(No Model.)

2 Sheets—Sheet 1.

M. T. F. WIESEBROCK.

GRAIN PRESS.

No. 504,098. Patented Aug. 29, 1893.

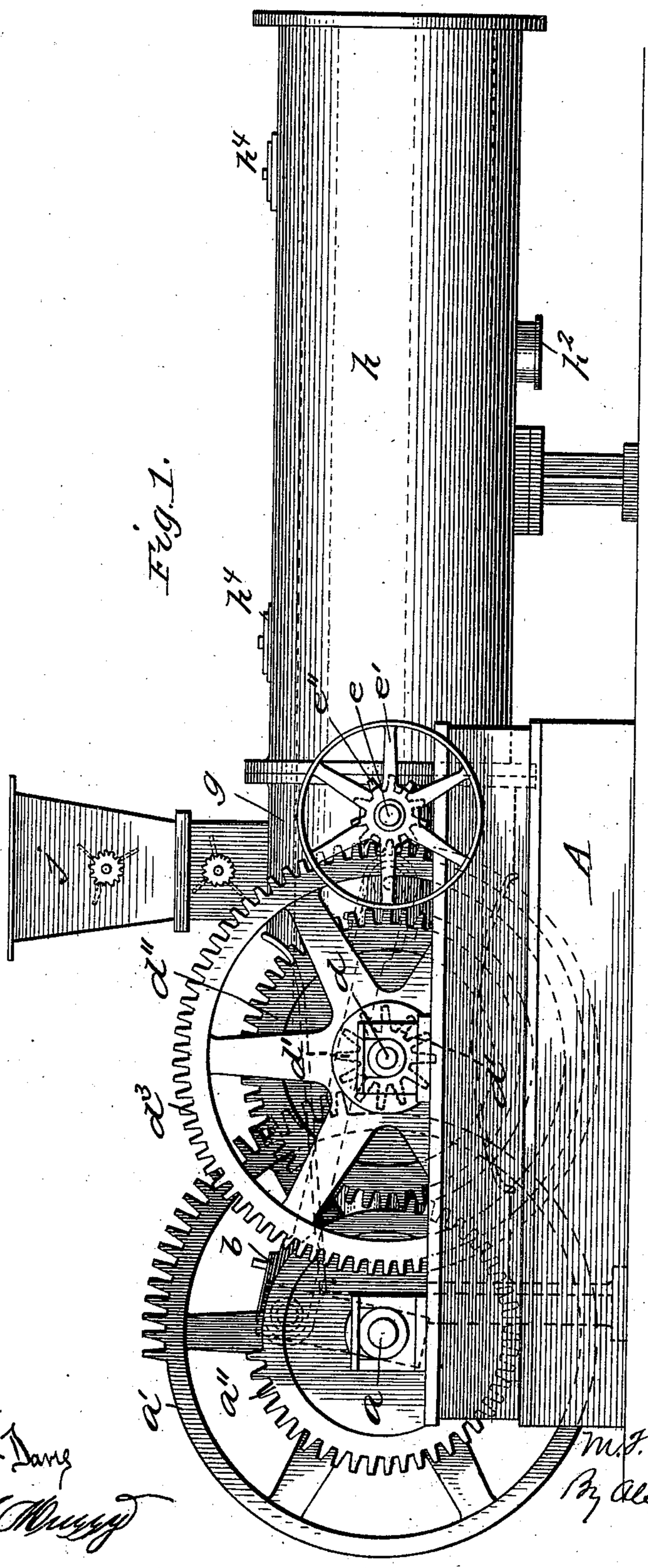

Fig. 1.

Witnesses
E. McCormick Dare
Charles F. Murray

Inventor
M. T. F. Wiesebrock
By Alexander & Dare
Attorneys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

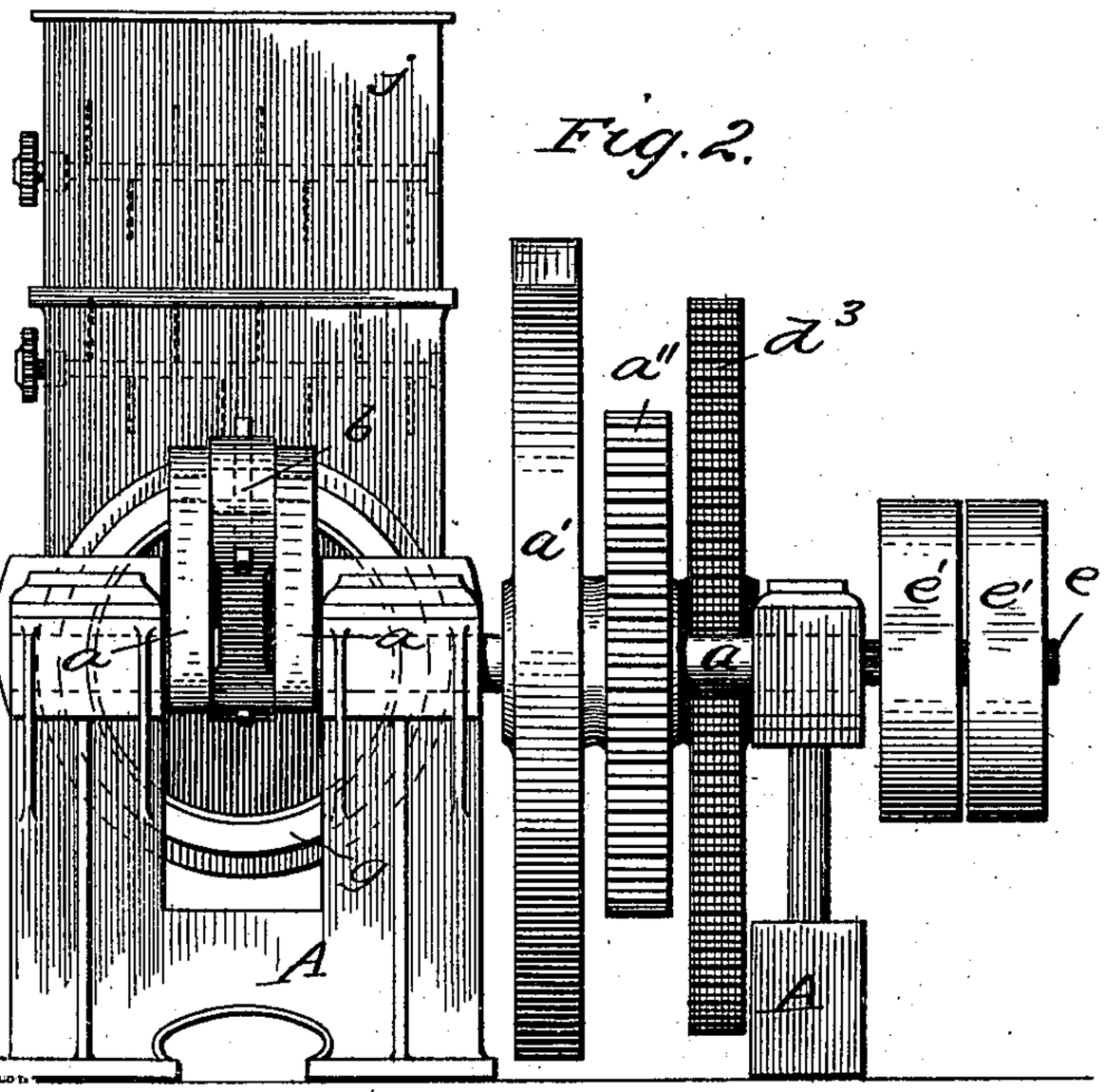


Fig. 3.

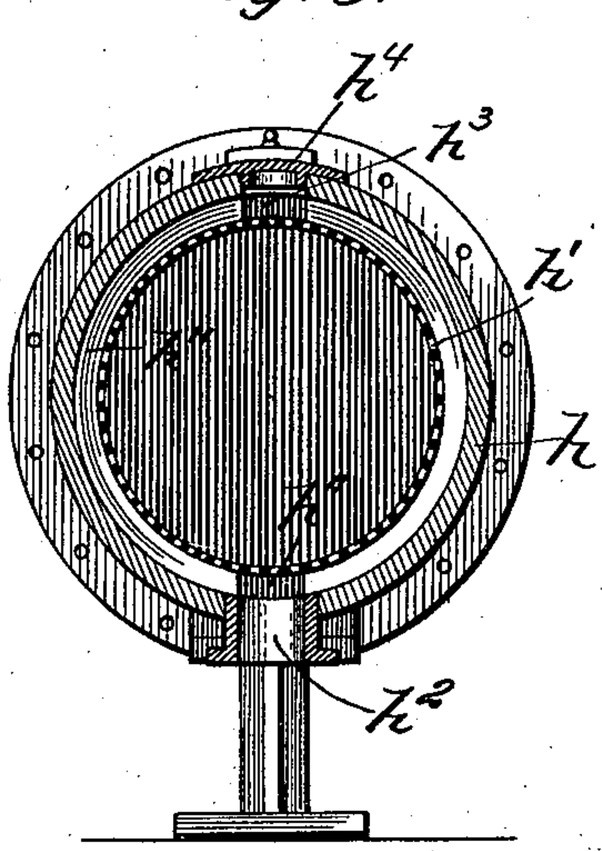


Fig. 4.

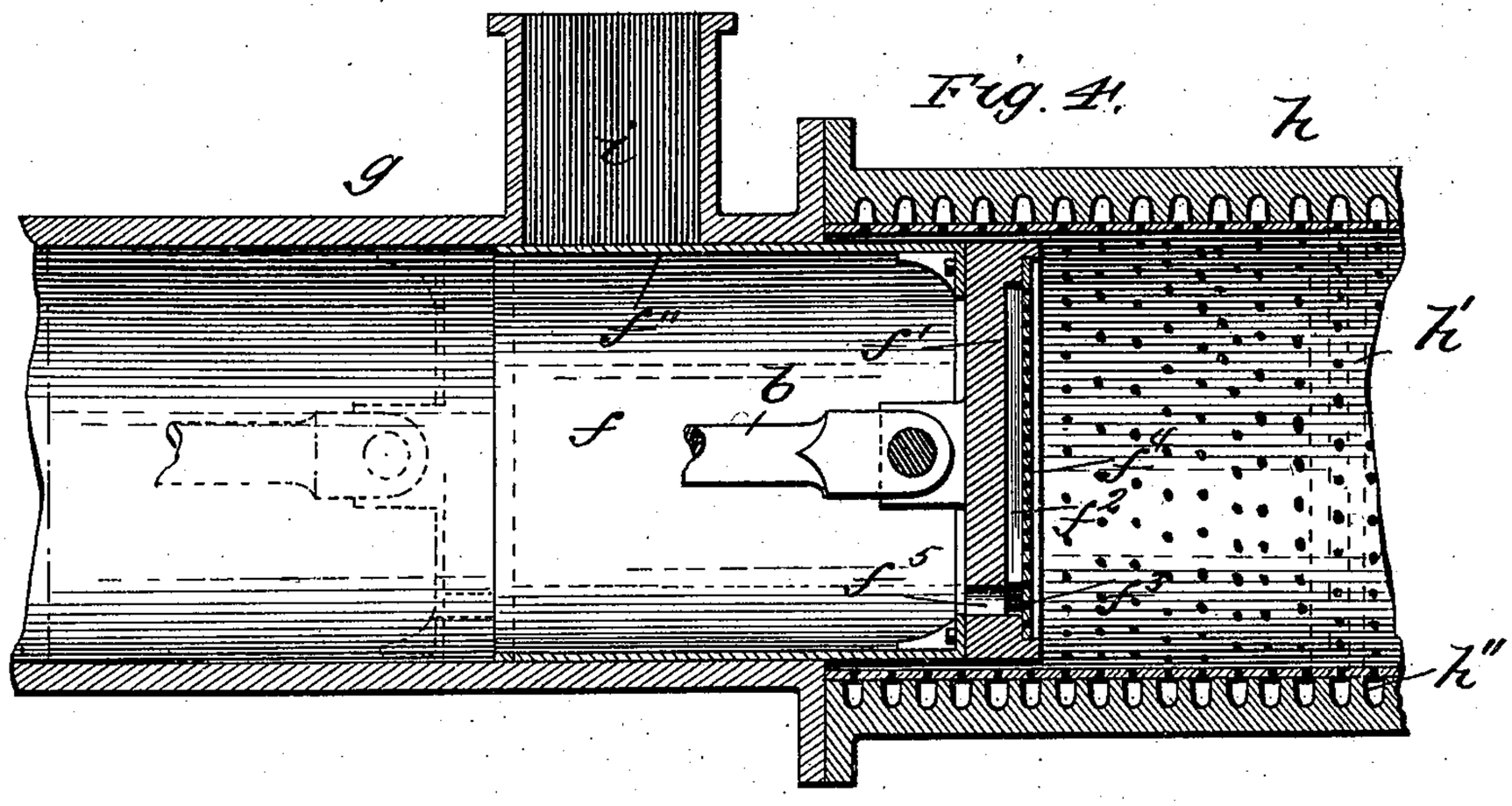
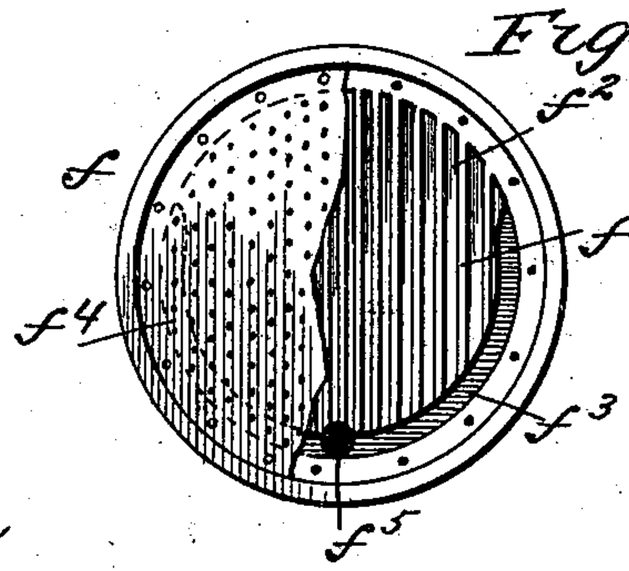


Fig. 5.



Witnesses
E. McCormick Davis
Charles A. Burgess

Inventor
M. T. F. Wiesebrock
By Alexander & Davis
Attorneys

UNITED STATES PATENT OFFICE.

MAX T. F. WIESEBROCK, OF CHICAGO, ILLINOIS.

GRAIN-PRESS.

SPECIFICATION forming part of Letters Patent No. 504,098, dated August 29, 1893.

Application filed October 17, 1892. Serial No. 449,114. (No model.)

To all whom it may concern:

Be it known that I, MAX T. F. WIESEBROCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Presses, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 represents a side elevation of my improved press; Fig. 2, an end elevation thereof; Fig. 3, a vertical section of the press-cylinder; Fig. 4, a vertical longitudinal section of the adjacent ends of the piston and press-cylinders, and Fig. 5 an end view of the piston.

This invention is designed to produce an apparatus which will effectually and inexpensively express the liquid from various wet materials, such as refuse from breweries, distilleries, glucose and starch factories, slaughter houses, &c., the expressed liquid being collected and conducted off to be discarded or saved as the case may be, and the solid matter being dried and employed as cattle feed, fertilizer, &c., as will more fully hereinafter appear.

The nature and advantages of the invention fully appear in the course of this specification and the accompanying drawings, in which—

A designates the base of the apparatus; *a* a crank-shaft journaled in suitable bearings on the forward end of the base and having connected to it a piston-rod *b* and provided with two mutilated gears *a' a''*, the latter being considerably smaller in diameter than the former. The larger mutilated gear *a'* during a portion of its revolution meshes with a driving pinion *d'*, secured on a counter shaft *d* journaled on the base, and the gear *a''* during a part of its rotation meshes with a larger pinion or spur-wheel *d''* also secured on said counter-shaft *d*, this shaft being driven by any suitable mechanism, such for instance as that shown, which consists of a driving-shaft *e* mounted on the base and provided with fast and loose band pulleys *e'* and a pinion *e''* that meshes with a large spur gear d^3 on said shaft *d*.

The operation of this mechanism is as follows: When the proper quantity of material to be pressed is introduced in front of the piston, by the means hereinafter described, and the driving mechanism is started, the larger pinion *d''* meshes with the mutilated gear *a''* and by reason of their relative sizes moves the piston rapidly through the first half or so of its forward stroke, at which point the larger pinion *d''* leaves the teeth of the gear *a''* and the smaller pinion *d'* comes into engagement with the teeth of the larger mutilated-gear *a'* and completes the forward stroke of the piston more slowly and with a greater power. By this differential mechanism, it will be observed the movement of the piston is so regulated that during the first part of its stroke, when very little power is required, it will be caused to move quite rapidly, while during the last half of its stroke, when considerable power is desired, it will be moved comparatively slowly and with great power. It will be observed that this peculiar movement of the piston is obtained by arranging the mutilated gears on the crank-shaft in such a manner that the mutilated portion of the smaller gear and the toothed portion of the larger gear will come approximately in line with or on the same side of the shaft as the crank-arm. During the rapid portion of the stroke very little liquid is expressed, this portion of the stroke serving simply to bring the material into a compact shape to be acted on by the more powerful portion of the stroke. In the retrograde movement of the piston it moves rapidly back to a point where it uncovers the feed-opening and allows ample time for the desired quantity of the material to be fed or to fall down in front of the piston before it covers the feed opening on its forward stroke again. The piston *f* is connected to the piston rod and fitted in the open-ended piston cylinder *g* suitably mounted on the base A, the forward portion of this cylinder being preferably open on its upper and lower sides in order to diminish its weight and permit access to be had to the piston, and to the rear flanged end of this piston-cylinder is bolted the forward flanged end of the open ended press-cylinder *h*. The piston consists of a head *f'* (to which the rod *b* is connected,) and a cylinder *f''*, which fits the cylinder *g* and is secured to the head and extends rearwardly therefrom a sufficient distance to cover the feed opening *i* (formed

through the top of the piston-cylinder near the press-cylinder) when the piston is at the forward end of its stroke, as shown in Fig. 4, whereby the material is prevented from falling down behind the piston. A hopper *j* is located above the feed opening and provided with feeding or stirring devices to assist in forcing the material into the piston-cylinder. The pressing face of the piston head is provided with a series of vertical ribs forming grooves f^2 whose lower ends are connected to a semi-circular groove f^3 formed in the face of the piston-head near its lower edge, and secured to the face of the head and supported by the vertical ribs thereon is a perforated disk f^4. An opening f^5 connects with groove f^3 and extends through the piston head in order to carry off the collected water expressed from the material. The object of this construction is obvious. When the piston is forced forward the pressure exerted will force a portion of the liquid in the material to filter through the perforated face-plate *f*, the grooves and ribs serving to collect the liquid and conduct it to the rear of the piston, as is evident, whereby but a minimum of the solid matter will be carried out by the expressed liquid. The ribs between the grooves serve to firmly support the perforated pressure plate. The pressing-cylinder is constructed of an outer cylinder, provided on its interior with numerous annular ribs and grooves, and an interior cylinder *h'* resting on said interior ribs and provided with numerous perforations communicating with the grooves between the ribs, said ribs serving to firmly support and strengthen the perforated cylinder. The inner cylinder is slightly larger in internal diameter than the piston-cylinder *g* and is secured concentrically with it as shown. Connecting all the annular grooves in the outer cylinder is a longitudinal channel *h''*, which extends the full length of the cylinder, along its lower side, and communicates with a discharge outlet h^2 formed through the lower side of the cylinder. When material is introduced into the piston-cylinder in front of the piston the latter is reciprocated to force it into the pressing cylinder to form a resisting medium to the subsequent charges, whereby the use of head-blocks or pressing blocks is avoided and the process of pressing and expelling the pressed material is rendered continuous, a portion of the pressed material being forced out at the rear end of the cylinder at every stroke of the piston. When the core formed by the repeated charges presents sufficient frictional resistance the process of pressing out the liquid commences, the expressed liquid passing through the perforations of the inner cylinder and being collected and discharged by the annular grooves and the longitudinal channel *h''* in the bottom of the exterior cylinder. By thus using the preceding charges to form the resistance for the subsequent charges it will be observed that any degree of resistance may be obtained by lengthening or shortening the press-cylinder. It will be observed that the piston enters the press cylinder but a short distance. The advantage of having the piston smaller in diameter than the press-cylinder is that a thin ring or layer of the material will be forced in between the piston and the perforated cylinder when the piston is forced forward, which layer of material will serve as a filtering medium and assist in preventing the solid matter being forced out through the perforations. As this ring of material is quite thin (being from one-eighth to one inch in thickness, according to the material to be pressed) it breaks apart and falls down in front of the piston after each stroke of the same, whereby it will be renewed at each stroke and its filtering capacity maintained.

To illustrate more fully the working of the apparatus I will describe the practice in pressing brewery refuse, called spent malt. The size of the press cylinder being twenty-four inches in diameter, the length of the stroke of the piston also twenty-four inches, the opening of the hopper twelve inches in the direction of the axis of the press, and the crank-shaft making one revolution in four minutes, I find it most advantageous to have the piston consume three of said minutes in moving the last half of its forward stroke and the remaining one minute for the whole backward stroke and one half of its forward stroke, this motion giving ample time for the liquid to escape from the material without injury to the albumen cells contained in the material. A too rapid pressing of the material would cause a loss by bursting the albumen cells and would also prevent the proper pressing out of the liquid.

The shape of the press-cylinder may be varied if desired and other features may be varied without departing from the invention in the least.

In order to wash out and clean the interior grooves in the press-cylinder, an interior channel h^3 is formed along its upper side to intersect the annular grooves, in the same manner as the lower channel *h''*, access to this channel h^3 being had through covered openings h^4 in the upper side of the cylinder. By pouring or forcing streams of water down through the openings h^4 h^4 the solid matter that may have passed through the perforations will be washed from the exterior of the perforated cylinder and from the grooves and carried out at the discharge opening below.

Having thus fully described my invention, what I claim is—

1. The combination of a piston-cylinder, an elongated piston working therethrough and means for operating this piston, an open ended press-cylinder secured to the end of the piston-cylinder and made larger in internal diameter than the piston, said press-cylinder being provided with numerous perforations, as and for the purpose described.

2. The combination of an open-ended press-cylinder provided with a series of internal annular grooves and ribs and an upper and lower internal longitudinal groove intersecting said annular grooves, openings in the upper and lower sides of the cylinder, communicating with said longitudinal grooves, a perforated cylinder fitted in the main cylinder and supported on the internal ribs, and a piston working in the perforated cylinder, substantially as and for the purpose described.

3. The combination of a cylinder, a piston working therein and provided in its face with a series of grooves and ribs and a main groove or channel (such as f^3) communicating with said grooves, an outlet opening f^5 communicating with the main-groove, and a perforated plate secured over the grooves and ribs and supported by the latter, substantially as described.

4. The combination in a press, of an open-ended cylinder h having formed on its interior a series of integral ribs and intermediate channels, an interior metal cylinder h' numerously perforated and fitted within the exterior cylinder, said interior cylinder resting on and being supported rigidly by said ribs, and a piston, substantially as described.

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

MAX T. F. WIESEBROCK.

Witnesses:

H. C. GAGER,

J. C. EASTLACK.