinery. We shall thus draw the attention of our readers properly to the subject, because the whole operation must not be regarded as an evidence of the invincible power of machinery, such as our saw mills exhibit, but of the delicacy, and no less certainty and accuracy of operation for which machinery is equally celebrated.

Fig. 1 is a perspective view of the whole arrangement of machinery, fig. 2, exhibits the top plan of a log marked by the architect in the shape in which it is required to be sawed, and figure 3, exhibits the mode of hanging the saw.

a a is a saw frame or "gate," formed of hollow bars of wrought iron, combining great stiffness with the lightest possible construction, and guided upon the square bars, *b*, *b*, in the ordinary manner. The top and bottom rails of this frame are accurately turned, and serve as horizontal guides to the two internal frames, *c*, *c*, and *d*, *d*; these two internal frames are fitted to slide with great freedom, horizontally upon the top and bottom bars of the frame, *a*, *a*, *a*, *a*, but with motions perfectly independent of each other, and are made each to receive the buckles of a saw blade, with the power of altering their position to any ordinarily required distance. The saw blades, *e* and *f*, are suspended in their buckles upon centres, which admit of the saw blades being turned round upon their vertical axes at the will of the attendant. The whole outer frame, with the two inner frames, is put in rapid vertical motion by the usual arrangement of fly-wheels, cranks, and connecting rods, *g*, and is connected with the motive power by the fast and loose pulleys, *i* and *j*.—The weight of the frame is balanced as usual by an opposite weight on the arms of the fly-wheels. By this arrangement the attendant is able to guide each saw blade, independently of the other, along any required curved line that may have been marked upon the timber, *k k*. The oblique lateral motion necessary for this being given to each saw blade independently, by rotating the blade on its centres between the buckles, and by traversing the inner frames, *c c* and *d d*, across the bars of the outer frame. This motion is communicated to each saw blade by a forked lever of wood in the hands of the attendant, which he applies to the back of the saw, and thereby guides it along any required line. The transverse bar, *l*, *l*, is fixed across the mill frame, the slot in which serves to steady the lever, whilst the pins, *m*, *m*, serve as fulcra to aid the internal frames in their lateral motion. So far the arrangement for curvilinear cutting is complete. A piece of timber may thus be cut with its sides either straight or curved, either parallel or tapered, as it may have been designed or marked out; but in sawing of ship's timbers every possible curve demands at each point some specific bevel; and in order to meet this requirement a further apparatus is necessary.

The timber, *k k*, is confined in chucks *n*, *n*, at either extremity, each of which is mounted on a horizontal axis, allowing the timber to rotate freely; one of these chucks is fitted with a vertical lever, *o*, the upper extremity of which is worked laterally by a horizontal transverse screw *p*, to which the requisite motion is communicated by the wheel work, *q*, *r*, so that by turning the hand wheel *s*, any required bevel can be given to the timber.

These two operations,—curvilinear sawing and beveling—by no means exhaust the difficult problem of sawing ship's timbers; in addition, it is necessary to ensure with all the accuracy of which machinery is capable, the regular and systematic changing of bevels from one given angle to another, and this to take effect within certain specific distances marked upon the timber.

We return to some of the details of this ingenious arrangement, and draw the attention of our readers to the means of securing a bearing for the timber in front of the saws. This, however, must be regarded, from the rigidity of the timber, and the little strain exerted by the operation of two saws, rather as an accessory than as a necessary accompaniment of the machine. It may be briefly described as follows: a roller, *t t*, is mounted on a swivelling frame, *u*, and possesses a vertical as well as a bevelling motion. The weight of the roller is balanced through the beam, *v*, *v*, by the adjustable weights, *x*, and the roller may be either elevated or depressed by the windlass, *y*. It is thus free to follow the surface of the timber, and is made to communicate an upward pressure by the same means; and thus support is given to the timber as may be required.

The method of feeding is, as usual, by means of a rack on each side of the travelling frame, *w*, *w*, worked by the pinions, *z z*, on the shaft 11. The rachet wheel, 2, on the same shaft, is moved by the pawl and rod, 3, 3, which is connected to an eccentric, 4, on the crank shaft, through the levers, 5 and 6. A means is provided of varying the feed by shifting the lower centre of the rod, 3, along the lever, 6, which is thus virtually shortened. This is effected by moving the hand lever, 8, into the various notches in the plate, 9, bolted on the side of the stationary frame.

By the foregoing description it will be seen that when the log passes through the machine without being rotated, it can be cut in any desired curved line by the slide of the saws transversely in the gate as the sawing progresses; and by adding to this facility that for turning the saw itself and for revolving the log, any required bevel or winding cut, so often required in ship-building, can be made.

We will now suppose that a line is drawn on the top of a log, and the cut at one end has to be parallel to one side of the log, but that at a certain distance, say three feet, from the end, the cut is required to be at an angle of fifteen or twenty degrees to the side, and the cut has to be a gradual twist until it arrives at this point; now, in order to indicate to the workman how to revolve his log so as to come to the required bevel at the point indicated, the following method is used.

The pointer or index, *x'*, on the axis, *o*, is to be turned either to the right or left to the angle from a perpendicular line, required for the difference of change in direction between the beginning and end of the cut, and this corresponds with a point marked on the board, which is seen above the index, *x'*. To this pointer, a lever, *x''*, is connected. The workman then takes an inclined bevelling bar, *z'*, which is set so that it can be shoved back and forth on rails, that run parallel to and on the sides of the rails carrying the head block; this bar, *z'*, is fitted so that it can be inclined and sustained at any required point by a pin or click in a vertical standard.

If the cut is to be three feet to the given angle, this bar is shoved along on its rail three feet beyond its point of contact with the lever, *x''*, when in a horizontal position, and then the bar, *z'* is to be inclined to such an angle as to bring the index, *x'*, to the point marked upon the board already mentioned (the angle of the first bevel.)

This index board is fitted to slide across the head block, and by means of a slot and screw is connected to the nut on the screw, *x*, that connects with the bar, 3, and rolls the log as the screw, *x*, is turned.

On setting the mill to work, the head block and levers, *x'* and *x''*, are carried along as the sawing progresses, and the lever, *x''*, slides down the inclined bar, z', until when the head block has traveled the given distance (three feet), the index, x', is vertical, therefore all the workman has to do, is to keep turning the screw, x. by the hand wheel, A, and gearing, which rolls the log and carries the index board across the head block, consequently, by keeping the point marked opposite the end of the index, x', the cut will be gradually brought to the required angle when it arrives at the given point; thus a continued variation in the curve or twist of the cut can be made from this point by proceeding as before, and the curved or twisting cut be made in either direction, according to which of the levers, x", are connected to the index, x', the beveling bar, z' being on the proper side of the head block.

We regard this as a very important invention. We have seen it in operation, and can speak with confidence of its merits. It is without doubt capable of making an important revolution in the process of ship building. It is certain that by this arrangement of machinery a timber can be sawed to any desired shape, and this with rapidity and precision, and we are confident that shipbuilders will consult their own interests by introducing it into their yards. A machine is on exhibition at Tupper's Foundry, Avenue C, near 11th street.

For further particulars, address the U. S. Patent Ship Building Company, No. 30 Merchants Exchange, New York.

Varnish for Patent Leather.

The process followed in France for glazing leather is to work into the skin, with appropriate tools, three or four successive coatings of drying varnish made by boiling linseed oil with white lead and litharge, in the proportion of one pound of each of the latter to one gallon of the former, and adding a portion of chalk or ochre. Each coating must be thoroughly dried before the application of the next. Ivory-black is then substituted for the chalk or ochre. the varnish slightly thinned with spirits of turpentine, and five additional applications made in the same manner as before, except that it is put on thin and without being worked in. The leather is rubbed down with pummice-stone powder and then varnished and placed in a room at 90°, out of the way of dust.

The last varnish is prepared by boiling ½lb of asphalt with 10 lb. of the drying oil used in the first step of the process, and then stirring in 5 lb. copal varnish and 10 lb. turpentine. It must have a month's age before it is fit for use.

Telescope for Amherst College.

The Hampshire "Gazette" says that Alvan Clark of Cambridgeport, has received an order from Amherst College, for a telescope, the expense of which, cannot be less than $1,800.—It is to be the gift of Hon. Rufus Bullock, of Royalston, Mass., a man who is the architect of his own fortunes and is fruitful in good works. Mr. Clark, who makes the telescope, is a wonderful man. Aside from the fact of his being one of the best portrait painters in Boston, he is an indefatigable and successful astronomer. He has discovered several new stars, and made out several double stars, which are not put down in any of the catalogues.

Blowing up the Ice.

Several experiments have recently been made at St. Louis, to see whether it were practicable to open a channel across the river, for the ferry boats, by blowing up the ice with powder. A two gallon keg, filled with powder, was sunk to the depth of twelve or fourteen feet, near the Illinois shore, and it was fired by means of a blasting fuse, run through a copper tube. The explosion produced no effect except cracking the ice for some distance around, and making a loud report.

Wonderful Invention.

One of our exchanges says:—An invention has been lately patented, which promises to effect a new era in locomotion. It consists in the application of india-rubber, working, when extended in contrary directions, on two axles, which communicate with the wheels of the carriage. The model, it is said, works admirably, and it has been pronounced by some of the first engineers in Manchester as likely to be eminently successful. Pro-di-gi-ous!

Imponderable Agents.---No. 10.

[Second Series.]

Heat, Light, and Electricity.—The theories of these three great powers of Nature may be divided into three heads: 1st. That Light, Heat, and Electricity are but different qualities or actions of all matter, developed under different conditions. 2nd. That they are different qualities or actions of one subtle fluid, developed under different conditions. 3rd. That they are phenomena of three different subtle fluids.

None of these theories are new. Light, as we have stated, was believed to be the motion of a subtle fluid, by Descartes; electricity has always been considered a fluid, and by Du Fay, as two fluids. Heat has also been held to be a fluid of inappreciable tenuity, with particles endowed with indefinite idio-repulsive powers, as described by Dr. Ure and other scientific writers.

There is so much of which we are ignorant, connected with the phenomena of these three powers, that we dare not advance any dogmatic opinions, in favor of any one of the theories.

The term "imponderables," applied to these powers, is not a correct one, for it means something destitute of weight, therefore not subject to the law of gravity, and until we find some material substance, possessing this quality, it is just as applicable to an action or a motion, as to light or heat. There may, indeed be a subtle elastic fluid throughout space, which has not been detected by our yet imperfect instruments. A substance bearing the same relation to hydrogen (in weight) that it bears to platinum could not be weighed by any instrument in our possession.

Heat.—The only apparently good argument in favor of heat being a substance—an elastic fluid—is, that it expands bodies, to this we may add another, viz., generating heat by friction. Neither of these positions, however, are strong. Cold expands bodies, as well as heat. Water expands by the addition of 180° from 1000 parts by measure to 1045—1 in 22. Water contracts in bulk by lowering its temperature until it reaches 40° but below this temperature it expands. If heat is a fluid, it should expand ice or water at the freezing point, but when heat is applied to water at 32°, instead of expanding, it contracts in bulk, until it arrives at 40°, when it expands with every increment of heat. Some may suppose that ice contains air and is indebted to it for its greater bulk than water; but this is not so. There is more air in water than in the ice of our large lakes. The water in freezing gives out its air, and in all our rivers and lakes, there are huge air crevices and rents, to allow the air to escape, as the water freezes below. By experiments with pure Norway ice, Prof. Donnet, proved that it could be heated up to 300° under oil at which point it exploded like water at the same temperature deprived of all its air. If a strip of gutta percha be plunged into boiling water, it contracts both in length and breadth. Dr. Ure calls this "a remarkable phenomenon apparently opposed to all the laws of heat."

It would also appear from Count Rumford's experiments, that by a moderate degree of friction, the same piece of metal may be kept hot for any length of time; so that if heat were a fluid contained in the pores of metal, the heat pressed out by friction must be inexhaustible, which is simply an absurdity. Sir Humphrey Davy believed that the phenomena of heat might be referred, as he says "to a vibratory motion of the particles of common matter, or a motion of the particles round their axes, or a motion of particles round each other." It is no argument in favor of heat being a universal fluid, to say "it is latent in cold bodies," for latent means an insensible quantity, not what heat is in itself.

Electricity—Franklin's theory of electricity is, that it is a single fluid, and is as follows: —"All bodies are endowed with a certain quantity of electricity, if they have more than their natural quantity they are electrified positively; if less, negatively." Du Fay's theory which is the oldest is that electricity is composed of two fluids,—one the positive, the other the negative (vitreous and resinous are also names used for these fluids.) The term "pole" is given to the ends of the wires of a battery from which the electricity proceeds; the zinc being the positive one. This term is given to the ends of the wires, from a belief that they are possessed of attractive or repulsive forces. Prof. Faraday denies the existence of such forces, and asserts that the poles are only doors or pathways for the current. He has therefore substituted the term *electrodes* for the positive and negative poles of a battery. The pole where the current enters the decomposing substance, he names *anode*, from the Greek word signifying upwards, or the way in which the sun rises. The point where the current issues from the decomposing substance, he calls the *cathode*, or downward, following the course of the sun. Decomposition he terms electrolyzation. Although electricity is generally believed to be a fluid; it has never been discovered to possess gravity, or to have increased the bulk of bodies that have been charged with it.

Light.—Having said so much on this interesting branch of what is termed the imponderables, we will add but a few remarks now, and that for the simple purpose of saying that T. Bassnett, in a work recently published by D. Appleton & Co., of this city, has founded his "Mechanical Theory of Storms," on the supposition that all space is filled with a subtle imponderable elastic fluid, like that described by Euler, the motions of which produce light.

The identity of the three *imponderables*, is no new idea. Sir Isaac Newton put forth the query whether light and common matter were not convertible into one another, and he also adopted the idea that the phenomena of sensible heat depended upon the vibrations of the particles of bodies. Euler seemed to entertain the idea that electricity was also derived from the same fluid as light. "Every new discovery," says R. Smith, a somewhat distinguished writer on Electrical Science, "appears to encourage the opinion of the identity of electricity, magnetism, light and heat." Light, heat, and electricity can be obtained from a solar ray, and from the galvanic current.

We have thus presented many different opinions on the imponderables, that is, respecting their self, and combined identity. These different opinions do not affect our knowledge of the operations of these powers. Thus one philosopher attributes the rosy, golden, blue, and gray colors, displayed in the heavens at the rising and setting of the sun to the polarization of light; another ascribes the Northern Lights to the effects of electricity; both may be right, but if not, it does not affect our knowledge of these phenomena. This field still stands broad and expansive for future scientific investigation; at present we must plead to much ignorance; and when it is considered that photography is almost a new science; that it was unknown but a very few years ago, and that the moon is now made to paint herself with a pencil of her own gentle light, and that plates for printing are now executed by the sun, we may well speak modestly of what we do know, but hopefully of what we may yet know. With these remarks we close the series of articles on Heat, Light, and Electricity.

Setting the Journals of Carriages.

Some time since an inquiry was made through our columns respecting a correct rule for setting the spindles of carriages. The following are three letters sent us in answer to that inquiry:—

Eckmansville, Ohio.

The following is the method which I have practiced for a number of years in setting the journals of carriages:—

To make the carriage track five feet on the ground, I weld the axle four feet six inches, between the shoulders, and then ascertain what the difference of size is between the butt and point of the spindle, (generally it is made about 3-16ths of an inch). I then take off the collar or hurder, heat the axle at the shoulder and set each spindle down at the point 3-16ths of an inch—or somewhat below a straight line, which is ascertained by placing a "straight-edge" on the top side of the axle from one shoulder to the other, I next set the point of each spindle 1-32nd part of an inch forward, or until it comes within 1-16th of an inch of a straight line in front of the axle, which will leave one-third of the difference on front of each spindle point, and two thirds on the back. When the carriage wheels are made, with the proper dishing, say about three fourths to one inch, this rule will gather the spindle so that the carriage wheels will stand 1½ inches closer on the front than on the back. The front wheels will then stand five feet apart on the ground, and five feet 3½ inches on the top, the hind ones over five feet on the ground, and five feet four inches on the top.

I have never known a spindle to heat or cut, when set according to this method.

Jos. R. Gates.

The question of setting the spindle of carriages, is one of no small importance, but the first question to be asked, is "why do the spindles of carriages require a peculiar set?" It is perfectly clear, that if the wheels of a carriage were not *dished*, and if roads were perfectly level, that the spindles of carriages should be of one uniform thickness and set perfectly straight. But as wheels require to be *dished* in consequence of uneven roads, something is necessary to obviate this difficulty. As the *dish* of a wheel is the first cause of alteration, the amount of *dish* must determine the amount of spindle alteration, (more dish is required in burden than light wagons.) The spindles should always be straight underneath to allow the wheels to play easily; the tire of the wheels should always stand on the ground under the center of the spindle, therefore the taper of the spindle must correspond with the dish of the wheel. The point of the spindle should stand slightly forward, to obviate the difference, (called "the *gather*") of friction between the large and small end of the journal; the amount of *gather* is also in proportion to the *dish* of the wheel. Now I think it is self-evident, that the surface of the ground bearing on one part, and the load on the spindles on the other, and then meeting at right angles, must necessarily cause less friction, than by any other plan. Many mechanics, however, suit their own convenience, leaving science to follow after, if she will. If a pitman should be hung at right angles with its crank, so should the ground be at right angles with the carriage spindle, and the place of contact should be "the centre."

Another question once asked in the Scientific American, "why do some wheels rise over an obstacle easier than others?" is much easier answered than the former. Some spindles are much larger than others, and these have an advantage in the incline of the spindle. A wagon built for rough roads, such as "log paths," should have the spindles of its axles made large; they tend to prevent rebounding; for smooth roads, however, large axles, increase the friction.

Thomas Mills.

Clearfield Pa.

In reference to the setting of carriage spindles, there is one point on which—I believe —all carriage makers are agreed, namely, that the spokes underneath the hub should describe a perpendicular or plumb line to the ground; this being the case, I will say nothing about the *gather*. The first thing to be examined is the size and *dish* of the wheel. This being found, get the center of the journal on the side against the shoulder and then strike a horizontal line on the axle from the centre, to the distance of half the size of the wheel, here mark a cross, by the square, and then measure up that line, from the horizontal, the distance of the dish of the wheel. From the last, strike a line to the center of the journal before mentioned, and prolong it as far as the length of the journal. Then if that line strikes across the center of the end of the journal, it is correctly set, if it does not, the journal must be modified until it does so. This is the rule I have laid down.

J. H. Cook.

Salem Iowa.

The diving bell was first used in Europe in the year 1509. It was used on the coast of Mull, in searching for the wreck of a part of the famous Spanish Armada, some time before the year 1669.

We are indebted to the Hon. S. A. Douglas for a copy of his letter on River and Harbor Improvements.