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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL

No. 390,545. Patented Oct. 2, 1888.

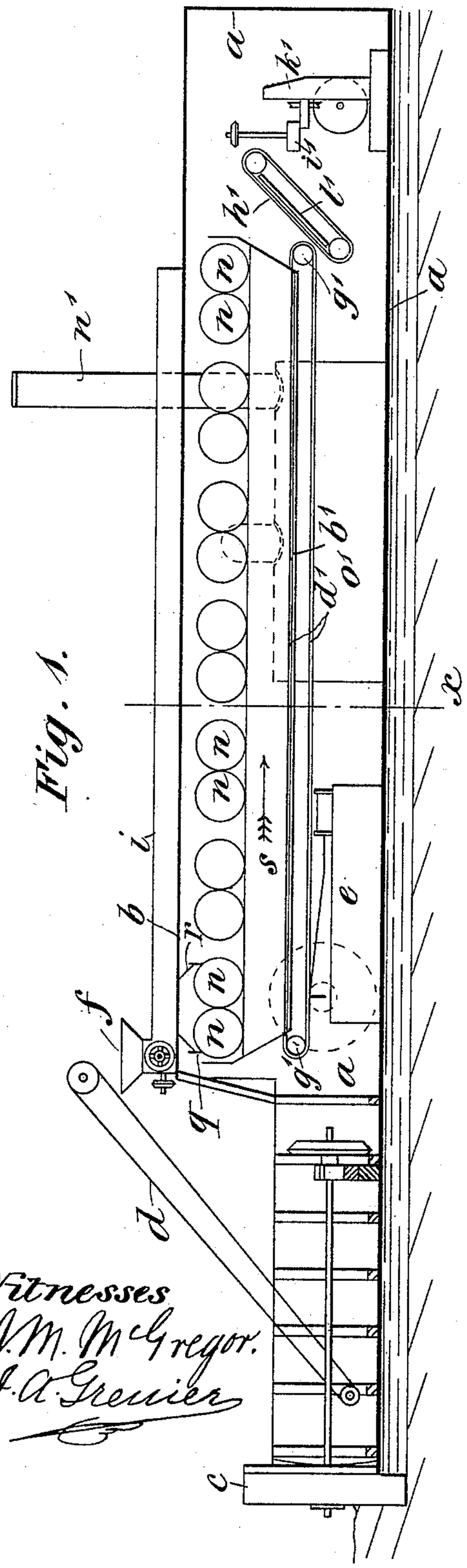

Fig. 1.

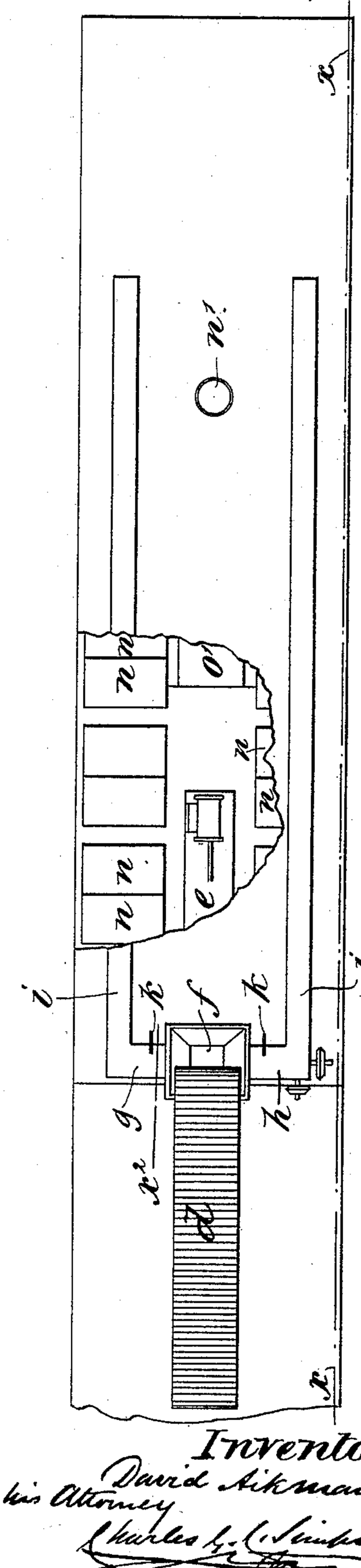

Fig. 2.

Witnesses
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Charles G. Swinburne

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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL

No. 390,545. Patented Oct. 2, 1888.

Fig. 3.

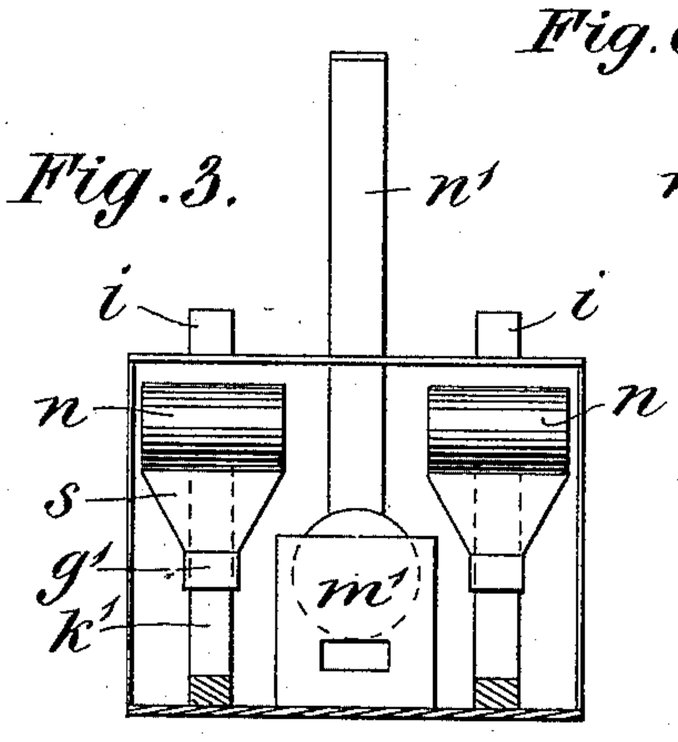


Fig. 6

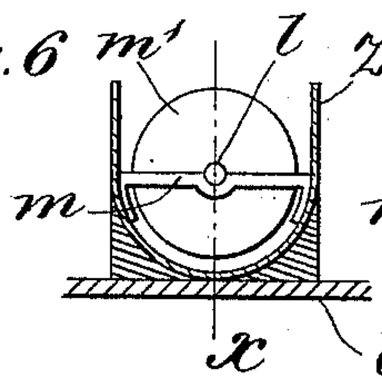


Fig. 7.

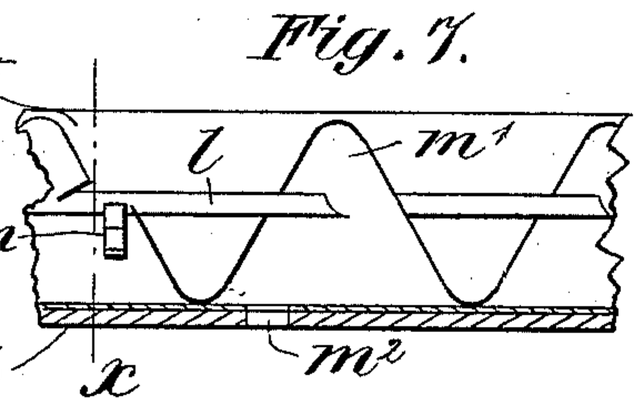


Fig. 5.

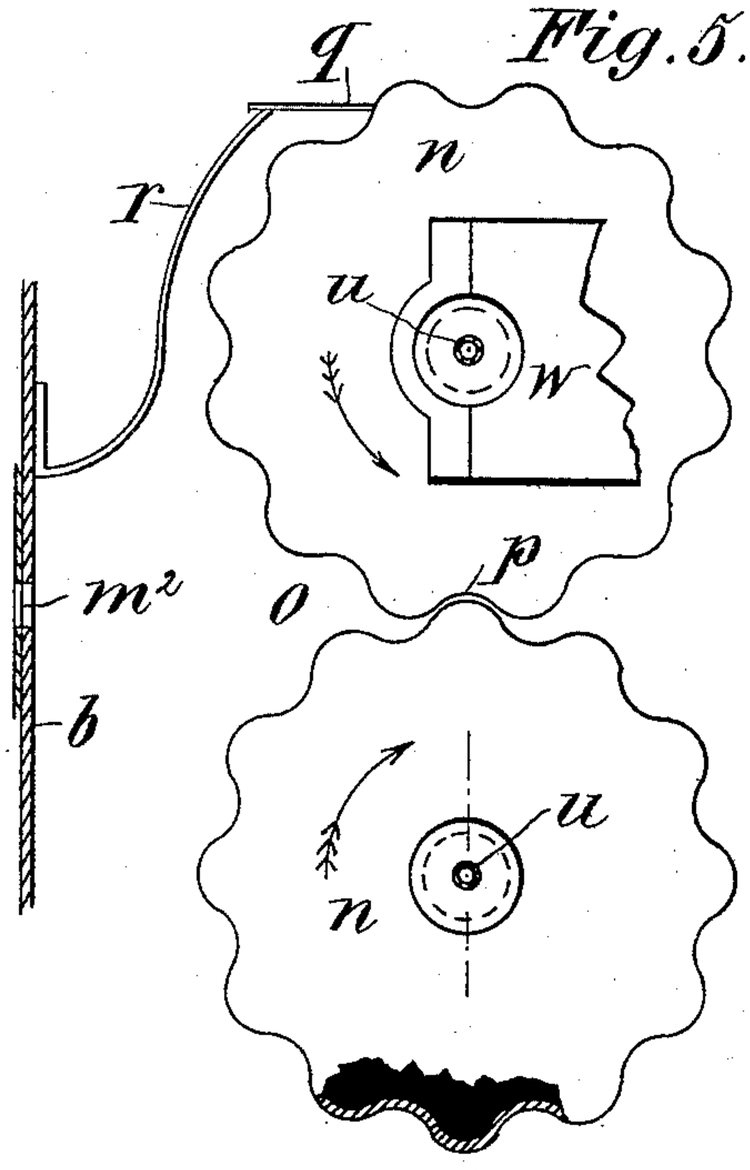
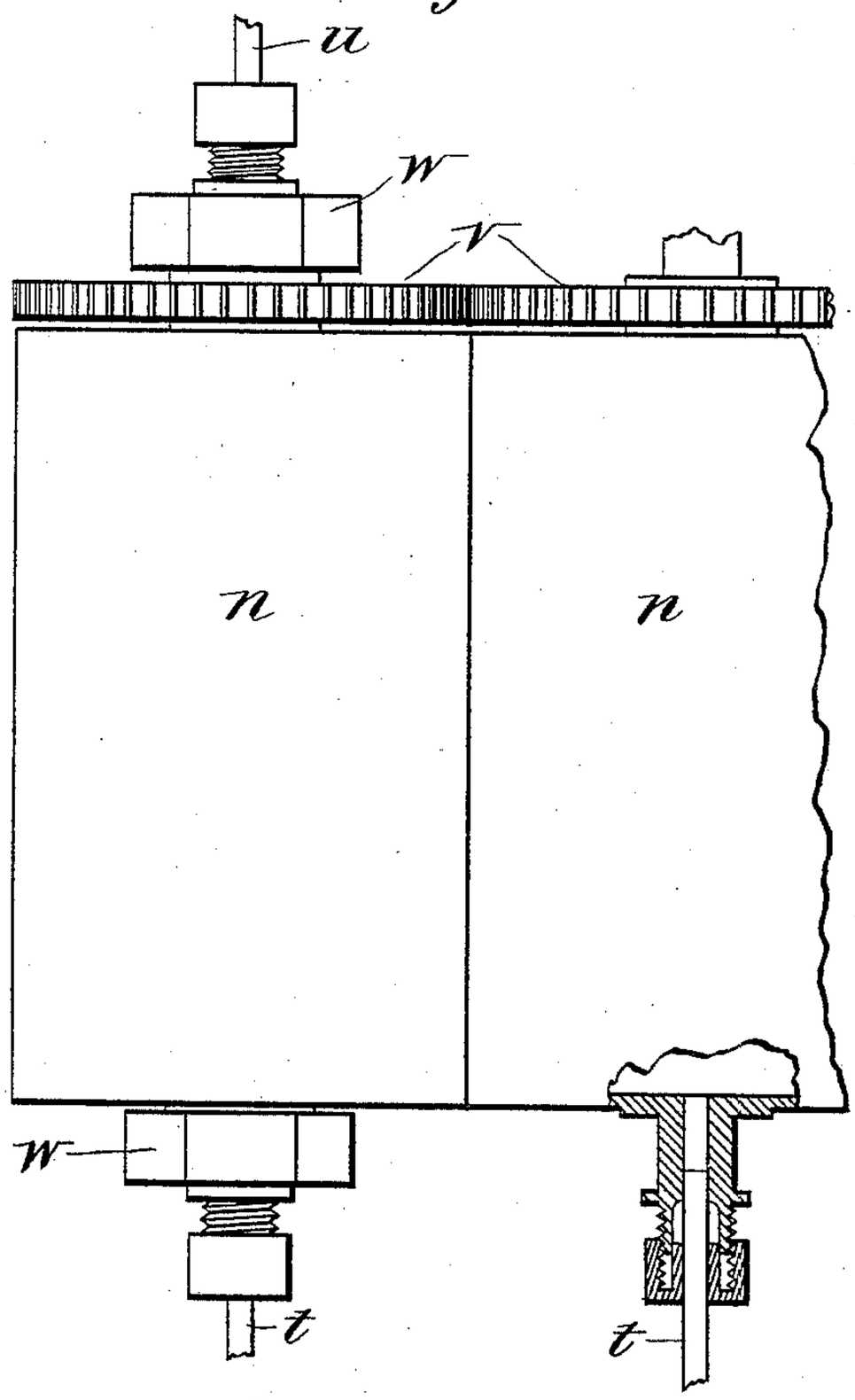


Fig. 4.



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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL.

No. 390,545. Patented Oct. 2, 1888.

Fig. 8.

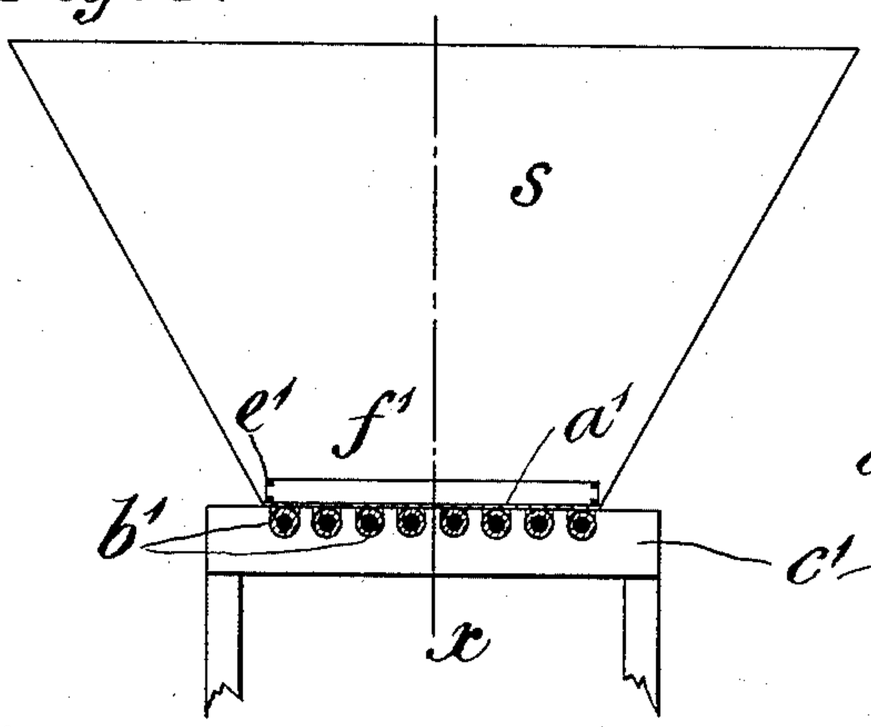


Fig. 9.

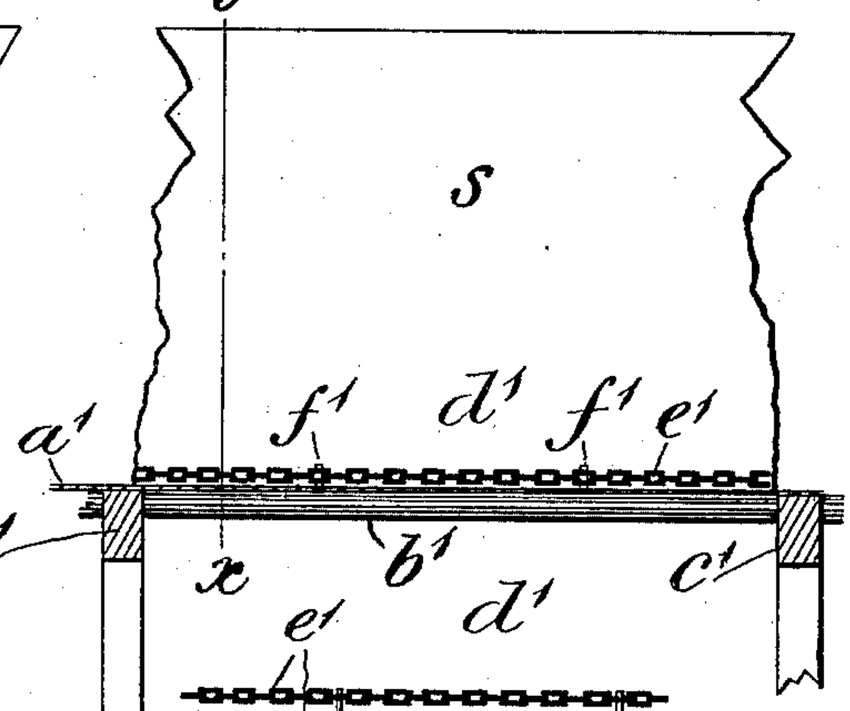


Fig. 13.

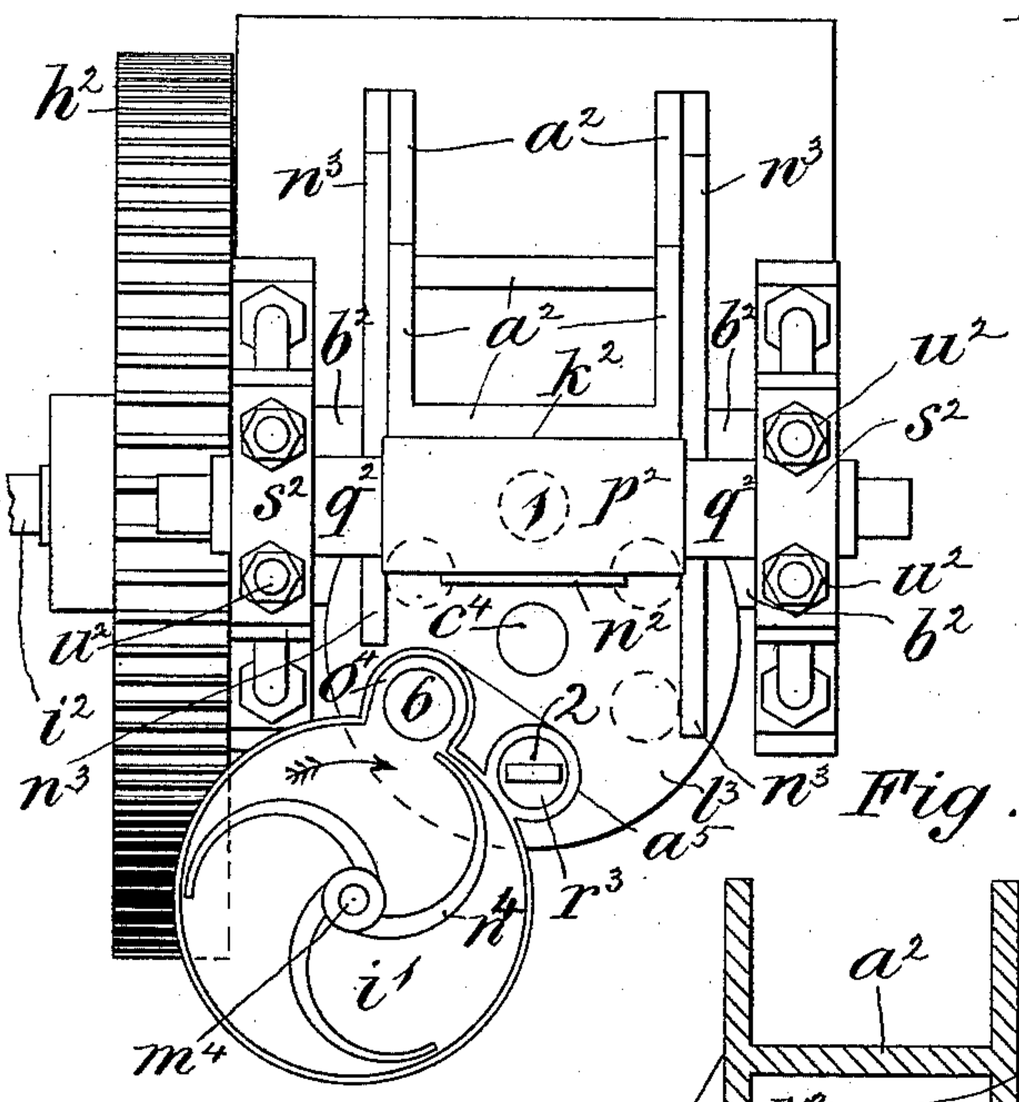


Fig. 10.

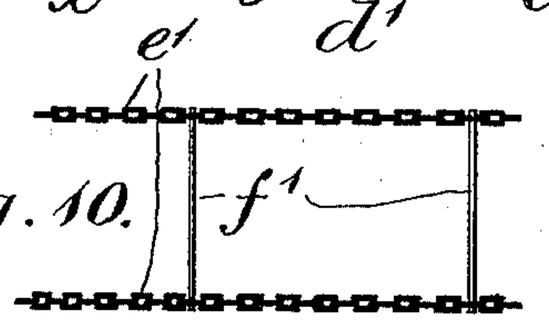


Fig. 15.

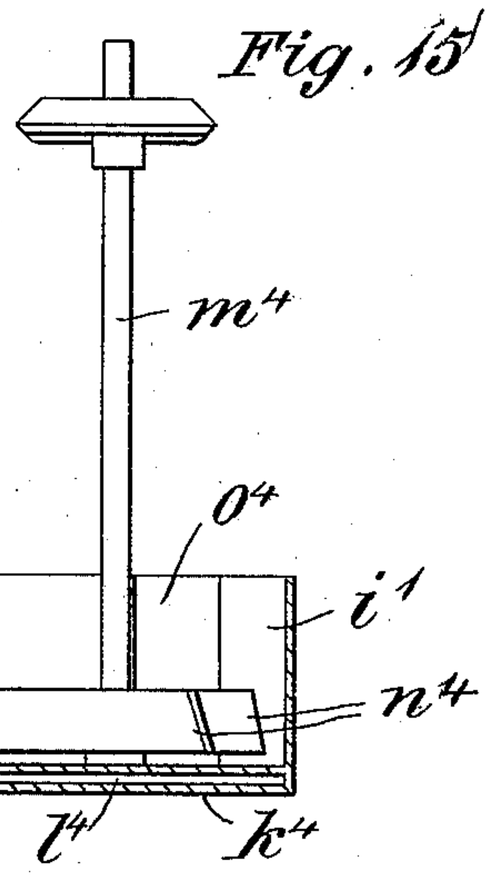
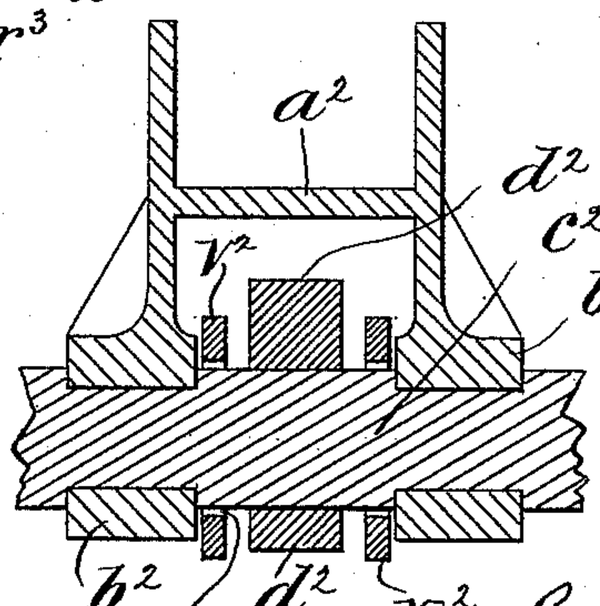


Fig. 14.



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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL

No. 390,545. Patented Oct. 2, 1888.

Fig. 11.

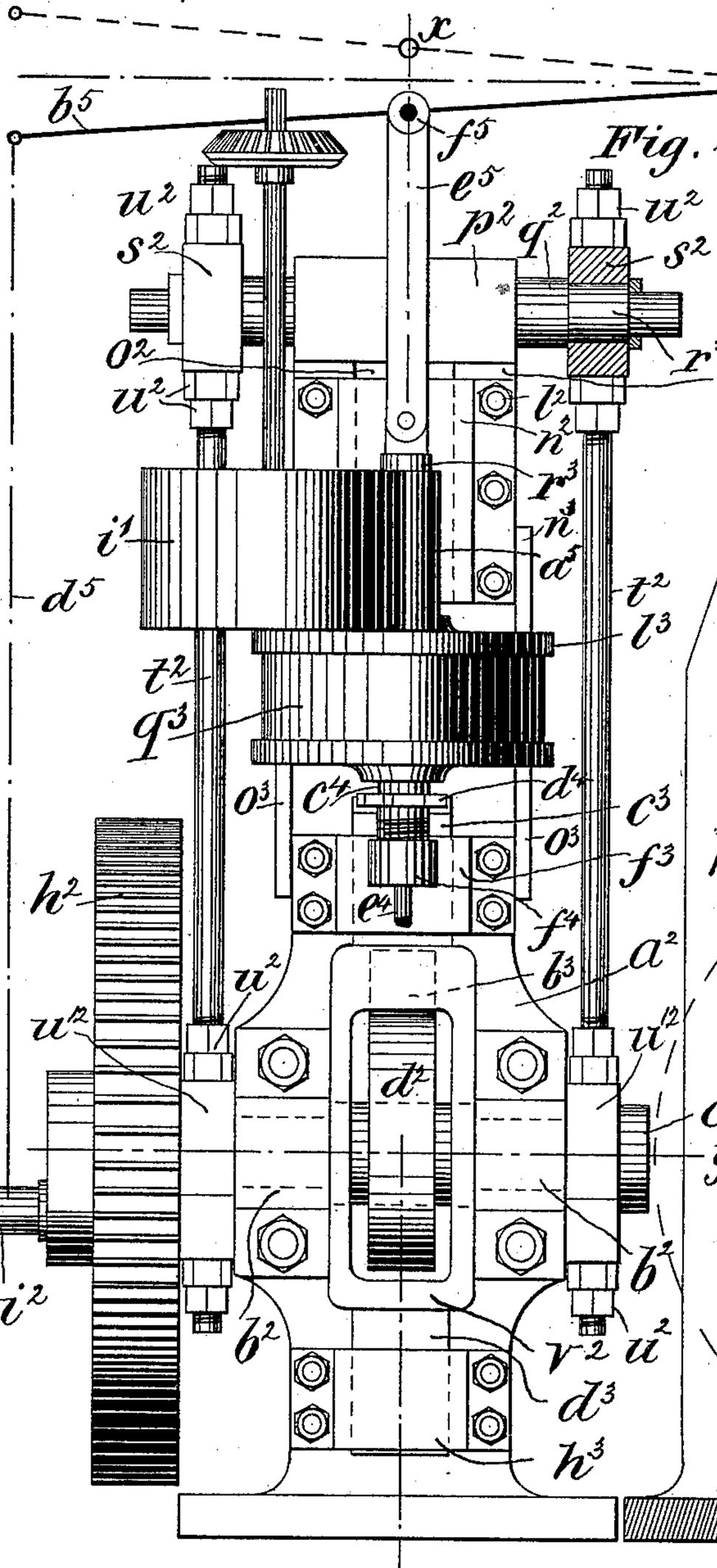
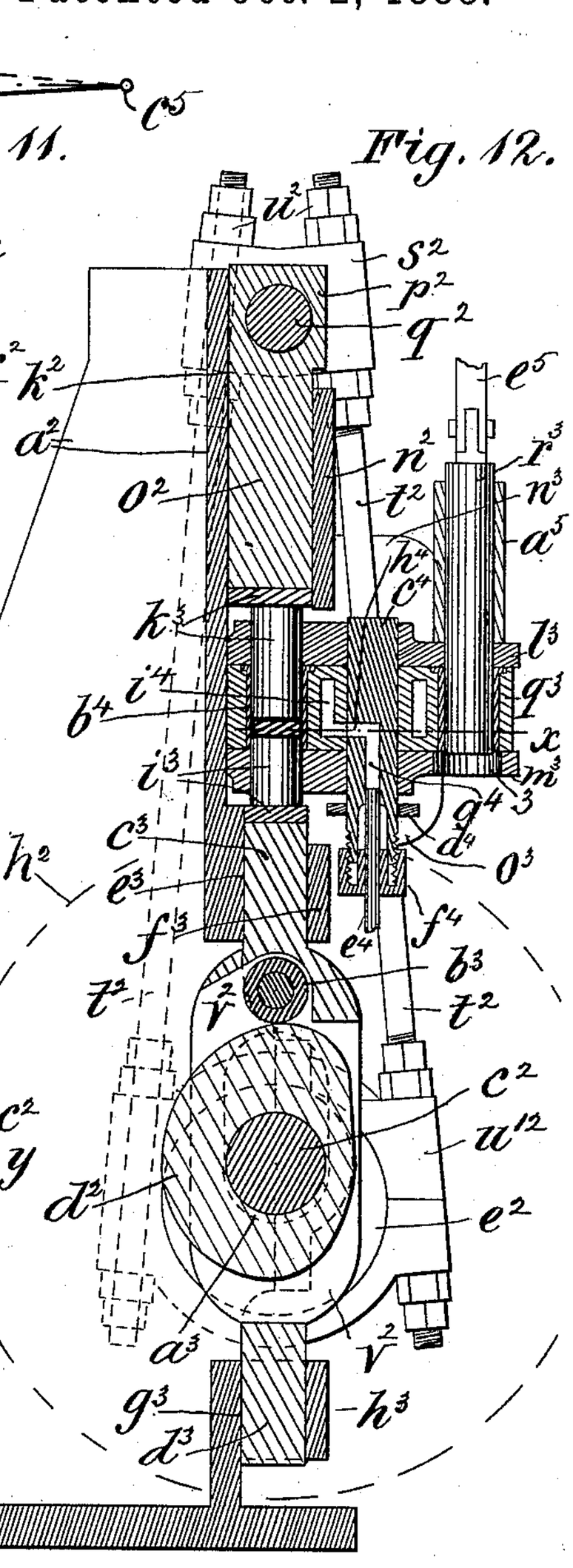


Fig. 12.



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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL.

No. 390,545. Patented Oct. 2, 1888.

Fig. 16.

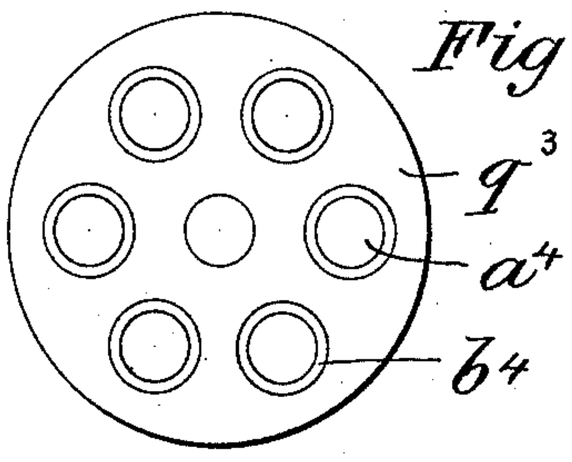


Fig. 17.

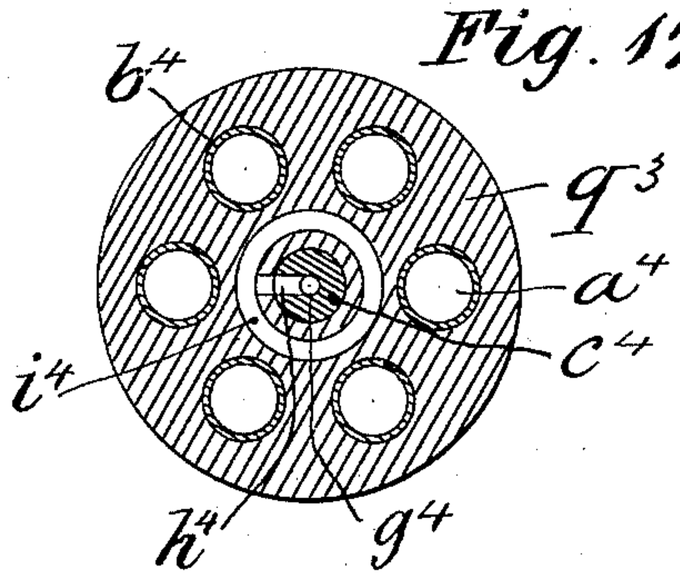


Fig. 18.

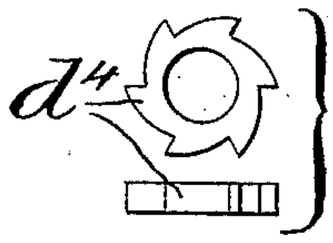


Fig. 19.

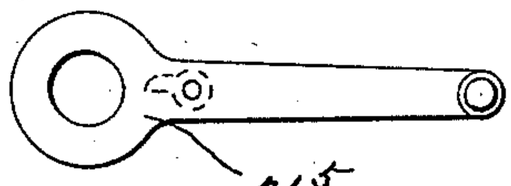


Fig. 20.

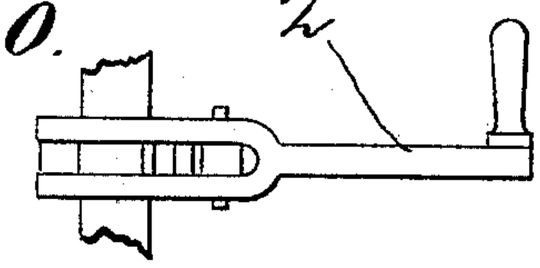
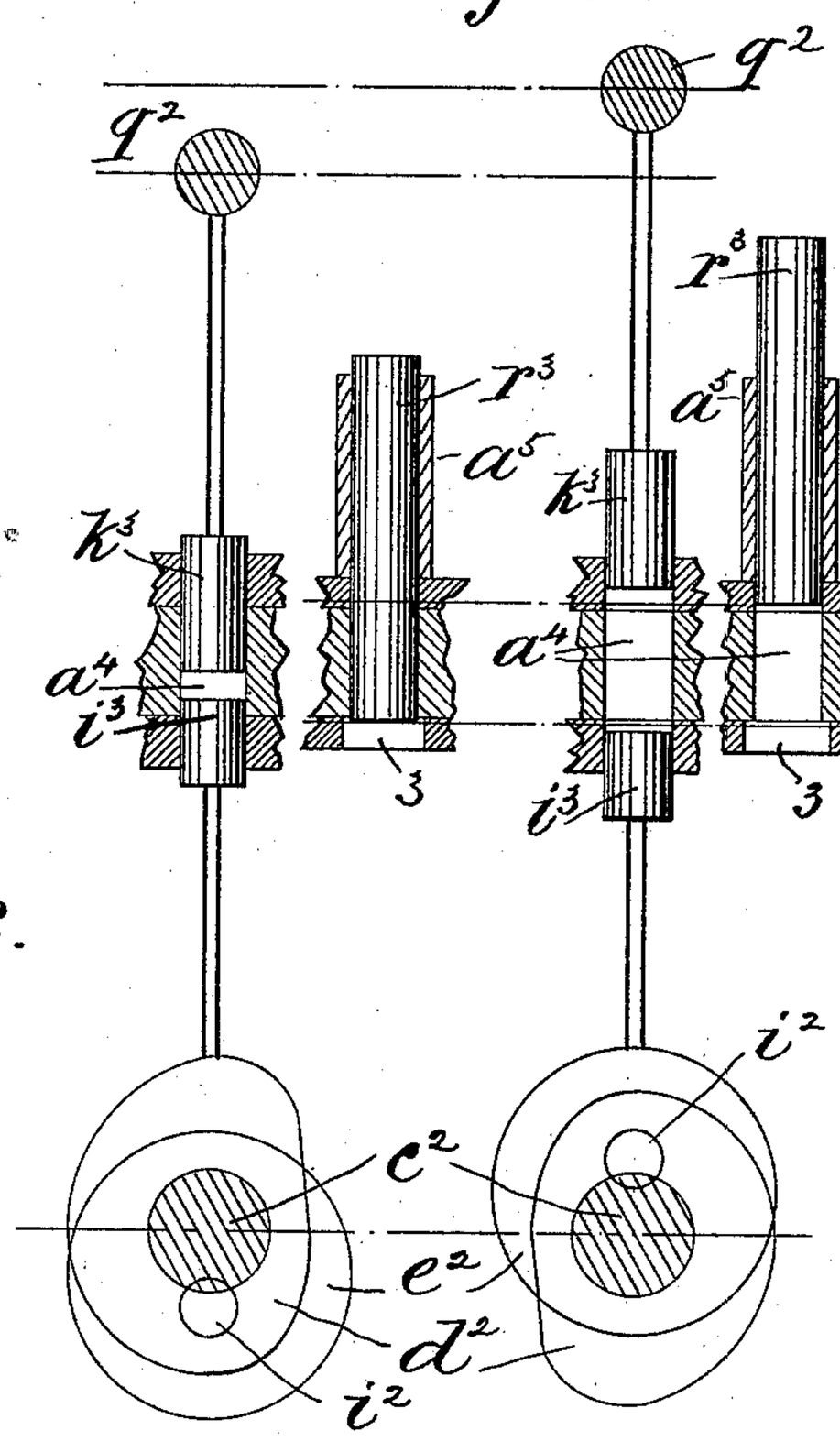


Fig. 21.



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APPARATUS FOR THE MANUFACTURE OF PEAT FUEL

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Fig. 5a

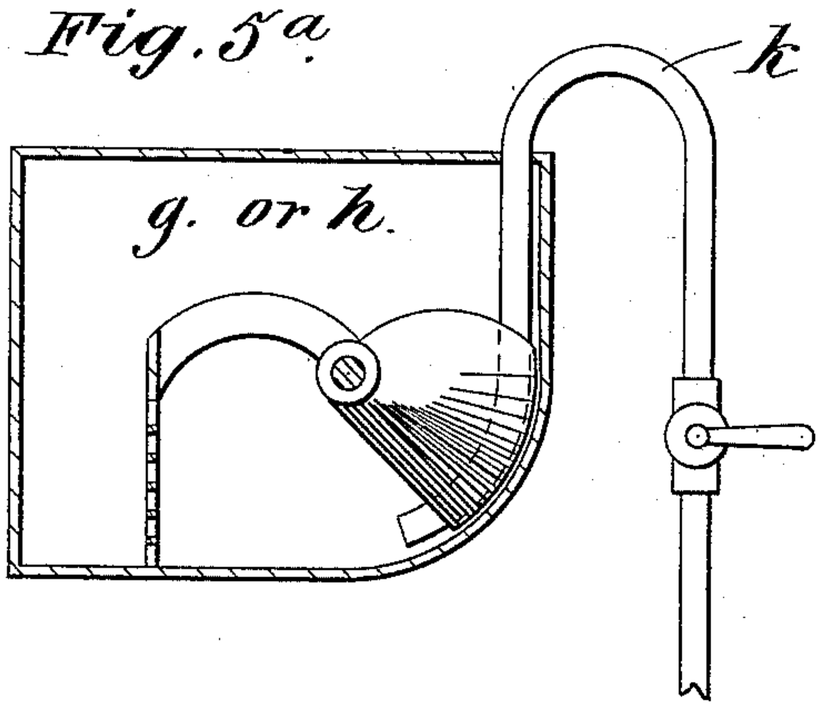


Fig. 23.

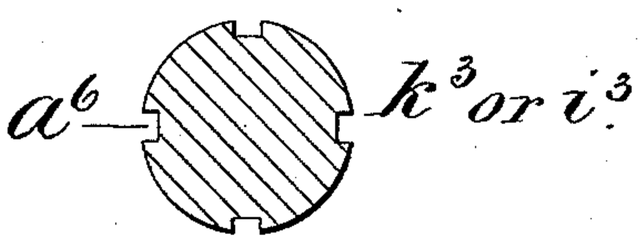


Fig. 22.

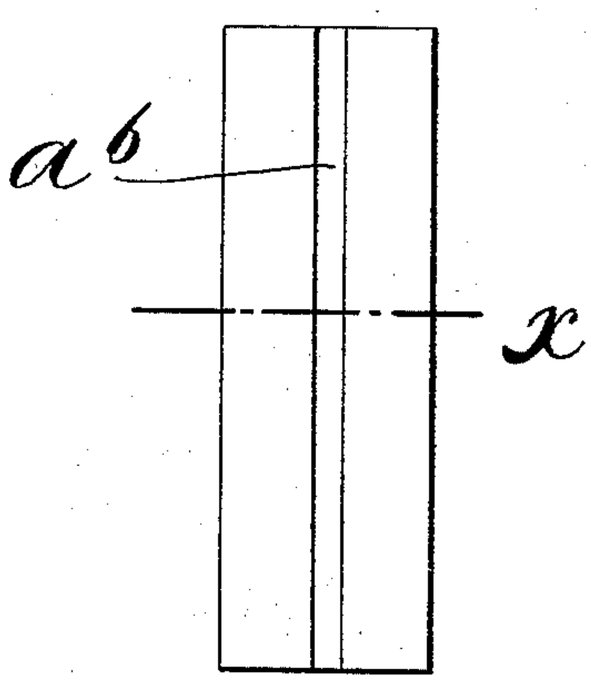
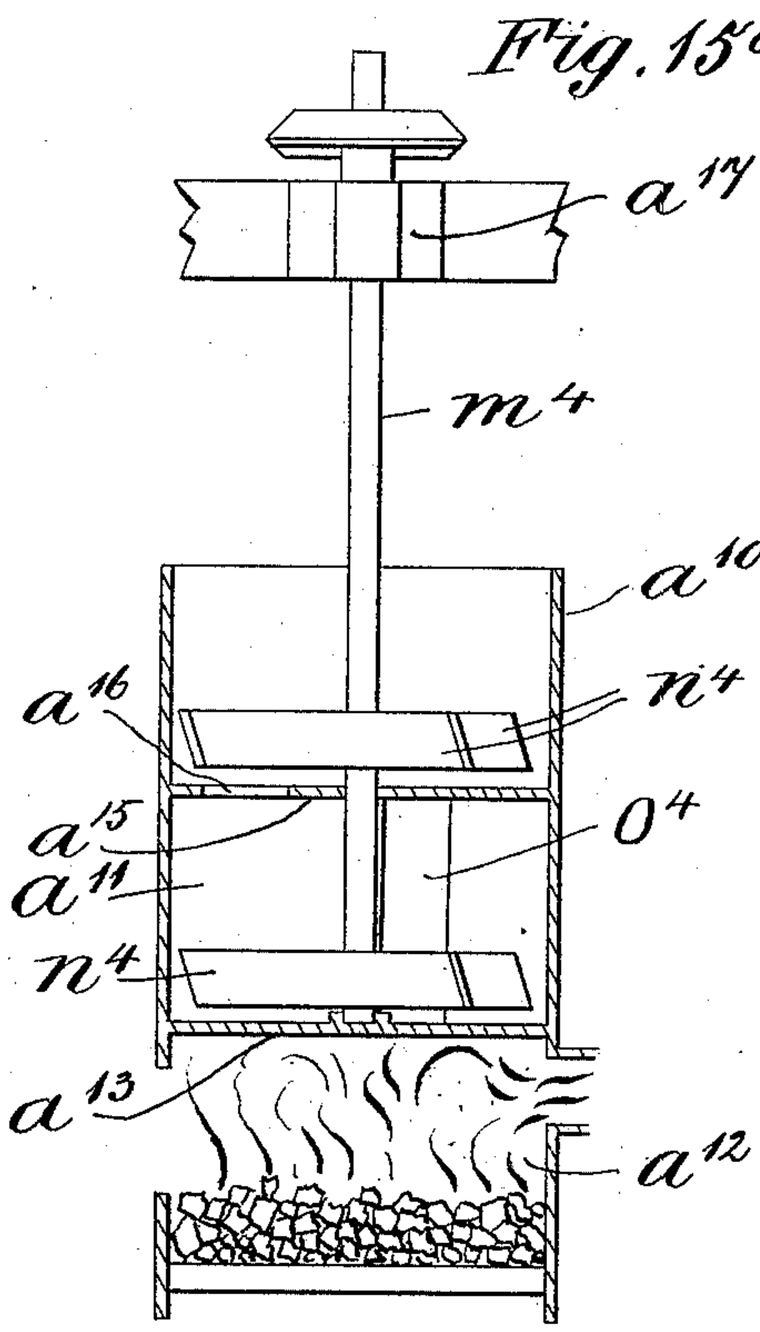


Fig. 15a



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Inventor.
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UNITED STATES PATENT OFFICE.

DAVID AIKMAN, OF MONTREAL, QUEBEC, CANADA.

APPARATUS FOR THE MANUFACTURE OF PEAT FUEL.

SPECIFICATION forming part of Letters Patent No. 390,545, dated October 2, 1888.

Application filed July 9, 1887. Serial No. 243,888. (No model.)

To all whom it may concern:

Be it known that I, DAVID AIKMAN, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented new and useful Improvements in the Machine for Manufacturing Peat Fuel and in the Mechanism Used Therefor; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to a particular construction of mechanism adapted for producing peat fuel, which is arranged not only on a scow, which can be moved about over the peat-bog and thus cut the peat and deliver it on board the scow, but also so that the peat so cut and delivered on board of the scow is passed by the apparatus from one part of the mechanism to the other without any manual labor until it is discharged from the mechanism in a state ready for the market. This is looked upon as an important feature of the invention, because of the large amount of manipulation required to be given the peat to render it a suitable or a desirable fuel in the market, and the low price at which it is necessary to vend it to render it an economical fuel, so that it cannot be manufactured with profit if much manual labor is required.

The particular construction or combination of mechanism or parts in the apparatus about to be described which form my present invention will be hereinafter fully set forth and claimed.

In the drawings hereunto annexed similar letters of reference and numerals indicate like parts.

Figure 1 is a diagram, partly in section and partly in elevation, showing the general arrangement in elevation of an apparatus or mechanism embodying the mechanical part of my invention, the sectional part being taken at line *x*, Fig. 2, or as if the side of the scow *a* were removed. Fig. 2 is a plan of the scow *a* shown in Fig. 1 and part of the apparatus thereon. Fig. 3 is a transverse section of the scow shown in Figs. 1 and 2, taken on line *x*, Fig. 1. Fig. 4 is a plan of the rollers *n n*. Fig. 5 is an end elevation of the rollers shown in Fig. 4. Fig. 5^a is a cross section of the stick-catcher spout *g*, with steam-pipe arranged to discharge live steam into the peat. Fig. 6 is a transverse section of the spout *i*, taken on line *x*, Fig. 1, or at line *x*, Fig. 7, showing also an end elevation of a portion of the conveyer or screw *m'*. Fig. 7 is a longitudinal section of the spout shown in Fig. 6 as taken at line *x*, Fig. 6, and side elevation of the conveyer. Fig. 8 is a transverse section of the hopper *s*, also showing a side elevation of the conveyer therein, the sectional part being taken at the position of line *x* in Fig. 9. Fig. 9 is a longitudinal part-sectional and part-elevational view of the parts shown in Fig. 8, the section being taken at line *x*, Fig. 8. Fig. 10 is a plan of the conveyer shown in Fig. 9. Fig. 11 is a front elevation of press *k'*. Fig. 12 is a central vertical section of the press shown in Fig. 11, taken at the position of line *x x* thereon. Fig. 13 is a plan of the press shown in Fig. 11. Fig. 14 is a section of the shaft c^2, frame a^2, cam d^2, and frame v^2, taken at line *y*, Fig. 11. Fig. 15 is a detail of the receiver detached. Fig. 15^a is a modification of the receiver detached. Fig. 16 is a plan of the revolving cylinder or table q^3 of the press detached. Fig. 17 is a section of the revolving cylinder or table q^3, taken at line *x*, Fig. 12. Fig. 18 is a plan and side elevation of the ratchet-wheel d^4 detached. Fig. 19 is a plan, and Fig. 20 is a side elevation, of the ratchet-lever by which the ratchet-wheel d^4 is operated. Fig. 21 is a double diagram comparing the positions of the plungers i^3, k^3, and r^3 at different positions as the shaft c^2 revolves. Fig. 22 is a side elevation of a portion of the plungers k^3 and i^3, showing grooves a^6 therein. Fig. 23 is a section on line *x*, Fig. 22.

Letter *a* is a scow of suitable dimensions for carrying the apparatus or mechanism hereinafter described. This is provided with an upper deck, *b*. The front end of the scow is provided with excavating-screws *c* and an elevator, *d*. *e* is a steam-engine arranged with an ordinary system of shafting (not shown) to operate the excavating-screws *c*, elevator *d*, and other moving mechanisms, to be hereinafter described, by gear-wheels or pulleys and belts in an ordinary manner. The said elevator conveys the material excavated by the screws *c* and delivers it into a hopper, *f*. The whole of this is constructed and arranged substantially the same or in a similar manner to what is described in patents granted to James

Hodges, as follows: Patent of the United States No. 53,985, granted April 10, A. D. 1866, and patent of the Province of Canada, No. 1,928, granted November 27, A. D. 1865. The raw peat received in the hopper *f* falls through it into the transverse troughs *g* and *h*, provided with what are called and known as "stick-catchers." These stick-catchers are fully described in the aforesaid patents granted to the said James Hodges, only that in this case they are arranged as right and left handed screws to convey the peat to the longitudinal distributing-spouts *i;* otherwise they would convey the peat to only one of the said spouts *i*.

In the troughs *g* and *h* steam-pipes *k* are situated for the purpose of discharging live steam into the peat as it passes through the troughs of the stick-catcher. This is one of the important features of my invention, as it reduces the amount of manipulation required to extract the sticks, &c.; it reduces the peat by the addition of water thereto; it also heats the peat, and the said heating of the peat reduces the amount of condensation of the steam in the rollers by which such pulp is afterward treated, as will be hereinafter described.

In the spouts *i* (see Figs. 6 and 7) conveyers are placed. These consist of a shaft, *l*, supported at intervals by bearers *m* and provided with screw blades or vanes *m'*, so that by turning the shaft and vanes in the proper direction the peat will be propelled in the spouts from the troughs *g* and *h* toward the aft end of the scow.

In the bottoms of each of the spouts *i* openings m^2 are formed (see Figs. 5 and 7) at suitable intervals to have one of the openings perpendicularly situated over each pair of rollers *n n*, located, as shown in Figs. 1 and 5, below the spouts *i*.

By Figs. 1 and 2 it will be understood that a number of the pairs of rollers *n n* are situated under each of the spouts *i*, the number of these pairs of rollers being according to the amount of work to be accomplished in a given time.

The rollers *n n* consist of hollow corrugated cylinders of equal diameter and size and number of corrugations, arranged together so that the elevations of the corrugations of the one roller will bear upon the depressions of the corrugations of the other roller. These rollers revolve in the directions as shown by the arrows in Fig. 5, and are set close up to each other, so that as the peat falls from the openings m^2 in a semi-liquid state it fills, partly, the space *o* between the two rollers *n n*, and, being taken or caught by the corrugations, is continuously fed between the rollers and adheres to the face of each roller in a thin film. As the rollers revolve, these films are carried round on their faces, and before they reach the scrapers *q* are dried by the heat of the rollers.

I would here explain that the rollers *n n* are not for the purpose of crushing or grinding the peat, for it has been hereinbefore stated that the peat is reduced to a pulp before it reaches the rollers; but they are for the purpose of drying the peat and reducing it also to a suitable form for being delivered to a press or presses, as hereinafter described. The employment of a means of thus drying the peat at this stage of the process and the means are both important features in the present invention, for, again, plain cylindrical rollers will not answer my purpose, for from actual practice I have found that they will either not work or if they do so they do it by "fits and starts," and as the peat falls continously from the openings m^2 the rollers are at times overflowed with peat, causing much manual labor and loss of time to get cleaned up and started again.

Each of the rollers *n* is provided with a scraper, *q*, which may consist of a plate of steel extending the length of the roller and situated in relation thereto as shown in Fig. 5. These scrapers are held in place by spring-arms *r*, which are sufficiently flexible and set with such tension that they yield to and follow the corrugations passing under their edges, while said edges are at all times kept to a fair bearing upon the rollers. By this means the dried films of peat are removed from the rollers and fall into an elongated hopper, *s*, thus cleaning the surface of the rollers as they revolve to receive continuously a film of pulped peat which has before been cleared of sticks and reduced to a pulp or homogeneous mass.

The scrapers *q* need not be formed in one plate if it is desired to form them in sections, each section being attached on one or more spring-arms, *r*.

The ordinary arrangements will be made, as shown, where, by a pipe, *t*, steam will be introduced into each roller *n*, and by a pipe, *u*, the steam and water of condensation will be carried off. Each pair of rollers is further provided with a pair of gear-wheels, *v*, to cause them to revolve equally and steadily with one another. This is arranged in an ordinary manner.

w are bearings for carrying the journals of the rollers. (See Fig. 4.) A suitable framework or support (not shown) will be formed in the scow for these bearings *w*.

The hoppers *s* are preferably formed throughout of sheet metal, and must at the top be sufficiently wide and long to receive the dry peat falling down from the rollers *n n*. Under the bottoms *a'* of the hoppers systems of heating-pipes *b'* are placed. These and the hoppers are carried by any suitable supports, *c'*, (see Figs. 8 and 9,) from the bottom of the scow. The sides of the hoppers *s* are placed at such an angle that the dried peat will not rest thereon, but will slide down freely to the bottoms *a'*.

Over the bottoms *a'* conveyers *d'* are caused to travel continuously. These consist each of two endless chains, *e'*, to which are secured transverse metallic slats *f'* at suitable intervals.

The conveyers *d'* are carried upon and op-

erated by revolving rollers g' g', (see Fig. 1,) situated beyond the ends of the hoppers, an opening being formed in each end of the hoppers for the chains e' and slats f' to pass in at the forward end and out at the aft end of the hoppers, the motion being in the direction of the arrow shown in Fig. 1, whereby the peat is brought toward the aft end of the scow, passes over the aft rollers, g', and falls off.

Were the height at which the peat falls off the roller g' sufficient it might fall at once into the receiver of a press, hereinafter to be described; but as, shown, it is not. Therefore an elevator, h', is interposed to discharge it into the receiver i' of a press or a number of presses, k'. When the elevator h' is used, it must be provided with a system of heater-pipes, l', to prevent the temperature to which the peat has been raised from being lowered at the said elevator, and thus delivered to the receiver i' not in a properly-heated condition. I should say that the heat at which the peat should be delivered to the receiver i' must not be less than about 120° Fahrenheit, and it would be better to be far above that point.

o' is a boiler of ordinary construction by which the steam for the engine e, steam-jets k, and rollers n, and systems of heater-pipes b' and l' is provided. Of this n' is the chimney, a sufficient space being left between the engine and boiler to form a proper stoke-hole.

We now come to the construction and arrangement of the receiver i' and press k', which are arranged for further heating the peat by pressing it to separate the natural tarry matter, as will be hereinafter described, and then pressing it into blocks or masses, or else carbonizing the peat and so pressing it. In either case the peat is discharged from the press ready for the market.

In constructing the press it must be remembered that before beginning this work the size and shape of the blocks or masses into which the peat is to be pressed must be determined and the construction made according thereto. The said construction and operation of the receiver i' and press k' are shown by Figs. 11 to 23, inclusively. Here a^2 is the frame of the press, in which are formed bearings b^2 for the journals of a revolving horizontal shaft, c^2, on which are secured a cam, d^2, two eccentrics, e^2, a gear-wheel, h^2, by which motion is imparted to the press, and a crank-bearing having a crank-pin, i^2. On the upper part of the frame a^2 a face, k^2, is formed, which is "trued up," and to it is attached, by bolts and nuts l^2, a cap, n^2, thus forming a guide to a neck, o^2. This neck is made integral with a cross-head, p^2, through which passes a shaft, q^2.

The shaft q^2 is provided with journals r^2, on which are placed blocks s^2. On the eccentrics e^2 are placed strong eccentric-straps u^{12}, which are united together and with the blocks s^2 by rods t^2 passed through suitable openings or eyes formed in the said eccentric-straps and through the blocks s^2 and secured with nuts u^2, as shown, whereby the distance that will be left between the plungers k^3 and i^3 may be easily adjusted, as will be understood by reference to Figs. 12 and 21.

v^2 is a frame having an opening, a^3, in it for the center portion of the shaft c^2 to pass through transversely, and the two sides of the frame being sufficiently apart (see Fig. 14) for the cam d^2 to revolve freely between them. In the frame v^2 is pivoted a roller, b^3, the periphery of which is arranged, as shown in Fig. 12, to roll upon the periphery of the cam d^2. The frame v^2 is also provided with an upper extending neck, c^3, and lower extending neck, d^3. The neck c^3 is guided by a face, e^3, formed on the frame a^2, and cap f^3, attached to the said face by bolts and nuts, as shown. Similarly the neck d^3 is guided by a face, g^3, and cap h^3, so that by the revolution of the cam d^2 the frame v^2 is moved up and down and is securely guided in such motion.

On the top of the neck c^3 is attached a plunger, i^3, of the configuration and size that the blocks or masses of peat are to be pressed into. In this case we will suppose it to be round or cylindrical. On the end of the neck o^2 is secured a plunger, k^3, of equal diameter to the plunger i^3. These two plungers i^3 and k^3 form the operative followers of the press.

To the frame a^2 are attached two disks, l^3 and m^3. These are horizontally situated, the disk l^3 being made integral with flanges n^3, and the disk m^3 being made integral with flanges o^3. These flanges extend backward over the sides of the frame a^2, to which they are securely attached.

The disks l^3 and m^3 must be "faced up" true and placed at a suitable distance apart to receive between them and fit closely upon a perfectly true and parallel cylinder or table, q^3.

The disk l^3 is provided with openings at 1 and 2, Fig. 13, for the plunger k^3 and plunger i^3, hereinafter described, to pass through. The disk m^3 is provided with an opening at 1 for the plunger i^3 to pass through, and with an opening, 3, situated immediately below 2, but is somewhat larger, as shown. The openings at 1 in these two disks closely fit their respective plungers, which they assist in guiding.

The table q^3 consists of a disk or cylinder formed with a number of cylindrical openings, a^4. As shown, these are six in number, (see Figs. 16 and 17;) but a greater or less number may be used. These openings must be equally distant from the center of the cylinder or table q^3 and equally distant from one another, being also equal in diameter to the plungers i^3 and k^3, being further situated to come immediately over and under the plungers, so that the plungers move and pass through the disks l^3 and m^3 and both pass into one of the openings a^4, and thereby form a mold in which to compress the peat. The openings a^4 are preferably provided with bushes b^4, of brass or non-corrosive metal, to prevent the openings a^4 from being eaten by rust.

c^4 is a vertical shaft passing through the disks l^3 m^3 and table q^3, the said shaft being

securely fastened in the said table, while the said shaft is fitted to revolve freely through the said disks. On the shaft c^4 is secured a ratchet-wheel, d^4. The lower end of the shaft c^4 is provided with a stuffing-box, f^4, to receive a steam-pipe, e^4. A passage, g^4, is formed in the shaft to the height as shown, (see Fig. 12,) and by a horizontal passage, h^4, connects with an annular chamber, i^4, formed in the cylinder or table q^3. This is for the purpose of introducing superheated steam into the said annular chamber and keeping it and the plungers hot.

As hereinbefore stated, i' is the receiver, situated, as shown in Figs. 11, 13, and 15, partly over the disk l^3. This receiver consists, as shown in said figures, of a cylindrical vessel provided with a double bottom, k^4, leaving a space, l^4, for the introduction of steam for heating.

On the bottom of the receiver i' is formed a "shoe" or bearing for the foot of the shaft m^4 to revolve in. This shaft is provided with arms n^4, of the configuration shown, so that by revolving the arms n^4, with the shaft m^4, in the direction of the arrow in Fig. 13 the peat placed in the receiver is forced downward upon the heated bottom of the receiver i' and outward into a projection, o^4, of the receiver i'. Here it falls through an opening, 6, formed in the bottom of the projection o^4, and through the disk l^3 into one of the openings a^4 in the cylinder or table q^3, one of which will be always set to receive it, while another of the openings a^4, at 1, is having the charge of peat contained in it pressed, the revolution of the table being in the direction of from 6 to 1.

When it is desired to carry the heating of the peat to such an extent that it will be carbonized or reduced to a charcoal, the receiver i, instead of being formed as hereinbefore described and as shown in Figs. 11 and 15, will be constructed as shown in Fig. 15^a, where a^{10} represents a cylindrical vessel, into which the peat falls from the elevator h', as before. Under this vessel a^{10} is arranged a second vessel, a^{11}, and in this case the projection o^4 for the passage of the peat into the table q^3 is formed in connection with the vessel a^{11}. Under the bottom a^{13} of the vessel a^{11} a chamber, a^{12}, is formed, suitable either for the application of fire direct to the bottom a^{13} or for the application of very highly superheated steam. In this modification the shaft m^4 will pass through both the vessels or chambers a^{10} and a^{11} and be provided with arms n^4 at about the bottom of each of them, as shown. In the bottom a^{15} an opening, a^{16}, is formed. By this arrangement the free circulation of air in the vessel or chamber a^{11} is prevented by the peat at the bottom of the vessel or chamber a^{10} and its falling through the opening a^{16}. The shaft m^4 is in this case carried by any suitable bearing, a^{17}, formed above, as shown.

On the lower end of the shaft c^4, and arranged to revolve it by, as before stated, a ratchet-wheel, d^4, is secured. This is operated in an ordinary way by a lever and pawl, z^5, (shown only detached in Figs. 19 and 20;) but I prefer to have the teeth of the wheel d^4 made equal in size to each other and in number to agree with the number of the openings a^4 in the cylinder or table q^3, so that by providing an ordinary stop for the action of the lever the wheel d^4 may always bring one of the openings a^4 to agree at 1, 2, and 6 with the openings in the disk l^3. The said lever and pawl z^5 may be operated by hand or power, as desired, this forming no part of my present invention.

a^5 is a guide situated over the opening 2 in the disk l^3 for guiding the plunger r^3. This guide is preferably made integral with the wall of the receiver i'.

b^5 is a lever pivoted at c^5 to any fixed body attached under the deck b of the scow. At its opposite extremity is attached a connecting-rod, d^5, of ordinary construction, connecting with the crank-pin i^2, which thus causes the lever b^5 to vibrate in the manner indicated and impart through a link, e^5, the required amount of motion to the plunger r^3.

The parts of the press being in the position shown in Figs. 11 and 12, and the peat from the hopper s introduced into the receiver i', where its heat is very considerably augmented, one of the openings a^4 of the cylinder or table q^3 is charged with the heated peat by the rotation of the shaft m^4 and arms n^4. These arms also break up and thoroughly mix the peat. As soon as the first hole is full, the table q^3 is turned and the next opening a^4 brought to the position 6 and filled, and the table q^3 is again rotated. The plungers k^3, i^3, and r^3 must now be put in motion, and when the third opening a^4 is being filled the first one filled will have been moved to the position 1, Fig. 13, where the charge of peat in it will be pressed by the plungers k^3 and i^3, and as the table q^3 rotates and brings the compressed charges of peat round to the position 2 they are expelled by the plunger r^3.

A double diagram of the action of the plungers k^3, i^3, and r^3 is given in Fig. 21. In the left-hand side of this figure the parts are in the same position as that shown in Figs. 11 and 12, in which position the said plungers k^3 and i^3 have just pressed a charge and the plunger r^3 has just expelled a charge. If the shaft c^2 is rotated one-half of a revolution, it will cause the said three plungers to come to the positions shown in the right-hand part of Fig. 21, at which time the cylinder or table q^3 is rotated, as hereinabove described.

In Figs. 22 and 23 it is shown (but not elsewhere) that the plungers k^3 and i^3 are provided with longitudinal peripheral grooves a^6. These are an important feature in my invention, as without them, although the plungers are made smaller than the recesses a^4, yet the air in the peat will not escape, but will be locked in, and when the pressure is withdrawn it will expand and the solidity of the mass be destroyed.

The peat treated as above described is pro-

duced in the form of very hard blocks of specific gravity approaching that of coal at a very slight expense, as no manual labor is required in handling it until it is expelled from the press, and by having the mechanism situated on a scow the whole apparatus is able to follow up its own work by moving it about in the canals cut by it.

What I claim, and wish to secure by Letters Patent, is as follows:

1. The combination, in a peat-fuel-manufacturing apparatus, of the troughs *g* and *h*, in which the peat is received, having stick-removing apparatus, as described, and pipes *k*, arranged, as shown, to admit jets of live steam at the bottom of the troughs *g* and *h*, spouts *i*, having conveyers *m'* and openings m^2, hollow corrugated steam-heated rollers *n n*, having pipes *u* and *t*, upon which the semi-fluid peat is received, spread out, and dried in the form of thin films, and scrapers *q*, the whole substantially as described.

2. The combination, in a press for pressing hot peat into blocks for fuel, of the revolving table or cylinder q^3, provided with a recess, i^4, for heating it by steam, as described, with the operating-plungers k^3 and i^3, operated as described, and provided with grooves a^6, as described, whereby the said openings a^4 and said plungers form a heated mold having passages for the escape of the air contained in the peat that is being pressed within the said mold, the whole substantially as described.

3. The combination, in a press for pressing peat into blocks for fuel, of the revolving table or cylinder q^3, provided with a recess, i^4, for heating it by steam, as described, also having opening a^4, as described, with the operating-plungers k^3 and i^3, operated as described, whereby the said openings a^4 and said plungers form a mold in which the peat is pressed into the desired blocks or masses, the whole substantially as described.

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