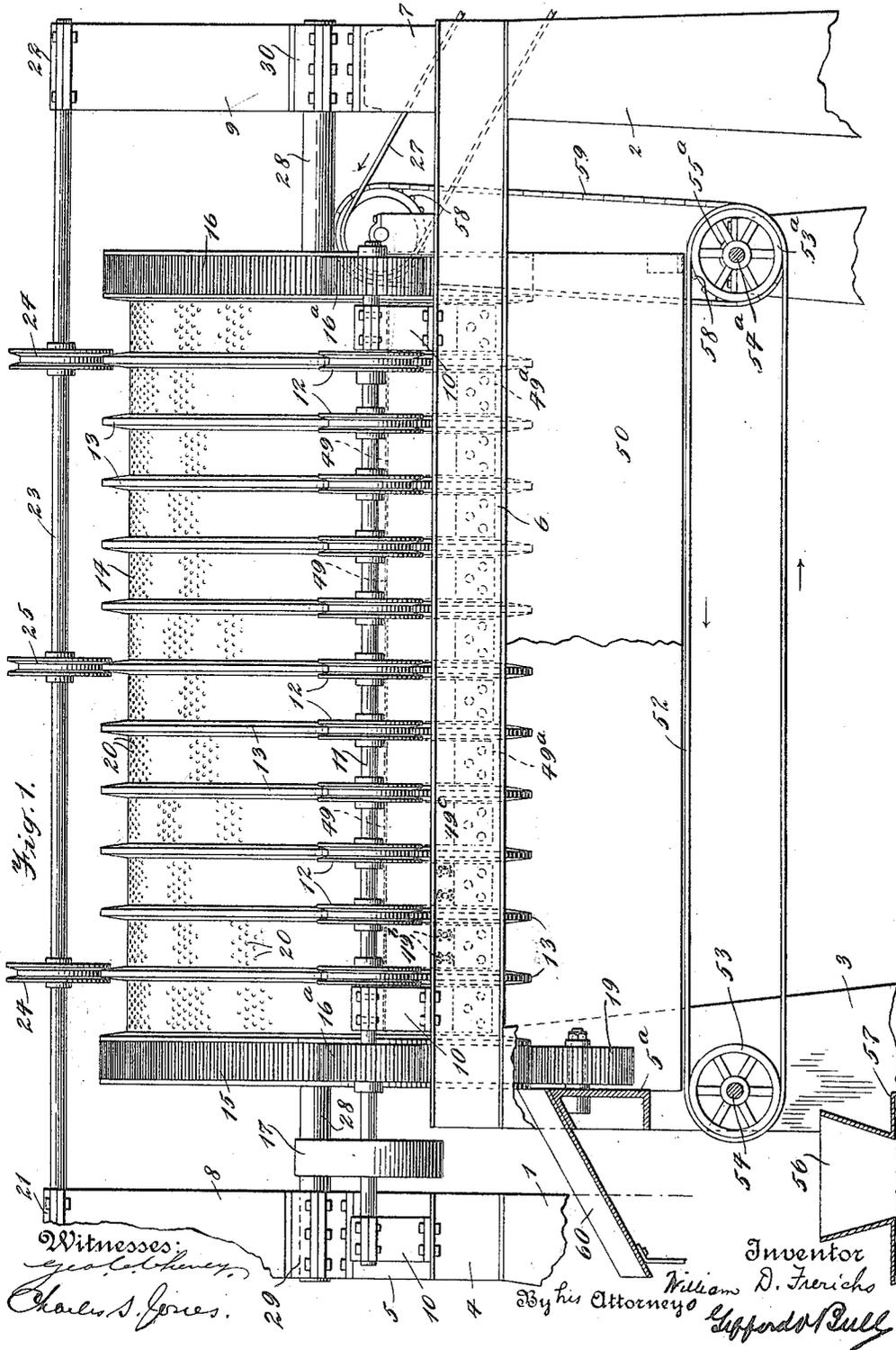


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 MACHINE FOR THE TREATMENT OF CLAY.
 APPLICATION FILED APR. 23, 1913.

1,202,504.

Patented Oct. 24, 1916.

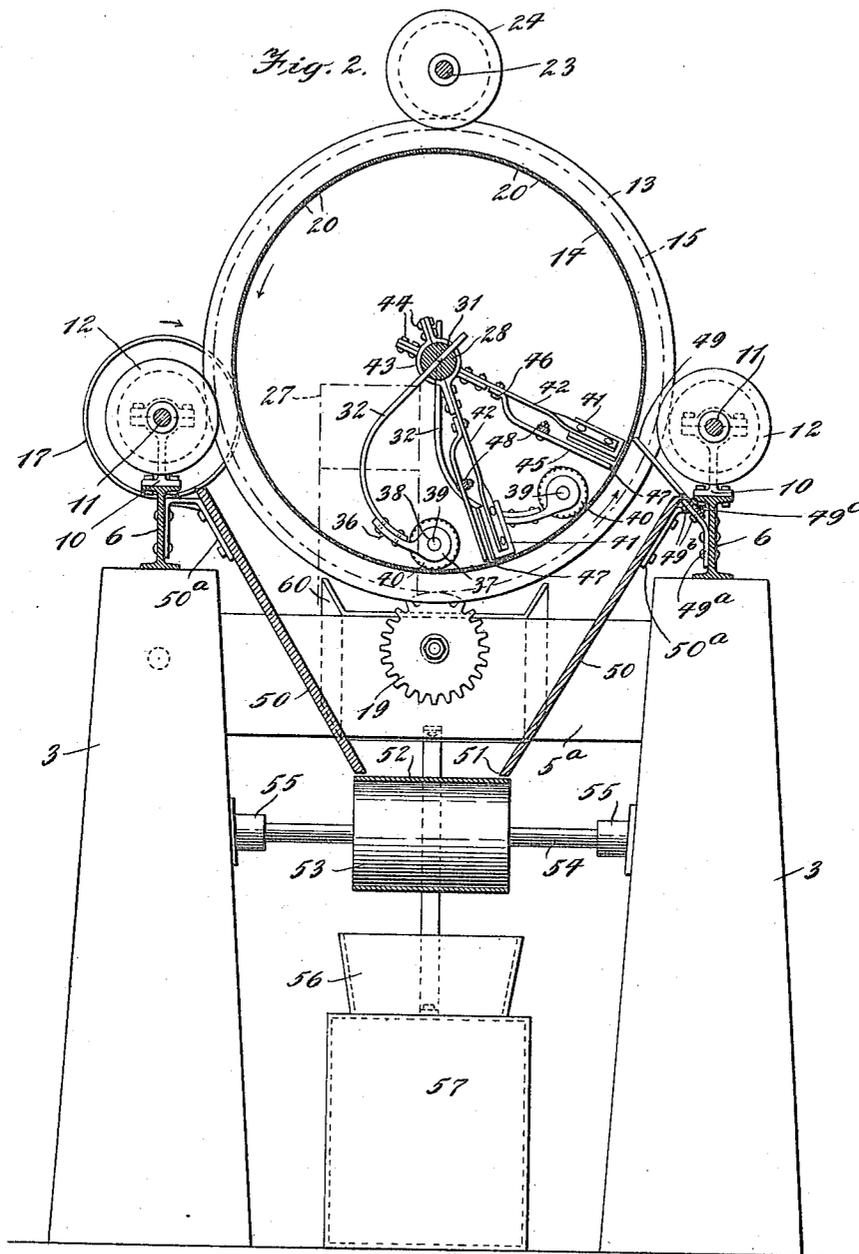
3 SHEETS—SHEET 1.



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Witnesses:
Charles S. Jones
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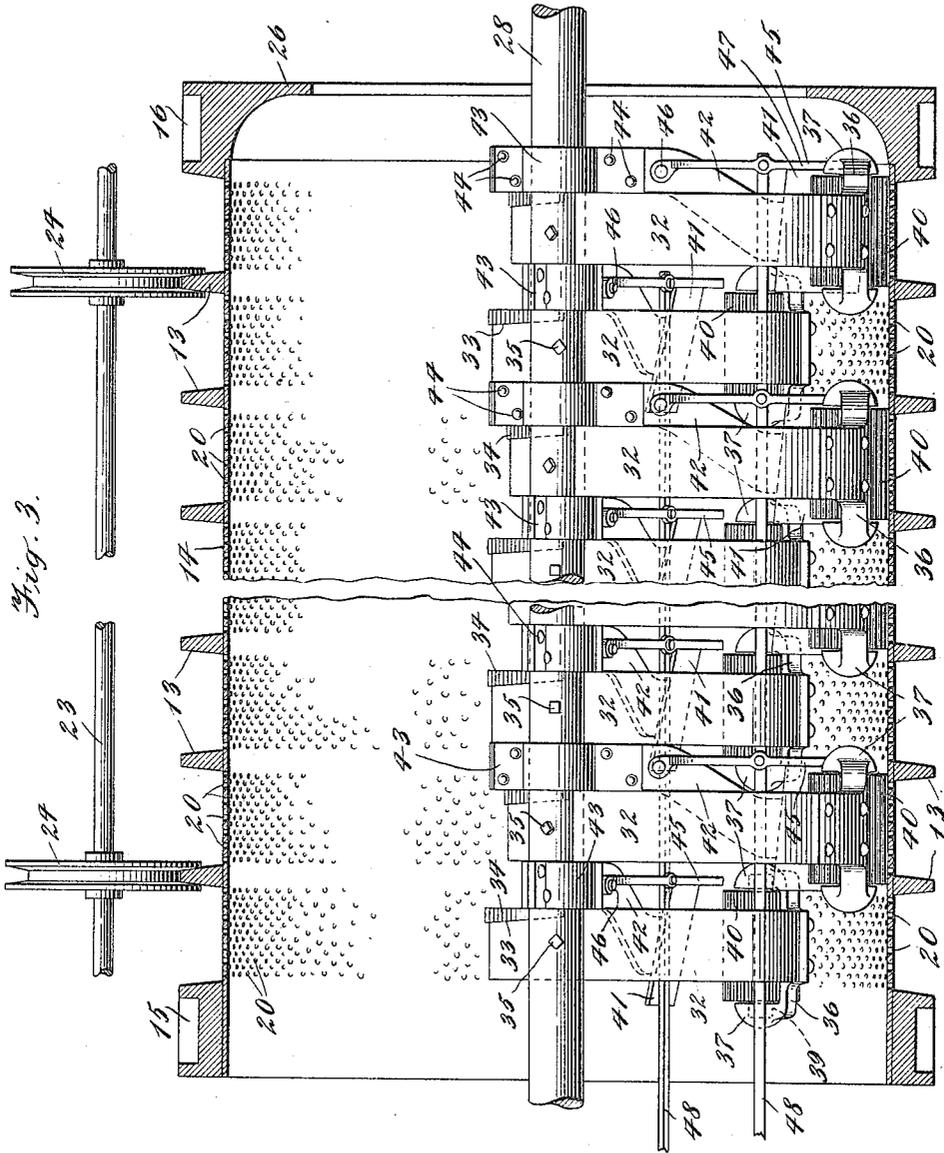
Inventor
William D. Frerichs
By his Attorney *Spafford Bull*

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UNITED STATES PATENT OFFICE.

WILLIAM D. FRERICHS, OF NEW YORK, N. Y.

MACHINE FOR THE TREATMENT OF CLAY.

1,202,504.

Specification of Letters Patent.

Patented Oct. 24, 1916.

Application filed April 23, 1913. Serial No. 762,993.

To all whom it may concern:

Be it known that I, WILLIAM D. FRERICHS, a citizen of the United States, residing at Tottenville, in the city of New York, borough of Richmond, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Machines for the Treatment of Clay, of which the following is a specification.

My invention relates to new and useful improvements in machines for the treatment of clay, and the object of the invention is to provide a simple and efficient means for the elimination of pyrites, stones and other impurities from plastic clay.

The invention consists in the construction and combination of parts to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein:

Figure 1 is a view in side elevation partly in section, and with certain parts broken away, of a machine exemplifying my invention. Fig. 2 is a transverse vertical section on the line 2—2 of Fig. 1. Fig. 3 is a longitudinal sectional view through a part of the machine.

Referring to the drawings by characters of reference: the operative parts of the machine are mounted and assembled upon a suitable frame-work which may be of any construction which will satisfactorily serve its purpose, but I prefer to construct it with pairs of vertical end standards 1, 2, spaced apart a suitable distance lengthwise of the machine, and the standards of each pair being spaced apart transversely of the machine. Arranged between the end pairs of standards is a pair of intermediate standards 3, which is located a short distance from the standards 1, the standards 3 being in alinement with the side standards of the pairs 1, 2. On the upper ends of the standards 1 are supported channel members 4, which are connected by a transverse member 5. Supported by the side members of the pairs of standards 2, 3 are longitudinally extending I-beams 6, arranged parallel to each other and arranged over and supported by said I-beams, over the standard 2, is a transverse

member 7. Each of the members 5, 7 supports a central pillar shown at 8, 9, respectively, which pillars serve as supports for parts to be presently described.

Mounted upon each of the side girders 6 and channel irons 4 are pillow blocks rigidly connected thereto and having alining bearings in which turn horizontally disposed shafts 11, there being one of the shafts supported over each of the side members 6, as clearly shown in Fig. 2 of the drawings. Fixed to each of these shafts 11 is a plurality of grooved supporting rollers 12, the grooved peripheries of which receive circular hoops or bands 13 parallel to each other, and mounted upon a horizontally disposed shell or drum 14 circumferentially thereof, which drum is supported on the said rollers 12 and arranged to revolve thereon. At its ends this shell or drum is provided with circumferential toothed gear bands 15, 16, respectively, with which mesh pinions 16^a carried on the ends of the shafts 11, heretofore described. One of these shafts 11 is provided with a belt pulley 17 driven from any suitable source by a belt, not shown. Supported by the transverse member 5 of the frame, is a pinion 19 meshing with the gear bands 15 to assist in supporting the shell and prevent distortion of the said band.

The shell 14 is preferably cylindrical in general contour and perforated throughout its length, as shown at 20, said perforations being preferably 32 to the square inch, although, of course, I do not desire to be limited to the particular number or size of the perforations to a given area of the shell, but I prefer the total area of the openings to equal about the total area of metal of the shell. Mounted in bearings 21, 22, on the standards 8, 9, and extending over the shell longitudinally and centrally thereof, is a shaft 23 carrying circumferentially grooved rollers 24 adapted to engage the end bands or hoops 13 of the shell, and an intermediate grooved roller 25, to engage one of the said bands adjacent the middle portion of the drum, said shaft and rollers serving to maintain the shell in proper position upon the supporting rollers 12 and the driving gears 16^a. The gear flange 16 at the inlet end of the shell is provided with an inwardly directed annular flange 26, which serves to prevent escape of material being treated from the inlet end

of the shell, after being fed thereto by suitable feed means, preferably an endless carrier 27.

I provide within the shell 14 means for working the clay fed thereto and freeing or separating the same from impurities by forcing it against the inner surface of the perforated shell so that the purified clay is forced out of the shell through the perforations thereof, and being thereby separated from the impurities, such as stone, &c., which are retained within the shell.

Extending through the shell, preferably coincident with the axis of rotation thereof, is a supporting bar or member 28, the ends of which project from the ends of the shell and are fixed in seats 29, 30, mounted respectively on the frame pieces 8 and 9. This bar or member 28 is formed with a plurality of transverse slots 31, preferably spaced apart equal distances from each other lengthwise of the shell 14, and in each of these slots is secured one end portion of a leaf spring member 32. These spring members are adjustable lengthwise in the slots and each is formed with an inclined face 33, to be engaged by a wedge-key 34, which cooperates with said face and the end wall of the slot to secure the spring members in place. As additional securing means for these members, a clamping bolt or set screw 35 may be let through the bar 28, to impinge each of the spring members, as clearly shown in Fig. 3 of the drawings. Each of the spring members 32 is deflected in the direction of rotation of the shell, and carries at its lower free end a bracket member 36, having spaced ears 37, having aligning bearing apertures 38 to receive gudgeons 39 of a pressure roller 40, arranged to rotate on an axis parallel with the axis of rotation of the shell 14, and to have its periphery bear against the inner surface of the shell, and to roll in contact therewith. The rollers 40, preferably are arranged so as to be staggered lengthwise of the shell, that is, they do not all contact the shell along the same line longitudinally of the shell, but are arranged, for instance, in two sets contacting the shell along parallel lines, and the rolls of one set being staggered relative to, or alternating with the rolls of the other set, as clearly shown in Fig. 3 of the drawings. These rollers serve to break up and crush the clay or other plastic material against the inner surface of the shell, and force it together with the crushed bodies out of the shell through the perforations thereof, the impurities such as stones and pyrites remaining within the shell. During revolution of the shell, the yielding support for the rollers 40 will permit them to ride over stones or other hard impurities in the clay.

The spring members 32 by being deflected

hold the rollers 40 in yielding contact with the shell, so that said rollers may move out of contact with the shell, as will be set forth presently. The rollers 40 are preferably corrugated lengthwise so as to have added cutting or crushing effect on the plastic material, and to insure rotation of the rollers.

The end rollers 40 at the inlet and delivery ends of the shell are arranged respectively to contact the zones of the shell between the gearing bands 15, 16, and next adjacent hoop 13, while the intermediate rollers are each arranged to contact the zones of the shell between the adjacent hoops. The said rollers are of such a length that they project beyond the said zones and have their ends in contact with the shell at the points where it is reinforced by the bands 13, and 15, 16, as clearly shown in Fig. 3. This arrangement is important because the pressure of the rollers is exerted against and sustained by the more rigid reinforcing members, thereby relieving the thin shell from such strains as might tend to deform or rupture the same.

Means is preferably provided for moving the material lengthwise of the shell 14, so that after being fed to, and operated upon, by the first roller 40, such amount as may not have been forced through the perforations of the shell, but still remains therein mixed with impurities, will be successively acted upon by the succeeding rollers until practically all of the available clay has been forced through the perforations of the shell and the eliminated impurities are delivered at the discharge end of the shell. This means preferably consists of a plurality of scraping devices, one of which is arranged in rear of each roller 40, and each of which may consist of an inclined blade or plate 41 supported on a bar or arm 42 rigidly clamped to the member 28. The arms or bars 42 are secured to the bar 28 in the spaces between the springs 32, with the exception of the end bar which is secured to the support in advance of the first spring, by means of adjustable clamps, so that said bars may be adjusted about the support to regulate the distance between each roller and its scraper.

The scraper blades are preferably arranged in rear of the rollers 40 such a distance as to obviate clogging or packing of the clay between the rollers and the scrapers, and the scrapers are inclined from the feed end of the shell toward the discharge end thereof in a direction away from the rear faces of the rollers so that the material remaining in the shell after having been acted upon by each roller is deflected by the scraper in rear of each roller into the path of the next succeeding roller to be acted upon thereon.

The scraper or deflector blades are pref-

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erably of such a length that their ends slightly overlap in order that the entire body of material remaining within the shell is moved toward the outlet end thereof, and successively acted upon by the rollers.

Any suitable means may be provided for clamping the bars 40 to the support 28, but I prefer to employ a two-part split sleeve arrangement such as is clearly shown at 43 in Figs. 2 and 3, the parts being connected by suitable bolts 44. It will be understood that the edges of the scraper blades closely approach the inner surface of the shell so as to insure as much as possible of the material retained in the shell being propelled there-through to be acted upon by the rollers, that is the blades should approach the shell close enough to prevent stones and similar impurities passing thereunder instead of being propelled lengthwise of the shell.

I may provide means for removing clay from between the rollers and scraper blades which may become packed or clogged between the same. This means preferably consists of a breaker-bar 45 pivoted as at 46 on each of the bars 42, and arranged with its lower end 47 projecting between the scraper blade and the roller in advance of the same, said breaker-bar being arranged to swing in a plane parallel with the longitudinal axis of the roller. These bars 45 are preferably all connected by an operating bar 48 extending to a point exterior of the shell, where it can be conveniently grasped by an operator to swing the bars 45 on their pivots. It will be readily seen that by reciprocating the bar 48 it will oscillate the bars 45 in the space between the rollers and scraper blades and thereby break up any body of clay which may become clogged between any roller and its blade.

I may provide means for removing the clay from the exterior of the shell, which means may be constructed as follows: Supported by one of the members 6 is a plurality of scraper blades 49 projecting between the hoops or bands 13, and contacting the outer surface of the shell 14 to scrape the purified clay therefrom as it emerges from the perforations in the shell, and beneath the shell and preferably throughout the length thereof is arranged a trough 50 to catch the purified clay removed by the said scraper blades 49, or which may drop from the shell before reaching the scraper blades. The blades 49 are preferably connected to the member 6 by brackets 49^a, to which the blades are clamped by nutted bolts 49^b, the blades being slotted as shown at 49^c so as to provide for adjustment toward and away from the shell 14. The trough 50 is preferably open at the bottom as shown at 51 so as to deliver the clay received thereby onto an endless belt conveyer 52 moving in the direction of the arrows, as shown in Fig. 1,

and mounted upon suitable belt pulleys 53, 53^a, mounted on shafts 54, 54^a, journaled respectively in bearings 55, 55^a, on the standards 3 and of the frame-work and the standards 3^a. This belt may deliver the purified clay into any suitable receptacle, for instance, a hopper 56 leading to a receptacle 57. The shaft 54^a, and the shaft for the pulley at the upper end of the feed conveyer 27, may have sprocket wheels 58 connected by means of a sprocket chain 59, so that the belts 27 and 52 are driven together. The side walls of the trough are supported from the members 6 by means of brackets 50^a (see Fig. 2 of the drawings).

The scrapers 41 inside the drum or shell and the scrapers 49 outside of the latter are arranged so that each outer scraper covers a path in common with one of the inner scrapers, whereby the inner and outer faces of the shell between the inner and outer scrapers is efficiently scraped clean of adhering material, the only material carried by the shell for the greater part of its circumference being the small amount which may stick in the perforations of the shell and which is easily dislodged during the operation of the machine. This arrangement of the scrapers is important as it effectively prevents clogging of the perforations of the screen.

At the delivery end of the shell and supported by the transverse girder 5^a may be a chute 60 to receive the impurities delivered from the delivery end of the shell and to convey the same to any suitable receptacle.

The construction being above described, the operation of the machine is as follows: The plastic clay to be treated is fed to the inlet end of the shell by means of the endless carrier 27, the latter delivering the clay in advance of the first roller 40. The rotation of the shell will carry the clay beneath the first roller 40, which will force the plastic clay out through the perforations of the shell and will ride over the stones or other hard impurities by virtue of its yielding support. The impurities which pass beneath the first roller, and such clay as has not been forced out through the perforations of the shell, will strike against the deflector plate arranged in rear of the first roller, which will deflect the same lengthwise of the shell into the path of the next adjacent roller. The continued rotation of the shell will then carry the body of material so moved beneath the second roller, when additional purified clay will be forced out of the shell through the perforations thereof, the eliminated impurities passing beneath the roller and striking against the deflector plate in rear of the second roller, which will deflect the remaining material lengthwise of the shell into the path of the next roller. This operation continues as described, the body of clay

being successively operated upon by the rollers from the inlet end of the shell to the outlet end thereof, until practically all of the available clay has been forced through the perforations of the shell, and the impurities are delivered at the outlet end thereof.

What I claim and desire to secure by Letters Patent of the United States is:

1. A machine of the character described, comprising a revoluble perforated shell having an inlet at one end and an outlet at the other end, a plurality of rollers arranged in succession lengthwise of the shell and contacting the inner surface thereof over the perforations therein, and means associated with each roller and substantially fixed in relation to the shell for moving the material lengthwise of the shell on the inner surface of the latter toward the said outlet successively from the path of one roller into the path of the successive rollers.

2. A machine of the character described, comprising a revoluble perforated shell having an inlet at one end and an outlet at the other end, a plurality of rollers arranged in succession lengthwise of the shell and contacting the inner surface thereof over the perforations therein, and scraper means associated with said rollers and substantially fixed in relation to the shell for moving the material lengthwise of the shell on the inner surface of the latter toward the said outlet successively from the path of one roller into the path of the successive rollers.

3. A machine of the character described, comprising a revoluble perforated shell, and a plurality of rollers contacting the inner surface of the shell, said rollers being arranged in a plurality of series lengthwise of the shell, the rollers of each series being arranged end to end and staggered relative to the rollers of another series, and a scraper arranged between each roller of one series and the next adjacent roller of the other series for transferring the material from behind said first-named roller to a point in front of the next adjacent roller.

4. A machine of the character described, comprising a revoluble perforated shell, a plurality of sets of rollers contacting the inner perforated surface of the shell and arranged with the rollers of one set in staggered relation to those of another set, and spring means inside said shell for supporting each roller and urging it toward the inner surface of the shell into contact therewith, whereby each roller is movable toward and away from the shell independently of the other rollers, and the spring pressure operates to cause the roller to force the material through the perforations of the shell.

5. A machine of the character described, comprising a revoluble perforated shell, a plurality of rollers contacting the inner per-

forated surface of the shell, and arranged in staggered relation, spring means supporting each roller and pressing it into contact with the shell to force the material through the perforations thereof, and scraper means located inside the shell and associated with said rollers and operating to move the material lengthwise of the shell successively from the path of one roller into the path of successive rollers.

6. A machine of the character described, comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell and disposed end to end lengthwise thereof, and scraper means associated with each roller and located in rear thereof, said scraper means being substantially fixed in relation to the shell and operated to progressively move the material lengthwise of the shell from the path of one roller into the path of an adjacent roller.

7. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell, and disposed end to end lengthwise thereof, and scrapers associated with said rollers for moving the material lengthwise of the shell from the path of one roller into the path of the next adjacent roller.

8. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell, and disposed end to end lengthwise thereof, and an inclined scraper in rear of each roller for moving the material from the path of each roller into the path of the next adjacent roller.

9. A machine of the character described comprising a revoluble perforated shell, a support extending through the shell lengthwise thereof, a plurality of rollers contacting the inner surface of the shell, and spring means connecting each roller with the said support.

10. A machine of the character described comprising a revoluble perforated shell, a support extending through the shell lengthwise thereof, a plurality of rollers contacting the inner surface of the shell, and a leaf spring connecting each roller with said support, each spring being deflected in the direction of rotation of said shell.

11. A machine of the character described comprising a revoluble perforated shell, a support extending through the shell lengthwise thereof, a plurality of rollers contacting the inner surface of the shell, said rollers being spaced apart circumferentially of the shell and traveling in different paths, and means for moving the material from the rear of one roller to a point in front of an adjacent roller.

12. A machine of the character described comprising a revoluble perforated shell, a

plurality of rollers contacting the inner surface of the shell and arranged in staggered relation, means for supporting each roller whereby it is movable toward and away from the shell, independently of the other rollers, and means for moving the material lengthwise of the shell, consisting of an inclined scraper in rear of one roller but in advance of the adjacent roller.

13. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell and arranged in staggered relation, means for supporting each roller whereby it is movable toward and away from the shell, independently of the other rollers, and means for moving the material lengthwise of the shell, consisting of an inclined scraper in rear of one roller but in advance of the adjacent roller, and means for removing material from between the rollers and scrapers.

14. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell and arranged in staggered relation, means for supporting each roller whereby it is movable toward and away from the shell, independently of the other rollers, means for moving the material lengthwise of the shell and consisting of an inclined scraper in rear of one roller but in advance of the adjacent roller, a pivoted bar between each roller and the scraper in rear thereof, and means for swinging said bars.

15. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell and arranged in staggered relation, means for supporting each roller whereby it is movable toward and away from the shell, independently of the other rollers, means for moving the material lengthwise of the shell and consisting of an inclined scraper in rear of one roller but in advance of the adjacent roller, a pivoted bar between each roller and the scraper in rear thereof, and means for swinging simultaneously said bars.

16. A machine of the character described comprising a revoluble perforated shell, a

plurality of external bands or hoops surrounding said shell, and a plurality of rollers contacting the inner surface of the shell, and arranged to have their end portions travel on that part of the shell covered by the bands or hoops.

17. A machine of the character described comprising a revoluble perforated shell, a plurality of external bands or hoops surrounding said shell, a plurality of rollers contacting the inner surface of the shell, and arranged to have their end portions travel on that part of the shell covered by adjacent bands or hoops, and a plurality of grooved-supporting wheels receiving said hoops or bands, and located at the lower opposite sides of the shell.

18. A machine of the character described comprising a revoluble perforated shell, a plurality of rollers contacting the inner surface of the shell and arranged in staggered relation, and means for supporting each roller whereby it is movable toward and away from the shell, independently of the other rollers, and means for moving the material lengthwise of the shell and consisting of an inclined scraper in rear of one roller but in advance of the adjacent roller, the ends of adjacent scrapers overlapping.

19. A machine of the character described, comprising a revoluble perforated shell, a roller contacting the inner surface of the shell, a scraper engaging the inner surface of the shell and a scraper engaging the outer surface of the shell over the path covered by the first-named scraper.

20. A machine of the character described, comprising a revoluble perforated shell, a plurality of external bands or hoops surrounding said shell, a plurality of rollers contacting the inner surface of the shell, and bridging the space between said bands or hoops, and scrapers contacting the external surface of said shell between said bands or hoops.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM D. FRERICHS.

Witnesses:

M. E. McNINCH,
C. G. HEYLMUN.