

E. BARTHOLOMEW.
 COMPRESSING AND LIQUID EXTRACTING MACHINE.
 APPLICATION FILED NOV. 28, 1911.

1,071,020.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 1.

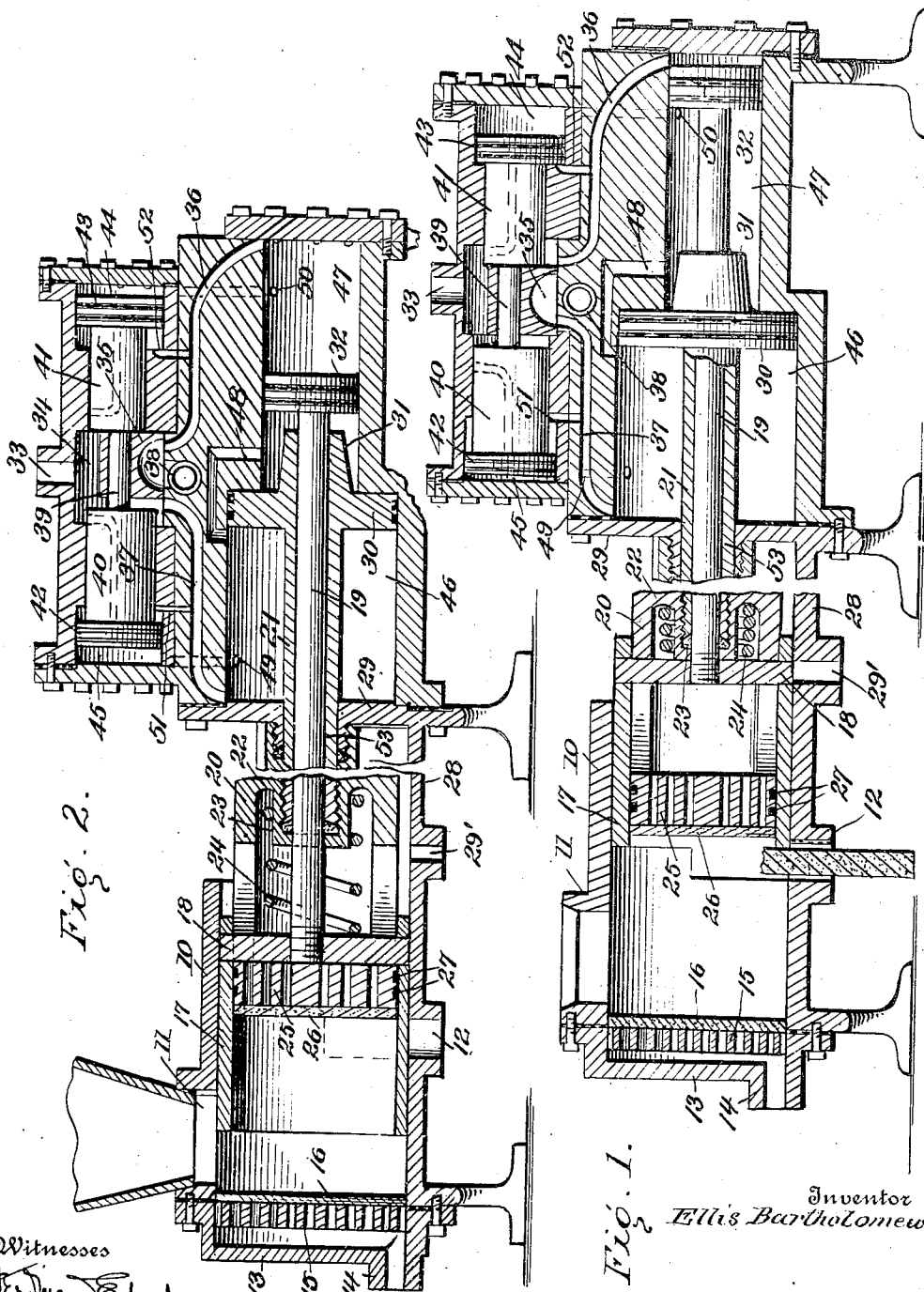


Fig. 2.

Fig. 1.

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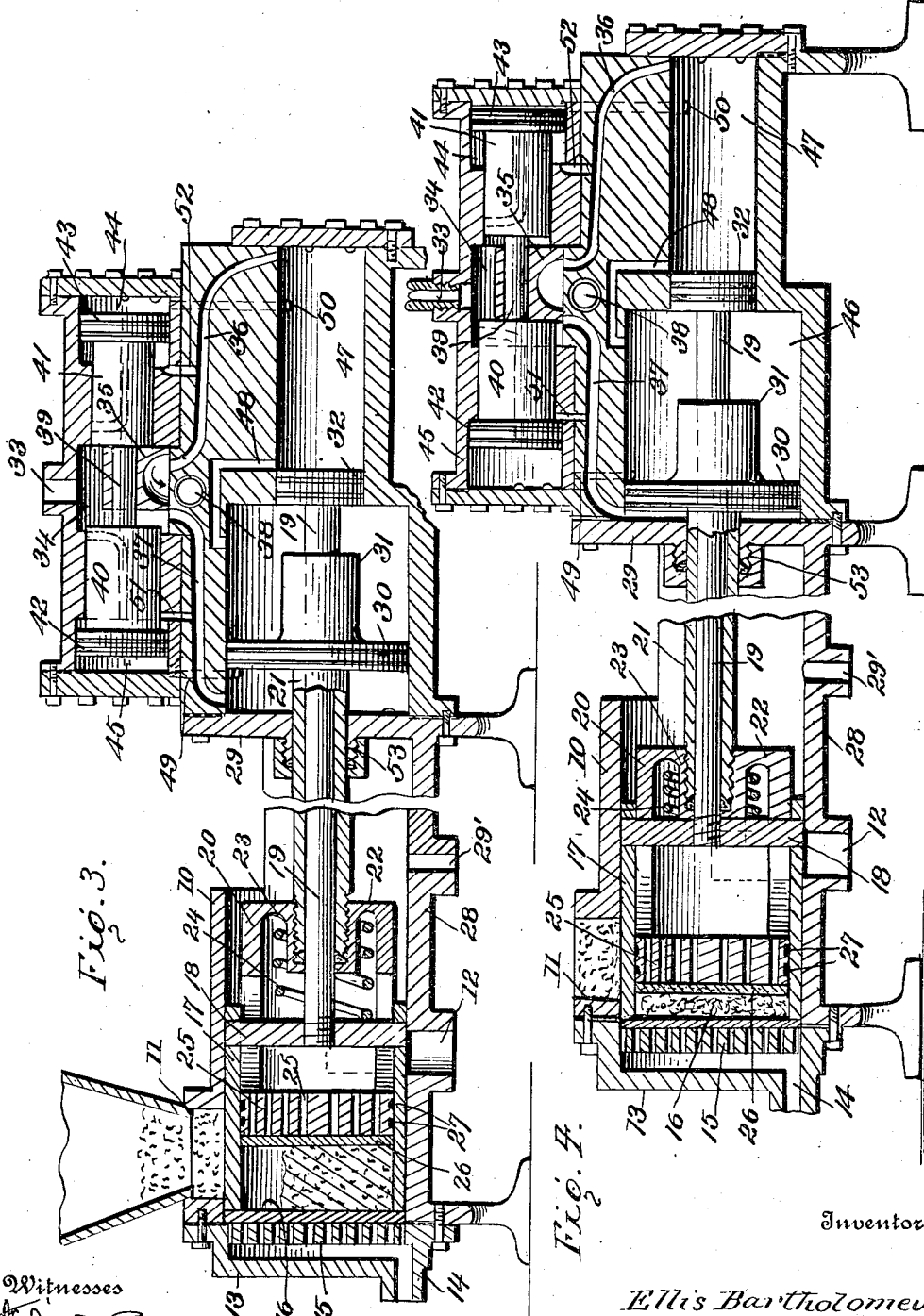
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Fig. 7.

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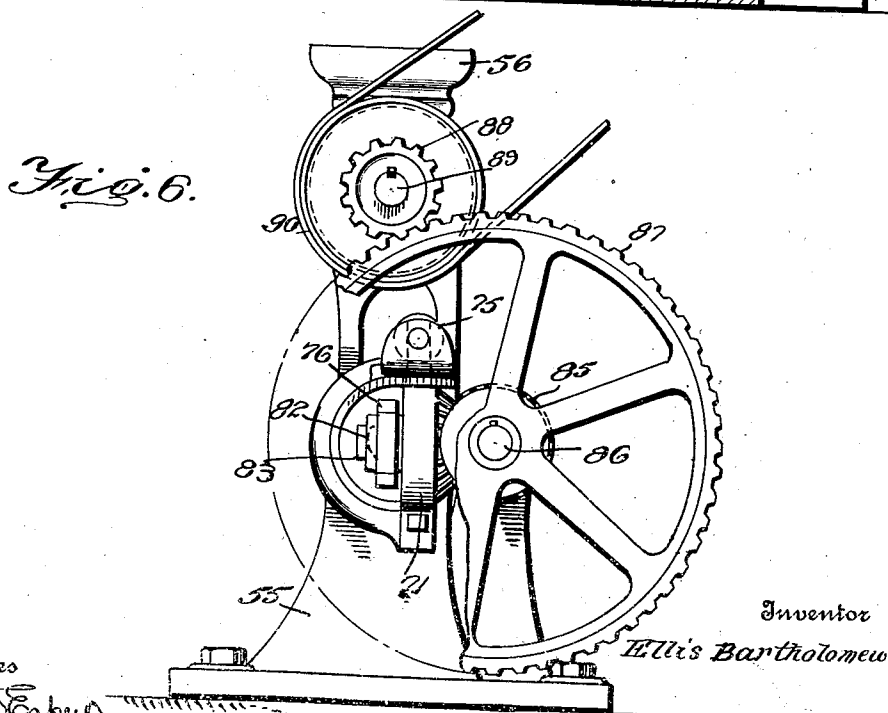
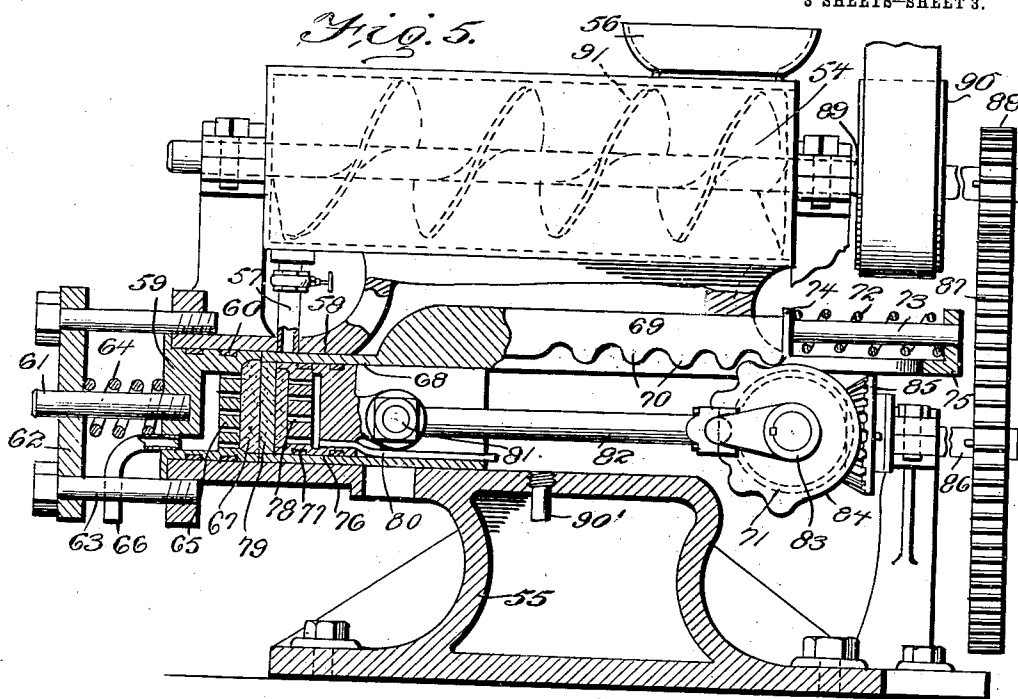
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3 SHEETS-SHEET 3.



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ELLIS BARTHOLOMEW, OF TOLEDO, OHIO.

COMPRESSING AND LIQUID-EXTRACTING MACHINE.

1,071,020.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ELLIS BARTHOLOMEW, citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Compressing and Liquid-Extracting Machines, of which the following is a specification.

This invention relates to compressors and refers particularly to a machine which is adapted for the compression of peat or other substances from which liquid is adapted to be extracted during the compression of the same.

The invention has for an object the provision of a machine of this character which is of such a construction that any substance from which liquid is to be extracted may be placed in the machine for compression, as for instance flax seed when it is desired to extract the oil therefrom or to extract the moisture from peat while being compressed.

The invention has for another object the provision of a machine wherein fabric is employed for extracting the liquid from the compressed material, the fabric being wool, cotton, linen, silk, wire cloth or canvas which are found to be especially applicable to such extraction, although any fabric desired may be employed.

The invention still further contemplates the construction of a machine of this description which comprises but few operative parts and one in which the parts will so co-act as to produce an efficient means for compressing the material placed therein and also for extracting the fluid therefrom during the compression process.

For a full understanding of the invention reference is to be had to the following description and accompanying drawings, in which:—

Figure 1 is a longitudinal vertical section through the machine disclosing the same in an open position ready for the reception of material to be compressed. Fig. 2 is a view of the same disclosing the same in a half completed operation. Fig. 3 is a longitudinal vertical section of the machine disclosing the same in the act of compressing the material placed therein. Fig. 4 is a view of the same positioning the operative parts in position when material is compressed. Fig. 5 is a longitudinal vertical section of a modified form of the machine, and Fig. 6 is an end elevation of the same.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In the drawings, which disclose the form of machine which embodies the principles of the invention, the numeral 10 designates a cylinder which is provided in its upper side with an opening 11 through which the mass to be compressed is introduced and which is provided with an exit port 12 through which the material is to be passed after compression. The cylinder 10 is provided with a head 13 which is apertured as at 14 for the purpose of forming a communication to the interior of the cylinder 10 adjacent the head 13. Spaced inwardly from the head 13, is a foraminous diaphragm 15 which is disposed in parallel relation with the head 13 and which is provided upon its inner face with a thickness of fabric 16 which is extended over the perforations through the diaphragm 15.

Slidably and snugly engaged within the cylinder 10, is a sleeve 17 which is adapted for engagement against the outer face of the portion of fabric 16 about the edge thereof and which is provided with a diametrically disposed arm 18 which is supported upon the forward extremity of a piston rod 19. The sleeve 17 is employed for the purpose of regulating the passage of the material through the inlet and exhaust openings 11 and 12, and is also used as a former to receive and to shape the material when under compression. The sleeve 17 is fixed upon a hollow piston 20 which is slidably disposed therein and which is secured to the forward extremity of a hollow piston rod 21 which is slidably disposed about the piston rod 19. The hollow piston 20 is provided in its opposite sides with longitudinal slots through which the arm 18 extends to permit reciprocatory motion of the hollow piston 20 within the sleeve 17 independently of the sleeve. The hollow piston 20 is provided with an inwardly and annularly formed head 22 against which is positioned a stuffing box 23 for the purpose of providing a fluid-tight connection between the two pistons 19 and 21 and preventing the access of air or steam between the same. The stuffing box 23 is of circular formation and cooperates with the head 22 to form a rest for the reception of a coiled spring 24 which is disposed thereabout and

which is engaged at its opposite extremities against the inner end of the hollow piston 20 and the edge of the arm 18 respectively. The forward end of the piston is provided with a perforated head 25 which carries a thickness of fabric 26 against the outer face thereof to close the outer ends of the perforations within the head 25 and for the purpose of engaging against material positioned in the cylinder 10 to be compressed. The piston head 25 is further provided with packing rings 27 longitudinally disposed in the periphery thereof for engagement against the inner wall of the sleeve 17 to prevent the passing of liquid therefrom as the same is extracted from the material under compression. The cylinder 10 is provided with a rear extension 28 which is provided with an outlet 29 through which the liquid is adapted to be drawn when the same passes from the hollow piston 20. The extension 28 terminates in a body 29 which constitutes the head of a cylinder in which a large piston 30 reciprocates, said piston being rigid with the rear extremity of the hollow piston rod 21 and adapted to impart motion to the same. A sleeve 31 is rearwardly extended from the piston 30 and is considerably reduced therefrom for the purpose of encircling the rear extremity of the piston rod 19 which extends therethrough rearwardly from the sleeve 31. The piston rod 19 is engaged at its rear extremity with a smaller piston 32 which reciprocates in a smaller cylinder axially aligned with the cylinder containing the piston 30.

The means preferably employed for actuating the pistons 30 and 32 independently of each other comprises a novel valve mechanism which is constructed as follows:—An intake port 33 is provided in the steam chest 34 which is arranged above the cylinders containing the pistons 30 and 32 and in which is slidably mounted a D-valve 35 for the purpose of connecting the channels 36 and 37 alternately with the exhaust port 38. The D-valve 35 is mounted upon a valve rod 39, which is slidably disposed longitudinally therethrough and which is enlarged at its opposite ends as at 40 and 41 for the purpose of abutting the ends of the D-valve 35 and actuating the same. The enlargements 40 and 41 are slidably disposed in chambered portions formed in the opposite ends of the steam chest 34 and are provided with valve heads 42 and 43 which reciprocate within enlarged channel portions 44 and 45 at or adjacent the ends of the steam chest 34. The channels 36 and 37 which extend from the chest 34 are extended downwardly and outwardly and terminating within the outer ends of the cylinders 46 and 47 within which the pistons 30 and 32 operate respectively. The cylinders 46 and 47 communicate with one another by means of a

passage 48 whereby steam may be carried between the cylinders. The cylinders 46 and 47 communicate with the enlarged portions 44 and 45 of the steam chest by means of channels 49 and 50 which extend from points within the respective cylinders spaced from the outer ends thereof the width of the pistons 30 and 32 disposed therein. Bypasses 51 and 52 are formed within the wall of the cylinders between the channels 36 and 37 and the inner ends of the enlarged portions 44 and 45 of the steam chest. A stuffing box 53 is provided on the body 29 within the extension 28 to prevent the escape of steam from about the piston rods 19 and 21.

In the drawings is disclosed a modification of the means for operating the machine as by a belt. This adaptation of the machine necessitates the following construction:—A receptacle 54 is mounted upon a base 55 and is provided with a hopper 56 into which the material to be compressed is placed. A pipe 57 is extended downwardly from one end of the receptacle 54 into a cylinder 58 to convey material thereto. The cylinder 58 is provided with a head 59 which is slidably disposed therein and upon which are positioned packing rings 60 for engagement against the inner wall of the cylinder 58 to seal the same, the head 59 being provided with a forwardly extended pin 61 which is engaged through a cross arm 62 mounted upon extension bolts 63 carried by the cylinder 58. The pin 61 is loosely disposed within the cross arm 62 and is provided with a coil spring 64 disposed thereabout between the head 59 and the cross arm 62. The head 59 is provided with a perforated diaphragm 65 at its inner end adjacent which a chamber is formed which is connected with a drain pipe 66 to carry off the liquid which passes through the perforated diaphragm 65. The head 59 is also provided with a thickness of fabric 67 which is mounted across the outer face of the diaphragm 65 to cover the apertures formed therethrough. A sleeve 68 is slidably positioned within the cylinder 58 and is provided with an offset arm 69 which is provided at one side with teeth 70 with which a toothed gear 71 mounted in the frame 55 is adapted to mesh and to withdraw the same to cause the sliding of the sleeve 68 rearwardly within the cylinder 58. The sleeve 68 is normally retained in a forward position under the tension of a spring 72 which is disposed about a rearwardly extending reduced portion 73 of the arm 69 and bears against a collar 74 carried by said arm and a flange 75 struck upwardly from the frame 55. The sleeve 68 fits around a hollow piston 76 which is adapted for reciprocation therein and which is provided with packing rings 77 to seal the same and which

carries a perforated head 78 over which is disposed a thickness of fabric 79 to completely cover the perforations formed therethrough and to engage against the material to be compressed. A pipe 80 extends rearwardly for the purpose of withdrawing at that side of the piston the liquid which is extracted from the material compressed and a drain pipe 80' may be provided in the base 55 below the pipe 80. The hollow piston 76 is provided with a cross head 81 to which is engaged the forward extremity of a pitman 82 which is carried at its rear end upon a crank shaft 83. The crank shaft 83 is transversely disposed within the frame 55 and carries the gear 71 thereon and is rigidly disposed therewith and adapted for operative relation with the teeth 70. The teeth disposed upon the gear 71 are continued but a short distance about the periphery of the same in order to engage the teeth 70 at intervals admitting of the forward motion of the arm 69 under the tension of the spring 72 alternately with the engagement of the teeth 70. The shaft 83 is provided with a bevel gear 84 which meshes with a beveled gear 85 carried upon a stub shaft 86 which is mounted longitudinally within the frame 55 and upon which is disposed in rigid relation, a large gear 87. The gear 87 is meshed with a pinion 88 mounted upon a drive shaft 89 disposed longitudinally in the upper end of the frame 55 and upon which is disposed a pulley 90 adapted to impart motion from any convenient or adaptable source of power to the machine. The shaft 89 is extended through the receptacle 54 and carries a screw conveyer 91 for the purpose of feeding material to be compressed from the hopper 56 into the pipe 57.

The operation of the preferred form of the invention above described is as follows: Steam or liquid under pressure is introduced through the intake 33 and enters the chest 34, passing about the D-valve 35 and through the channel 37 into the cylinder 46 against the outer face of the larger piston 30. At the same time, a part of the fluid or liquid employed flows through the by-pass 51 into the portion 45 of the steam chest against the inner face of the valve head 42 and causes movement of the same toward the adjacent end of the steam chest. The piston 30 is moved within the cylinder 46 under the pressure of the fluid until it passes the lower end of the channel 49 when the fluid is admitted to said channel and passes into the portion 45 against the outer face of the valve head 42, thereby equalizing the pressure upon the sides of the valve-head 42 and retaining the same in an operative position. The slight movement of the valve head 42 away from the by-pass 51, however, has caused the enlargement 41 at the opposite end of the valve rod 39 to impinge

against one end of the D-valve 35, although not sufficient to operate the same, since the pressure upon the opposite sides of the valve head 42 moves the same only one-half of its stroke. The piston 30 continues its movement withdrawing the hollow piston rod 21 from the cylinder 10 and carrying the hollow piston 20 therewith, sliding the same within the sleeve 17 to enlarge the space within the cylinder 10 beneath the opening 11 through which material is introduced, as disclosed in Fig. 2. The sleeve 31 strikes against the smaller piston 32 and forces the same beyond the end of the passage 48 within the cylinder 47 when the enlarged piston 30 reaches the rear extremity of the cylinder beyond the end of the channel 48 within the latter cylinder, whereupon the steam or compressed liquid flows from the cylinder 46 through the passage 48 into the cylinder 47 against the rear face of the piston 32. This operation causes the piston 32 to be forced toward the outer end of the cylinder 47 and to carry therewith the piston rod 19 retracting the sleeve 17 from the forward end of the cylinder 10. When the sleeve 17 is retracted, the material is allowed to drop from the opening 11 into the cylinder 10 between the portions of fabric 16 and 26 which are respectively positioned upon the cylinder head 13 and piston head 25. The spring 24 is employed for the purpose of cushioning the retracting of the sleeve 17 to prevent the jarring or pounding of the device during operation. When the piston 32 reaches the outer end of the cylinder 47, the channel 50 is opened to admit the steam or liquid from said cylinder into the portion 44 of the steam chest against the outer face of the valve head 43 which causes movement of the same away from the end of the steam chest carrying therewith the D-valve 35 to shift the same and to open the channel 36 into communication with the chest 34 and to connect the channel 37 with the exhaust 38, as indicated in Fig. 1. The fluid or liquid then passes from the chest 34 through the channel 36 into the cylinder 47 against the piston 32 and causes reverse movement of the same. Simultaneously with the forward movement of the piston 32 the movement of the valve head 43 is checked by the introduction of the liquid or fluid through the by-pass 52 leading from the channel 36. The piston 32 moves forwardly and strikes the sleeve 31 carrying the piston 30 beyond the entrance of the passage 48 into the cylinder 46 and at the same time opens the end of the passage 48 within the cylinder 47. The fluid or liquid will then pass from the cylinder 47 through the passage 48 and into the cylinder 46 against the outer face of the piston 30 and cause the continued reverse movement of the same. In this operation, it will be noted that as the piston 32 is

moved forwardly prior to the movement of the piston 30, the sleeve 17 is first moved forwardly to close the opening 11 and to confine the material to be compressed within the outer end of the same against the cylinder head 13. The hollow piston 20 is then moved forwardly under the action of the piston 30 and is caused to engage against the material within the cylinder 10 compressing the same. The moisture extracted from the material while being compressed is absorbed by the fabric upon the opposite sides thereof and is passed through the perforations formed in the diaphragm 15 and piston head 25 whence the same is conveyed through the ports 14 and 29', respectively. The compressed peat or other material is held within the sleeve 17 until said sleeve is fully withdrawn, when it will be discharged through the opening 12, as shown in Fig. 1. After the material has been compressed, the pressure fluid acting upon the piston 30 will withdraw the hollow piston 20 and the head attached thereto, so that after the sleeve 17 starts its outward or rearward movement, the compressed material will still be held within the end of the sleeve and will not be ejected therefrom by the piston head 25. The piston 30 and piston 20 connected therewith have a more limited movement than the piston 32 and the sleeve 17 actuated by the same, so that, when the piston head 25 has reached a point just clear of the discharge opening 12, the piston 30 will have reached the end of the cylinder 46, so that its movement will be arrested. The piston 32, however, will continue to travel so that the sleeve 17 will be withdrawn past the piston head 25 and, consequently, the material held in the end of the sleeve will be ejected by being brought against the piston head 25 and will drop through the discharge opening 12, as shown in Fig. 1.

It is thus seen that in a machine of this construction and operation, the moisture is extracted from the peat, which is necessary for the proper compression of the same, at the same time that the peat is compressed, thereby producing a great saving in processes of this nature and forming a novel and efficient means for producing such result.

The operation of the modified form of the machine, which embodies the principles of the invention, is as follows: The material to be compressed is fed into the hopper 56, whereby it is conveyed to the receptacle 54 and carried therein to the forward extremity of the same by means of the screw conveyer 91 and fed through the pipe 57 into the cylinder 58. The screw conveyer 91 is actuated by the rotation of the drive shaft 89 through the medium of the pulley 90. The pinion 88, which is rigidly disposed upon the drive shaft 89, operates the gear

87, and causes the rotation of the stub shaft 86 to operate the beveled gear 85. The beveled gear 85, which meshes with the gear 84, causes the actuation of the same and thereby rotates the crank shaft 83 to reciprocate the pitman 82 to cause the actuation of the hollow piston 76 through the medium of a cross head 81. As the crank shaft 83 is rotated, the teeth disposed upon the gear 71 are engaged with the teeth 70 upon the arm 69 and causes the retraction of the sleeve 68 within the cylinder 58 so that the material to be compressed may be fed into the cylinder through the pipe 57. When a quantity of material is dropped into the cylinder 58, the gear 71 is rotated sufficiently to disengage the teeth thereof from the teeth 70 and permit the spring 72 to force the sleeve 68 forwardly within the cylinder 58 against the cylinder head 59 and to inclose the material within the end of the same. The continuation of the rotation of the crank shaft 83 causes the forward movement of the pitman 82 to force the piston 76 forwardly within the cylinder 58 and to compress the material against the perforated head 78 of the same. The moisture extracted from the material is absorbed by the portions 67 and 79 of the fabric which are carried by the cylinder head 59 and piston head 78, which moisture or liquid is carried through the perforations formed in the respective heads into the rear end of the cylinder 58 and into the chamber formed within the cylinder head 59 whereby the same is conveyed to the outlet pipe 66. When the mass of material between the portions of the fabric 67 and 79, offers a resistance greater than desired, the piston head 59 will recede from the cylinder 58 compressing the spring 64 and thereby permitting the forward movement of the piston 76, without damage or breakage to any portion of the machine.

Having thus described the invention, what is claimed as new is:

1. A machine as specified comprising a cylinder, a perforated head formed on said cylinder, a layer of fabric stretched across the inner face of said head, an integral sleeve disposed in said cylinder for slidable engagement therein against said head, a piston slidably mounted within said sleeve, a perforated head formed on said piston and fitting closely against the inner wall of said sleeve, and means for operating said sleeve and said piston, said sleeve adapted to be actuated in advance of the movement of said piston.

2. A machine as specified comprising a cylinder having openings formed in the upper and lower sides of the same in different radial planes thereof, a piston rod disposed in said cylinder, an integral sleeve slidably disposed within said cylinder

adapted to close the openings therein, a piston slidably mounted in said sleeve, means for actuating said sleeve and said piston independently of each other, and means carried by the head of said cylinder and said piston for extracting the moisture from masses of material positioned between the same in said cylinder.

3. A machine as specified comprising a cylinder, a perforated head formed in said cylinder, a strip of fabric carried by said head for engagement with material positioned in said cylinder, a sleeve slidably disposed in said cylinder for inclosing material placed therein, a piston slidably mounted in said sleeve, a hollow piston rod secured to said piston and extended backwardly therefrom, pressure cylinders positioned at the rear end of said first-mentioned cylinder, an enlarged piston mounted in one of the pressure cylinders at the forward end thereof, said enlarged piston connected to said hollow piston rod, a piston rod positioned within said hollow piston rod carried by said sleeve, a reduced piston positioned in the rear pressure cylinder and connected to said piston rod, and means for operating said enlarged piston and said reduced piston alternately in advance of one another for actuating said sleeve and said piston.

4. A machine as specified comprising a cylinder having ports disposed in its upper and lower sides, a head mounted in said cylinder, a sleeve carried in said cylinder adapted for reciprocation therein to open and close the ports thereof, a piston mounted in said sleeve for reciprocation therein, a pressure cylinder formed at the rear extremity of said cylinder, an enlarged piston mounted in said pressure cylinder and connected to the first-mentioned piston disposed in said chamber, a valve mechanism disposed in said chamber for admitting fluid under pressure to said enlarged piston to move the same rearwardly, a second pressure cylinder, a reduced piston disposed in said cylinder, said valve mechanism adapted to admit fluid under pressure to said reduced piston to move the same forwardly, and means for admitting fluid under pressure from one of said pistons to the opposite piston upon the completion of the alternate central strokes of the same.

5. A compressing machine including a cylinder having an inlet opening and a plurality of outlet openings, an integral sleeve slidably disposed within said cylinder for successively closing said openings, a piston mounted in said sleeve for reciprocation therein to compress material in said cylinder upon the closing of the openings therein, and means for actuating said sleeve and said piston.

6. A compressing machine including a cylinder having openings to admit material and remove the same, a sleeve slidably disposed in said cylinder to regulate said openings and conveying compressed material from below the inlet opening to a point over the outlet opening, a piston slidably mounted in said sleeve to compress the material upon the closing of the openings and expel it when over the outlet opening, and means connected to said sleeve and said piston for separately actuating the same.

7. A compressing machine including a cylinder having openings to admit and to exhaust material in different radial planes, a sleeve slidably disposed in said cylinder to regulate the openings and to form the material when compressed and convey the compressed material from the inlet to the exhaust opening, means for extracting moisture from the material during the act of compression, and a piston located in said sleeve to compress material in the same.

8. A compressing machine including a cylinder having inlet and exhaust openings in different radial planes, a former located in said cylinder to receive material admitted thereto and to retain the same during and after compression, a piston located within said former to compress the material in the same and to eject said material after its arrival over the exhaust opening, and means for extracting moisture from the material during the act of compression.

9. A compressing machine comprising a cylinder having an inlet and outlet openings, a sleeve slidably mounted in said cylinder to extend over said openings, a hollow piston slidably mounted in the said sleeve and provided with longitudinal slots, a perforated head on said hollow piston within the sleeve, a hollow piston rod extending from the hollow piston, a piston rod extending through said hollow piston rod, a cross head on the inner end of the last-mentioned piston rod extending through the slots in the hollow piston and secured to the sleeve, and a spring interposed between said cross head and the outer end of the hollow piston.

In testimony whereof I affix my signature in presence of two witnesses.

ELLIS BARTHOLOMEW. [L. s.]

Witnesses:

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L. A. BARTHOLOMEW.