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THE PREPARATION OF PEAT FOR FUEL.

There is no more important economical question under discussion, at the present day, than that which broadly includes the production and manufacture of fuel for industrial and domestic purposes from new sources, and especially the substitution, for coal and wood, of peat and similar products, which are capable of being obtained and prepared at a much less comparative cost. The subject of the utilization of peat as fuel, though of great interest in this country, is in England, probably on account of the temporary famine and stress of prices in coal, and also by reason of the apprehension which exists regarding the ultimate exhaustion of the mines of the kingdom, strongly attracting the attention of scientific men, leading them toward investigations and experiments, the results of which may be considered as embodied in such improved machines as that to which our engravings refer, and to which we shall presently allude.

It is well known that both in the northwestern section of the United States, and to as great, if not to a greater, extent in certain parts of Canada, very large deposits of peat exist. It may be safe to predict that, in view of the scarcity of other fuel in such districts and the rapid progress which is being made to the improvement of means for utilizing the bog product, ere long the latter will be exclusively employed both for domestic and manufacturing uses.

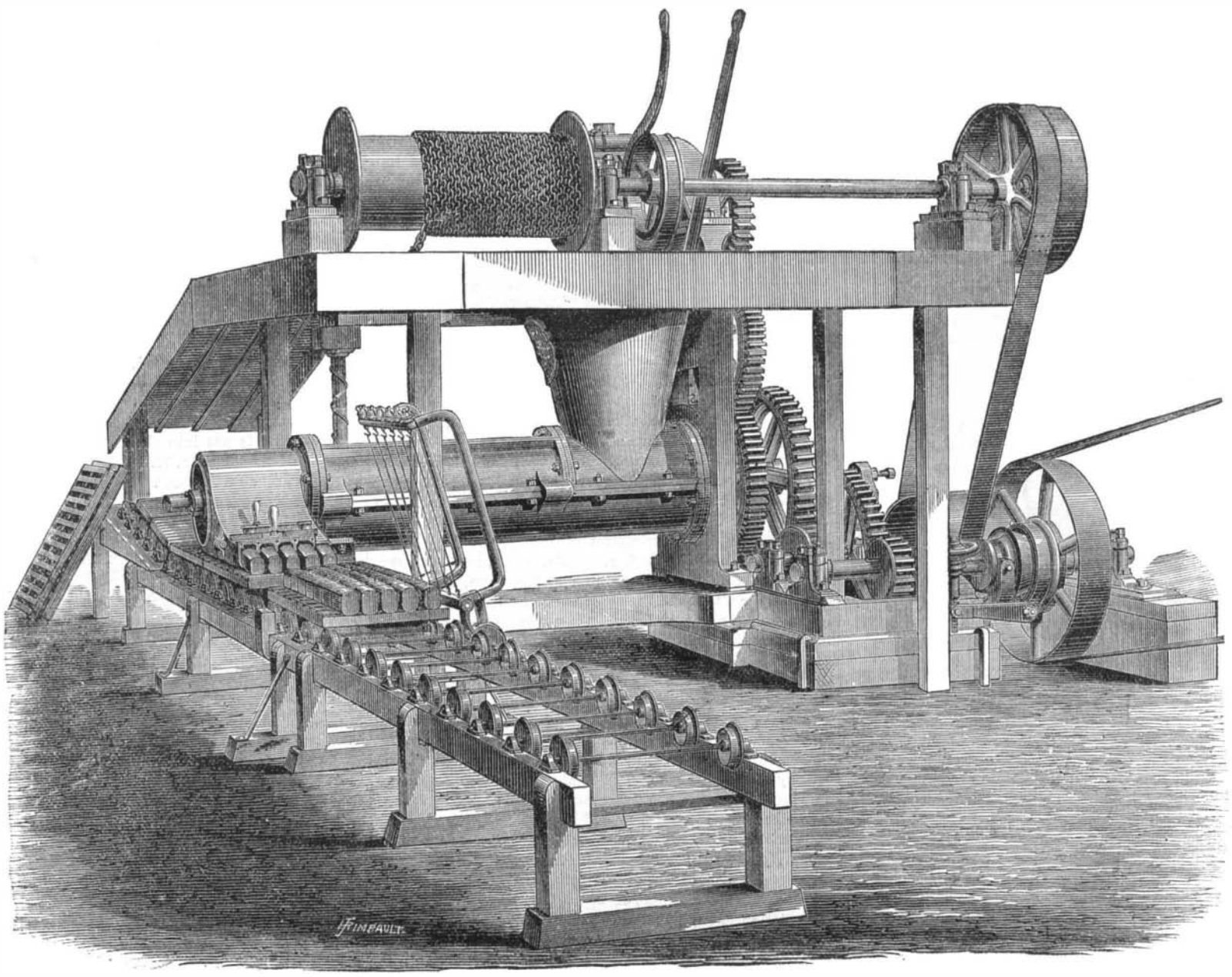
Of the associations which, in the Dominion, are at present organized for the prosecution of this industry, we have recently received the prospectus of one, the Huntingdon Peat Company, the field of the operations of which is located in the county of Huntingdon, forty-seven miles from Montreal. The peat bed there situated is said to be of superior quality, and comprises about 800 acres, averaging from 10 to 18 feet in depth of pure vegetable matter, and capable of yielding 3,000 tuns of dry peat per acre. The process employed, known as R. A. Griffin's patent, consists in raising the peat by a system of endless chains and buckets, throwing it into "curers," in which the water is strained from it. The peat is then passed into a mill; and within fifteen or twenty days from the time it leaves the bogs, it is fit for the market. The cost of the necessary machinery calculated to produce 100 tuns per day, at a cost of $1.25 per tun, is estimated, in the prospectus above referred to, at $35,000.

Whether or not peat can be profitably employed in the manufacture of iron, is a question which many of the iron trade journals have lately made the subject of protracted controversy. The matter seems to rest upon the economical and more especially the rapid preparation of the fuel for use; for when it is first taken from the bog, it is so saturated with moisture that its combustion is perforce a very slow process. Naturally, the efforts of inventors have been especially directed toward surmounting this difficulty; and while the patentee of the Canadian process, before noted, has effected a stride in advance in reducing the three months, generally required for drying the material, to fifteen or twenty days, the manufacturers of the machine represented in our engravings, Messrs. Clayton, Son, & Howlett, of London, England, have made much greater progress by diminishing the time necessary to completely extract the hygroscopic and fixed water, and to compress the substance into convenient form for stowage and transportation, to scarcely as many hours.

Before entering the apparatus (for the engravings and description of which we draw upon the pages of the *Engineer* and *Engineering*), the peat is filled into squeezing trucks, in which, during its journey to the works, all free water is squeezed out of it by mechanical devices.

From the trucks the peat is tipped into the vertical hopper of the machine, in which are inclined blades fixed upon the vertical shaft. The blades which, with other internal arrangements are shown more clearly in the sectional view, break up the lumps of peat and press the mass downwards into the horizontal cylinder into which it is fed by a worm placed on the central shaft. The peat is thus brought within reach of the propelling arms which are fixed spirally around the central shaft in the horizontal cylinder, and which pass between sharp steel knives. The knives are made with dovetailed feet, and are received into corresponding grooves in a removable bar plate, which is secured in the side of the horizontal cylinder by bolts. By means of the scissor-like action of this internal machinery, the peat is cut up into small pieces and squeezed and kneaded together. The fibers of peat are, by this treatment, so divided that facility is given for setting free all moisture and fixed air that may be retained in the cells of the stalks, and the peat is deprived of elasticity, or resiliency, so that it is reduced to a suitable condition for molding. The spaces between the cutting knives are gradually reduced from the feeding to the delivery end of the cylinder, the propelling arms being correspondingly placed. The molding orifices are adjusted at the nose of the machine, and may be of any desired form. Five of these orifices have hitherto been used and have been found convenient in working.

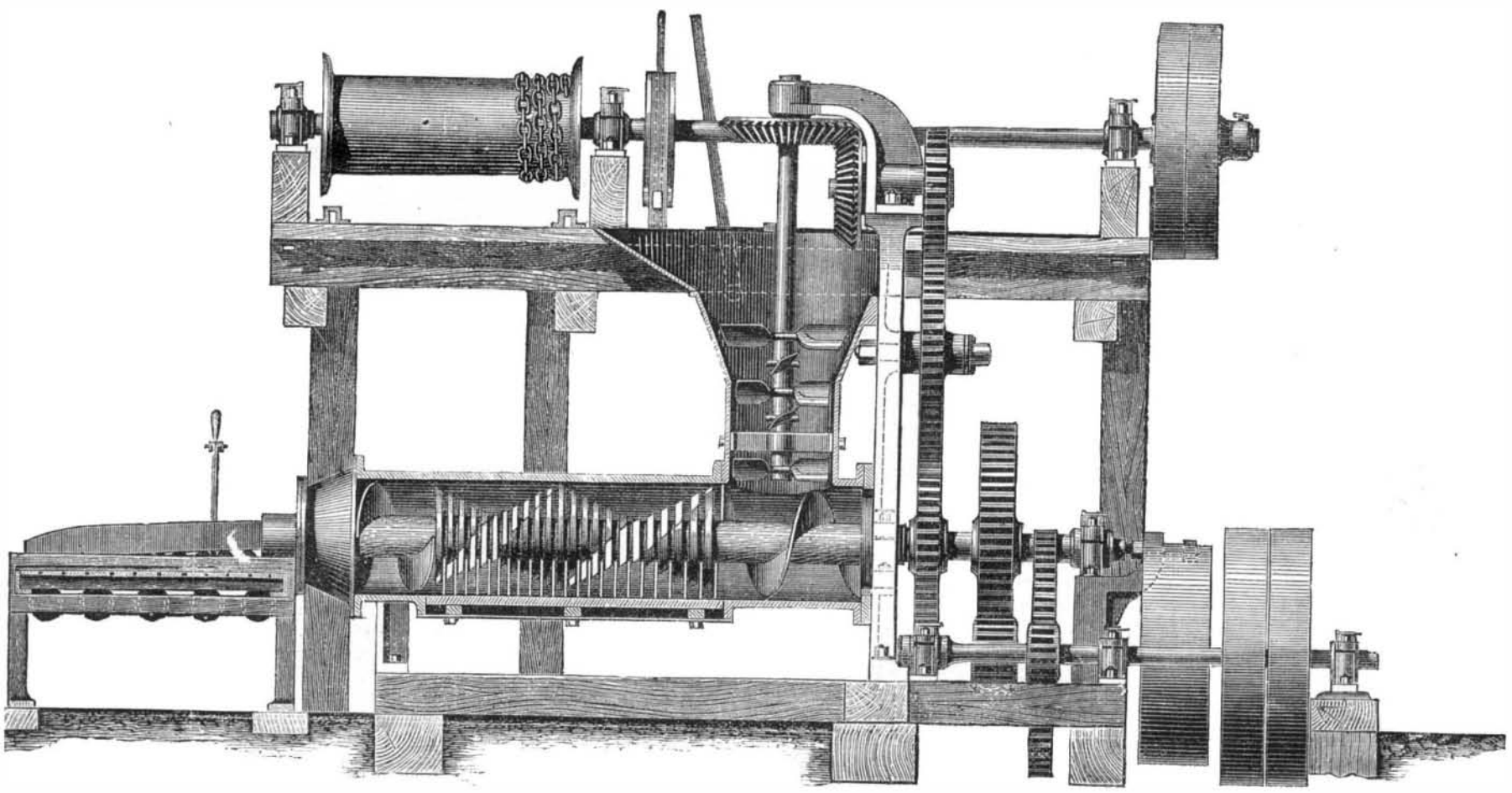
Beneath the chamber upon which the molding orifice is fixed, and which is seen to the left of the machine, is a roller table on which the trays for receiving the molded peat are placed in succession by a boy, so that they run in a continuous series underneath the molding orifices and receive the peat issuing from them. As the front end of each tray comes up, the workman severs the streams of molded peat by means of a sliding cutter, and pushes the loaded tray forward until it is opposite the cutting frame, in which several wires are stretched. These wires, being brought down on the peat, sever each bar into pieces five inches long, which is a convenient size for use. The loaded trays are sent along the roller table until they are opposite the tray racks. The trays are then lifted off on to the racks, where they remain for about three days, until the peat will bear handling, when they are placed upon the open shelving for final drying. The tray racks consist of uprights with arms fixed upon them between which iron rods are strained. The contingency of accident to the machinery, from stones or hard foreign substances passing in with the peat, is provided against by means of a friction clutch, seen to the right of the machine in front of the driving gear. This clutch can be screwed up to give any desired pressure, or resistance, and when any substance having an objectionable degree of solidity passes into the machine, the clutch slips, its resistance being overcome, and breakage is thus avoided. The cylinder has a movable cover so that the interior may be readily examined, foreign substances removed, knives replaced, or anything else necessary done.



CLAYTON & CO.'S PEAT COMPRESSING MACHINE.

The producing power of the machine has been fairly tested, and, so far, the yield has been found to be at the rate of from 75 to 95 tuns of crude peat per ten hours. The output of raw material appears to depend much upon the state of moisture of the peat bog, being greatest when the peat is wettest and least fiberous.

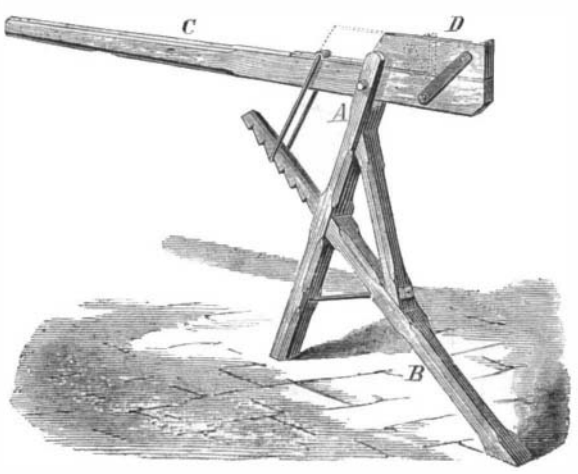
Various kinds of peat have been tried by this machine, and it is interesting to notice the difference between the peat dried without having been previously treated, by the machine, and that which has been operated upon. Peat of very fiberous nature when dry has an open spongy appearance, suggestive of cocoa nut fiber. The same peat treated by this machinery becomes compact and hard, and assumes a specific gravity of from 1·05 to 1·10, while black decomposed bog condenses to about 1·20. A set of machinery to work 100 tuns of crude peat employs, in all, ten men and five boys, including diggers, engine drivers, men in drying sheds, etc., so that the cost, allowing a fair amount for wear and tear, is placed at from 87 cents to $1.25 per tun.



PEAT COMPRESSING MACHINE—SECTIONAL VIEW.

THE HERCULEAN LIFTING JACK.

The invention illustrated in the accompanying engraving is an improved lifting jack, invented and patented by John Riddlesberger, of Franklin county, Pa., and which, it is claimed, may be advantageously applied to many uses. The framework consists of a standard, A, combined with an auxiliary standard and brace, B, in a strong and snbstantial manner. A lever, C, rests in a slot formed in the upper end of the post, A, and is secured by a bolt passing through it. By means of an attachment, D, on its short arm, the lever can be adjusted to different hights. The falling link shown



serves to secure the apparatus while the weight is suspended.

In operation, the short arm of the lever is placed under the axle of a wagon or other weight to be raised. The opposite or long arm is then borne down, when the falling link becomes engaged in notches formed in the under side of the post, B, as represented.

For further particulars regarding sale of territory, agencies, rights, etc., address Dr. I. N. Snively, Waynesboro', Franklin county, Pa.

The Modes of Steel Making.

A priori, the making of steel by removing carbon from cast iron is the most rational way, says the *Engineering and Mining Journal*, because it is the most direct; but a trial shows us at once that directness is not the only premise which must be regarded. There are two other things which go to the making of steel. One is purity of product and the other is equality of "temper." A pure product is only to be had by using a pure pig; and, as this article is not always obtainable, that process is, generally speaking, more rational which introduces some purifying operation—like the conversion of cast iron to wrought. As to the equality of temper, that depends upon the amount of carbon left in the steel (neglecting other elements). Here again repeated trials have shown that it is very difficult to hit the exact amount of carbon in every operation when oxidizing agents are used, and a large proportion of past failures have been due to this difficulty. So that, after all, the direct conversion of cast iron into steel is not the most rational mode, because it leaves two important requirements unregarded. On the other hand, wrought iron, being a purified product of a tolerably definite composition, satisfies these requirements, and may, therefore, rationally be used for steel making. In practice we find both these kinds of iron used together. In such cases, the wrought iron must be considered as the leading raw material, while the cast iron is a carbonizer.

The old idea that the direct conversion of pig metal into steel is the only rational process has cost inventors untold agonies of mental activity, and capitalists have suffered quite as much in pocket on account of it. The proof that the idea was wrong is to be found in the constant abandonment of the process in steel making of every kind. Crucible steel, furnace steel, and Bessemer steel making processes are now, in most cases, founded upon the principle of using wrought iron as a basis and either carbon or pig metal as a carbonizer.

Effect of Sulphur Water on Iron Pipes.

Dr. E. Priwoznik, in *Dingler's Journal*, says: It appears that, when the iron mains conveying the mineral water from a source near Hainburg, Austria, were taken up after having been for more than a dozen years underground, the iron thereof had been strongly acted upon, as exhibited, by the difference in structure, upon the fracture. On being analysed, the author found the interior layer to consist, in 100 parts, of: Hydrated oxide of iron $[(Fe^2)^2O^3(OH^6]$, 81·08; free sulphur, 12·29; sulphuret of iron, 4·48; hygroscopic water, 0·57; nickel, cobalt, magnesia, silica, traces of carbon, and chlorides of ammonium and sodium, 1·58. The second layer was found to contain only 79·2 per cent of iron, but no sulphuret or excess of carbon was discovered; while the third outmost layer was almost pure cast iron.

A Leaf from the Early History of the Mowing Machine.

Jeremiah Bailey, of Chester county, Pa., was one of the early American inventors, whose contributions to the mechanical arts have so greatly assisted the progress of the country. In 1822 he obtained a patent for a self-sharpening mowing machine, which was considered of so much importance that it was engraved and printed in London, in the *Mechanic's Magazine* for November 1, 1823, almost fifty years ago. We here give a copy of the engraving and quote the remarks of our venerable cotemporary:

"The mowing machine, of which the annexed cut is a representation, was invented by Jeremiah Bailey, of Chester county, United States, who has obtained a patent for the same. [Patented February 13, 1822.]

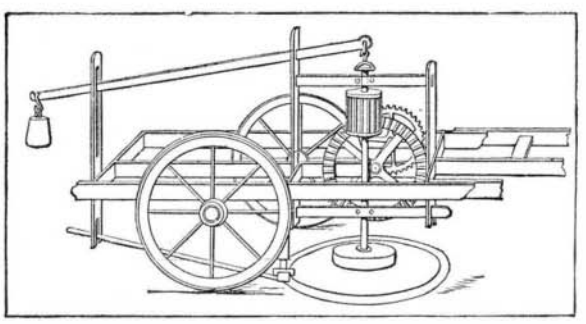
"It has been extensively used and approved of during the last season, in the neighborhood of the patentee, and promises to be of great public utility. It is understood that it will mow ten acres per day. The following description will explain its operation, and show the skill and ingenuity of the inventor.

"This machine is supported by two wheels on different axles. The left wheel is fixed to its axle so that they revolve together. The right revolves on its axle like a common cart wheel, and is placed about a foot further back than the other. The left works within the frame, and has a circle of cogs screwed on the outside of the fellows, but of a less diameter, to keep them from the ground. These cogs work into a vertical cog wheel in front, that turns an iron shaft extending horizontally towards the center of the machine; upon the inner end of this shaft is fixed a vertical fuce wheel, whose cogs turn a trundle head or a vertical shaft. To the bottom of this shaft, near the ground, is fixed a circular horizontal frame work, on the circumference of which is screwed the scythes in six parts, laid horizontally, with the edges turned outward, so as to form a complete circle. To keep the scythes at a proper distance from the ground, the bottom of the shaft is supported on a piece of wood of the machine, secured by a tye from the tail, somewhat resembling a sled runner, in which it works in the manner of a gudgeon—with the inequalities of the ground, the scythe frame, shaft and trundle head rise and fall.

"The edge of the scythe in its revolution passes under a whetstone fixed on an axis, and revolving with the scythe. To create friction, this axis is more or less inclined to the line of direction of the revolution according to the friction required. This stone, by means of a sliding rod, by which it is attached to the machine, rises and falls with the scythes.

"To prevent too great a pressure of the trundle shaft and scythe frames on the ground, a lever, like a steelyard, is fixed to the top of the shaft, extending to the tail of the machine, where it is weighed according to the nature of the ground and grass.

"The horse is put into shafts, and *walks* in front of the left side of the machine, and always on the mowed ground after the first swarth is cut.



"By the increase of velocity, the scythes revolve with great swiftness. The grass, as it is cut, is first thrown by the progressive motion against a rise in the scythe frame toward the center, and by the same motion is afterwards thrown off in a regular row, following the center of the machine."

New Plan of Removing Sand Bars.

A method of removing sand bars from rivers, invented and patented by Alfred Garnham, of St. Louis, Mo., consists in anchoring a cable under water, and providing the cable with angular arms, so arranged that the force of the stream will actuate the arms, make them revolve and beat up the sand, which is swept away, as fast as loosened, by the current.