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IMPROVED HOISTING MACHINE.

The machine illustrated in the annexed engraving is the result of a series of experiments in adapting the friction clutch pulley, of the same manufacturers, as a means of transmitting the power, in combination with a new improved shipping apparatus and stop motion. All parts of the machine are inclosed in a single iron framework or hanger, so constructed that the bearings are less liable to get displaced or out of line than when bolted in separate parts to the wood framework.

We represent the device in perspective, Fig. 1, and in section, Figs. 2 and 3. The frame of the apparatus consists of the two main standards, A, Fig. 1, connected and held in their position by means of the three studs or bolts, B, the two upper bolts or studs having shoulders inside, against which the standards bear when the outside nuts are screwed up; and the lower bolt being incased by the sheath or pipe, C, so that, when the nut is taken off either end, the bolt may be drawn out. The sheath, C, can be removed in case of necessity, for repairs or renewal of any portion of the machine in case of accident or wear. D is the main shaft, having its bearings in each end of the frame standards, A. Upon the former are the worm gear, E, drum, F, and the small gear, G, which meshes into the gear, H, Fig. 2, which drives the stop motion disk, I. This disk has a V scroll cut from a point near its hub or center to its circumference; and when the drum, F, revolves, also rotates by reason of the gearing described. On the face of the scroll are adjustable stops for the purpose of striking the shoe, J, which traverses the radial slot in the shipper wheel, K. When the shoe is moved by the stops on the scroll wheel, this actuates the shipper rock shaft, L: and its crank, on its inner terminus, moves the sliding shipper bar to unship the clutch which is driving. This stop motion is independent of the stop motion usually provided in the hatchway on the shipper rope, being provided to prevent accident in case the latter should become disarranged or inoperative, as quite frequently happens.

Another important feature of this invention relates to stopping the revolving worm shaft, M, promptly at the same time the clutch is unshipped. This is accomplished by means of a brake, shown bearing against the worm in the oil receptacle, N, attached to one side of which is a bolt, O, adjustable by two check nuts to regulate the pressure of the shoe against the worm and a set screw on the opposite side. The top of the bolt is provided with a cam strap, which encircles the shaft adjoining the crank (which throws the shipper bar). The same movement of the shaft, L, which operates the shipper bar, also operates simultaneously to draw up the brake shoe against the worm to stop the revolution of the shaft, M, and thereby it prevents the platform from traveling by the point where it should stop, at the top or bottom of the hatchway, or at any intermediate point where it is required to stop. These machines are furnished with platforms when desired, the latter being constructed of new patterns, and extra strong in their safety parts.

All further information required, with circulars, may be obtained by addressing the inventor, Mr. Volney W. Mason, post office lock drawer 33, Providence, Rhode Island.

FIG. 1.

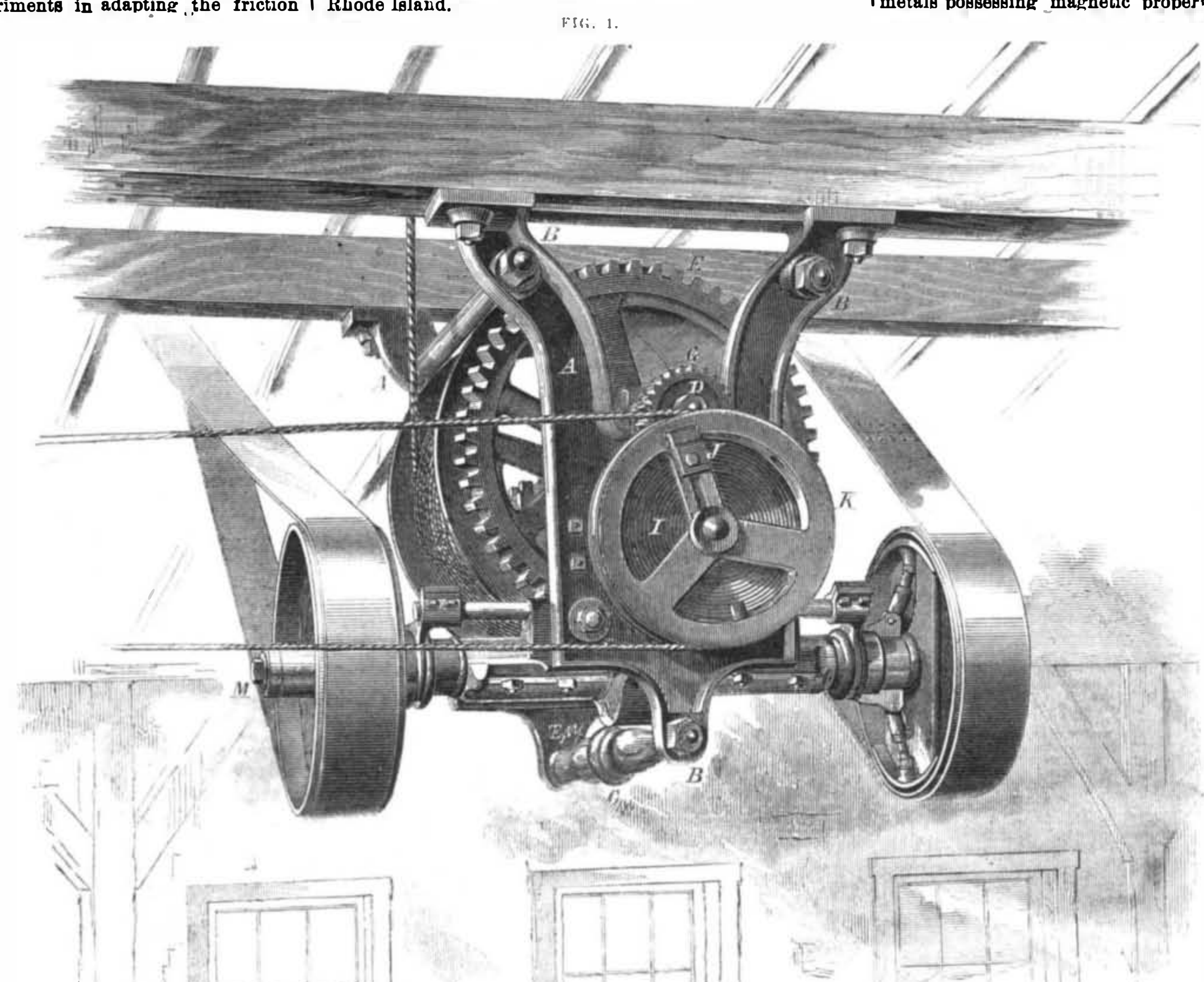


Fig. 2

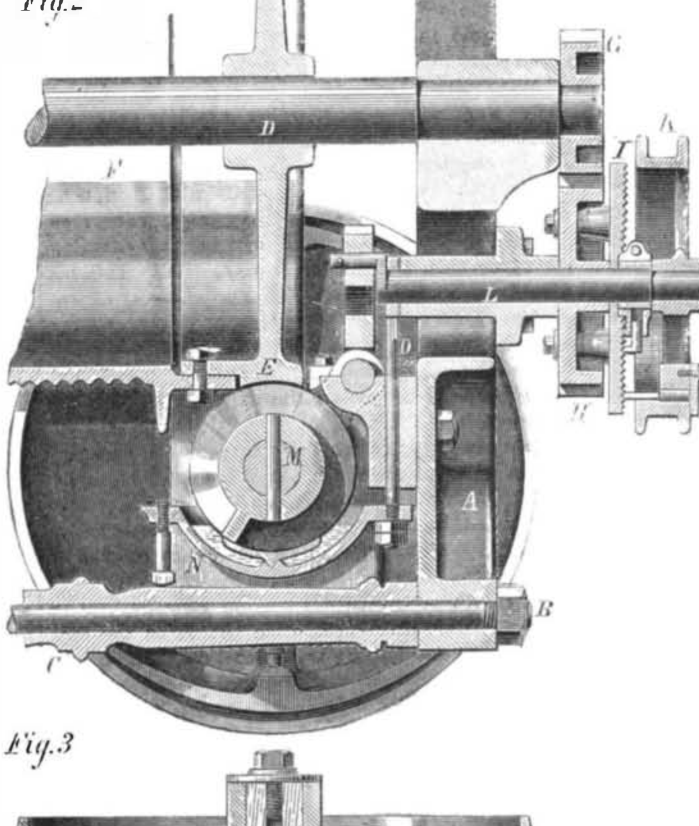
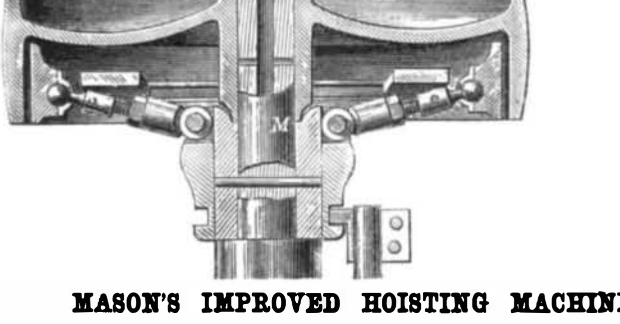


Fig. 3



MASON'S IMPROVED HOISTING MACHINE.

The Magnetic Metals.

It is well known that, besides iron, there are a few other metals possessing magnetic properties, namely, nickel and cobalt in a strong degree, manganese and chromium in a feebler one. Mr. W. F. Barrett, in an article in the *Philosophical Magazine*, has pointed out the similarity of these metals to each other in their physical and chemical properties.

Thus, as to specific gravity, that of the thirty-eight known metals ranges from lithium, 0 50, to platinum, 21·5, a difference of nearly 21; whereas those of the three strongly magnetic ones are iron, 7·8, nickel, 8 3, cobalt, 8 5, where the extreme difference is only 0·7. Their specific heat is nearly identical; their atomic one is the same; so also their conductivity for sound, heat, and electricity. Their dilation by caloric, and the amount they lengthen by mechanical strain, are also identical. The enormous cohesive power of iron, nickel, and cobalt, in the solid state, signalizes these substances as the most tenacious of metals, and their melting point is only exceeded by the platinum group of metals. They are not volatile at the temperature of the hottest furnace, but only by the electric spark, when they yield very similar spectra. As to their chemical properties, the combining weight of iron is 56·0, nickel, 58·5, and cobalt the same. Chemists class these three metals in the same group, from the similarity of their chemical behavior, and also the identity of their combining energy or atomicity.

What has been said concerning the likeness of iron, nickel, and cobalt, in many respects holds true of manganese and chromium. The former has latterly been used to replace nickel in the alloy of German silver. The compounds of all these five metals are conspicuous for the brilliancy of their colors. This uniform coincidence suggests the practical inference that nickel and cobalt might be obtained in a malleable and ductile condition when submitted to a process similar to that by which wrought iron is produced.

Gas Pipes Fatal to Trees.

J. Boehm says: Cuttings of willow, the lower ends of which were placed in flasks containing a little water and filled with coal gas, developed only short roots, and the buds on the upper parts died shortly after unfolding in the air. Of ten plants in pots (varieties of fuchsia and salvia), among the roots of which coal gas was conducted through openings in the bottoms of the pots, seven died in four months. To show that the plants were killed, not by the direct action of the gas, but in consequence of the poisoning of the soil, several experiments were made with earth, through which coal gas had passed for two or three hours daily for two and a half years. The rootlets of seeds sown in this soil remained very short, and soon rotted. A plant of dracæna was re-potted in the soil; in ten days the leaves dried up and the roots died. The author thinks these results sufficiently account for the fact that trees planted near gas pipes, in streets, so often die; and recommends the inclosing of gas pipes in wider tubes, having

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openings to the air, and through which currents could be maintained by artificial means. Such a plan is still more to be recommended on hygienic grounds, since it has been shown, by Pettenkoffer, that infiltration of coal gas, through the soil, takes place even into houses not supplied with gas.

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Contents:

(Illustrated articles are marked with an asterisk.)

MORBID MENTAL CONDITIONS.

There is an old saying that "every man has a bee in his bonnet," which, being translated, means that we are each, on some one topic, slightly insane. Somewhere in the marvelous organism of the brain there is a weak spot; some place in the connection between mind and body is at fault; and in the exercise of certain faculties, as a consequence, our actions are less governed according to the dictates of a sound reason. We are not prepared to vouch for the accuracy of such a theory, or to adduce scientific proof in its support; but in the daily life of every one, instances apparently substantiating the notion may be constantly encountered. Take, for example, the search for perpetual motion, which in some reaches a mania, or, indeed, the efforts made for solving any of the problems which Science demonstrates to be beyond peradventure insoluble. This is not confined to the ignorant, though perhaps such a class are in excess; for there are men, scores of them now living, some we have ourselves encountered, who, while well versed in philosophy, and who will follow the mathematical demonstration that a circle cannot be squared or a perpetual motion constructed, point by point admitting the truth of every step, will yet, after all, nevertheless find it impossible to divest themselves of the idea that, by some hook or crook, the wished-for result may be obtained. Or, conversely, they may see results reached which their reason and knowledge must teach them are impossible, either in principle or from the means employed, without the addition of hidden or extraneous circumstances, and yet they will grasp at the apparent proof, and even hold it out to the world as genuine, simply because it goes to confirm their secret and cherished ideas which their very reason prevents them openly avowing. Such cases, mere ignorance being eliminated from consideration, we may term the mildest form of the "bee in the bonnet," and starting from them, as it appears, may be traced a whole series of mental defects, reaching perhaps up to actual monomania.

We mention the above as a common and harmless instance of the triumph of will or desire over reason and judgment. As the beginning of a special category of human actions, which, did we believe in the doctrine used by some, that spiritual beings unseen govern men's every doing, we should say were directed by a demon of perversity. Passing through all intermediate grades, considered in their ascending order, in proportion to their hurtful effects upon society, the end seems to be found in morbid impulse, in that strange condition which Professor Hammond, in his recent able lecture on the subject, defines as a state "in which the affected individual is impelled consciously to commit an act which is contrary to his natural reason and to his normal inclinations." We would not have confounded the feelings which impel an educated man to seek the perpetual motion, and those, which perhaps all of us have felt, when on the verge of some high eminence, to cast ourselves down; but while they differ in point of time, one extending over years and the other over seconds, there appears, in certain cases, in both a morbid element which, in its result of overcoming reason, lends to them a similarity sufficient to class them as extremes of a like mental action.

At the present time, however, when the plea of insanity is so frequently interposed in courts of law to shield the criminal from the consequences of his guilt, too great care cannot be exercised in approaching or admitting the existence of a mental state which tends to destroy the responsibility of a person for his own actions. How fine a distinction may be drawn, showing the existence or non-existence of morbid impulse, Professor Hammond indicates by pointing out that, in the case of a person committing murder while delirious, who acts in accordance with reason, though it may be perverted at the time, and in that of another who, supposing himself to be imminent to a great danger, commits suicide to avoid it, neither acts from morbid impulse; but if a delirium acts so over the mind as to convince a man that some one is going to murder him, and hence he lies in wait for and kills that individual, that is true morbid impulse. The person suffering is perfectly aware of his wrongdoing, but cannot help performing the action. Dr. Hammond mentions repeated cases of such impulses impelling men to murder, and instances especially that of Jesse Pomeroy, the child who recently killed his playfellow in Boston. The boy, on being questioned, asked to be put where he could not do such things.

In other cases people have been impelled to throw vitriol on handsome dresses, and we are aware of an instance of a lady, for some time known in society, who could not resist the temptation of stealing small articles from shop counters.

What to do with such people is a question which the community sooner or later must solve, and Dr. Hammond's answers, as the result of his experience, may be summarized as follows: A person aware of the influence of the disorder, and knowing that he cannot resist it, is bound to put himself under suitable physical restraint, so as to render it impossible to yield. If he does not, then, when shown to have committed acts thus impelled, it is the duty of society to prevent his being at liberty. Morbidly constituted persons who commit crime because it is pleasant for them should be dealt with according to law. The apparent absence of motive is apparent only. The fact that a murder has been committed in order that the perpetrator might secure his own execution is not a palliating circumstance; the desire to be hanged is the evidence of a morbid mind, not of an insane one. A morbid impulse to crime experienced by a really insane person demands continued sequestration; but the plea "I could not help it," when standing alone in an otherwise sane individual, should be absolutely disregarded.

CHEAP TRANSIT FOR OIL.

We have heretofore described the extensive ramifications of the pipes, used in the oil regions, for conveying the oleaginous products of the neighboring wells to the railway stations. Many miles of such pipes are now in use. A new and extensive work of this kind, which is rapidly progressing, is the oil pipe of the Pittsburgh Pipe Company, now being laid from the heart of the oil regions, at Millerstown, Butler county, Pa., to the Baltimore and Ohio Railroad, near Pittsburgh, Pa., a distance of about forty miles. The pipe has a diameter of three inches, and will have a delivering capacity of four thousand barrels a day. Relay stations will be placed every five miles. The pipe company expect to charge thirty cents a barrel for pipage, the present charge by railway being fifty-five cents. This will, doubtless, prove to be a profitable investment. The first cost of pipes is not great, and, if properly laid down, the expenses of working cannot be heavy.

The ordinary railways undoubtedly furnish the cheapest transportation for most products; but there are some substances, as, for example, water, gas and oil, that to a certain extent may be said to possess the power of self-transportation, whereby they can be moved cheaper than by railway or canal.

The facility with which liquids may be made to flow in pipes, between distant places, has often suggested the idea of using similar means for the transportation of grain and merchandize. Years ago it was proposed to convey grain from Chicago to New York in pipes, by air pressure, and the notion has been lately revived. The idea of transporting merchandize packed in rolling balls, within tubes, the balls to be driven by air pressure, was patented a generation ago in England, and re-patented here recently, as a new discovery. Wonderful things in the way of speed and cheapness of transportation were predicted in favor of these schemes. But the predictions were not based upon the mathematics of the subject. After all, whether the project relates to so ideal a thing as music, or so practical a matter as the carrying of goods, the performances of mankind are inexorably confined to the limits of exact numbers. We think that any intelligent person who will take the trouble to figure out the cost of pipes and air machinery, and the expenses incident to the working thereof, will soon become satisfied of the folly of expecting to compete with the ordinary railway over long distances in the transportation of general merchandize. The pneumatic system is a good motor for short lines in cities. But it stands no chance with the common railway, economically considered, on long lines through the open country.

Oil, water, and gas are exceptional commodities. These, when placed in pipes, will flow of themselves; and if the apparatus is properly arranged, of the right size, almost any extent of distance can be easily overcome. Thus, the city of New York is supplied with water which flows through an underground tube from Croton Lake, Westchester county, a distance of some forty miles, while the street piping, by which the water is locally distributed, has a total length of some two hundred miles. In view of the cheapness and facility with which liquids may be transported in pipes, it would seem as if this method might be employed with great advantage to convey oil, from its fountains in Western Pennsylvania to Philadelphia and New York. The present cost of transporting oil by rail from Venango and Butler counties to New York is $1.20 per barrel. The pipe system would, probably, effect a considerable reduction over this cost, and yield a handsome profit to the projectors.

POWER REQUIRED TO DRIVE COTTON MACHINERY.

The New England Cotton Manufacturers' Association have recently performed a good act in publishing a little "Manual of Power," prepared for them by the well known engineer, Mr. Samuel Webber, of Manchester, N. H. Mr. Webber presents an extended tabular statement of the power absorbed in driving mill machinery in a large number of mills, as determined by the dynamometer. Some of the machinery was new when tested, some very old, some in good and some in very bad condition. Special tests were made to determine the effect of weather changes, of different kinds of oils and various methods of lubrication, of altering the method of banding, etc. The information given is derived from the experience of the author, extending over several years, and is of great value to engineers and manufacturers. We have only space for a general *résumé* of results.

Cotton openers, delivering cotton loose on the floor, with single beaters revolving from 532 to 820 revolutions per minute, and single fans at 700 to 1,600 revolutions, required, including countershaft, from two to over six horse power: with two beaters and two fans, four and a half to six horse power. The cotton delivered ranged from 3,000 to 10,900 lbs. per day.

Cotton pickers, delivering cotton in the lap, at the rate of from 1,000 to 5,000 lbs. per day, required from 3 to 13½ horse power, averaging about 2½ horse power per 1,000 lbs.

Cotton cards absorbed from 2 to 9 horse power, carding from 30 to 76 lbs. per day, averaging about one twentieth horse power per pound for finishers, a third more for breakers, and one fifth for very fine work.

Railway heads required from 1½ to 2½ horse power, a usual figure being about a horse power for 9 inch rolls at 10 yards per minute, and half a horse power for 1½ inch rolls at 300 revolutions per minute.

Drawing frames indicated a resistance of from ½ to 1¾ horse power at speeds varying from 200 to 400 revolutions, 3 to 5 rolls, 2 to 4 doublings.

Roving frames ranged from 28 to 276 spindles per horse power, at speeds of from 475 to 1,350 revolutions. A fair performance would seem to give about 150 spindles per horse power, at 1,200 revolutions.

Throstle spinning required a horse power for from 65 to 165 spindles, the latter at 2,685 revolutions of the flier, the former at 5,000. Ring spinning absorbed very nearly similar power.

Mule spinning gave 200 to 280 spindles per horse power, speeds of spindles ranging from 3,000 to 5,000 revolutions.

Cotton looms required usually about one sixth or one eighth horse power, at 120 picks per minute. Looms making 156 picks per minute, on Nos. 15, 16, and 20 warp and weft, ran 5·1 per horse power. Others, at nearly the same speed, on finer goods, ran 9 and 10 per horse power.

Cotton spoolers, at 100 revolutions, required 0·2 to 0·3 of a horse power, twisters about three fourths of a horse power, and warpers 0·11 to 0·17; dressers 2 horse power, and slashers 1½ horse power.

A circular saw, 18 inches in diameter, sawing 3 inch hard plank, gave 1·27 horse power; and a saw, 9 inches in diameter, cutting 1 inch pine board, 1·6, their speeds being 1,300 and 4,000 respectively.

A small lathe, turning ⅜ inch iron, took 0·09 of a horse power, and a larger lathe, turning 1 inch iron, 0·21. An upright drill, boring a ¾ inch hole, absorbed 0·16. A crank planer, cutting with a two inch stroke, required 0·23, and a planer with a five feet table took, when making 4 feet length of cut, 0·25. Three polishing wheels, of 12 inches diameter and 1½ inches face, absorbed 1·15. A grindstone, 6 feet in diameter and 12 inches face, grinding axes, took 3 horse power, while another, 6½ feet diameter, grinding axes, in wooden boxes, absorbed 11; and a stone, 3 feet 10 inches in diameter and 11 inches face, required 7·8.

Wool cards absorbed 0·9 to 1·27 horse power, at 96 to 130 revolutions; jacks, at 2,457 revolutions, 0·65 to 0·78; and looms, making 65 to 95 picks, took 0·4 to 0·6.

Coefficients of friction on shafting ranged from 0·0336 to 0·759, a good average result being about 0·05.

Reviewing the whole series of results, we deduce the following as fair approximate rules for estimating power:

Cotton openers, one horse power per thousand pounds cotton delivered.

Cotton pickers, three horse power per thousand pounds cotton delivered.

Cotton cards, one twentieth horse power per pound cotton delivered per day.

Cotton cards, best practice, one fortieth horse power per revolution per minute.

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