

No. 714,679.

Patented Dec. 2, 1902.

L. B. EBERLY.
BELT AND ROLLER PRESS.

(Application filed Feb. 27, 1902.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

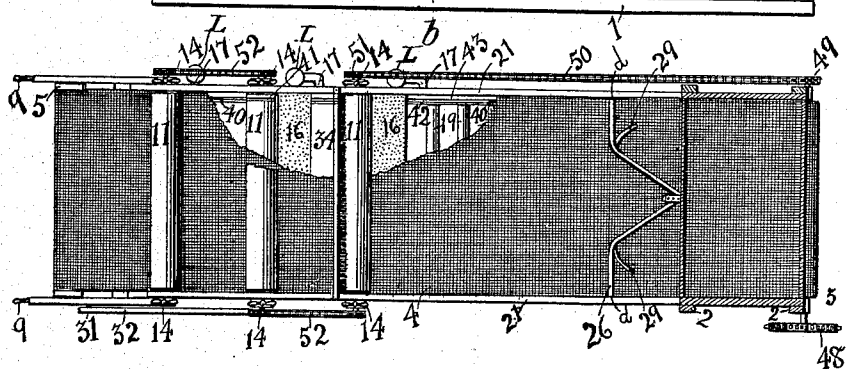
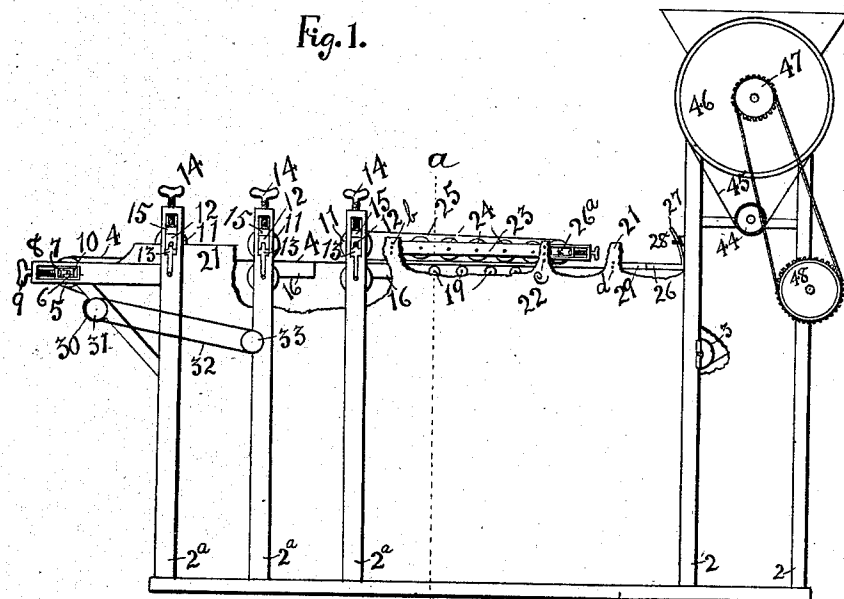


Fig. 2.

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Fig. 3.

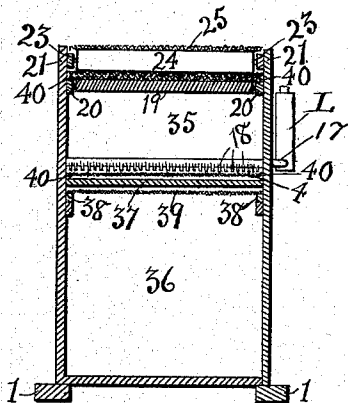


Fig. 4.

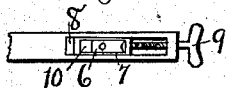
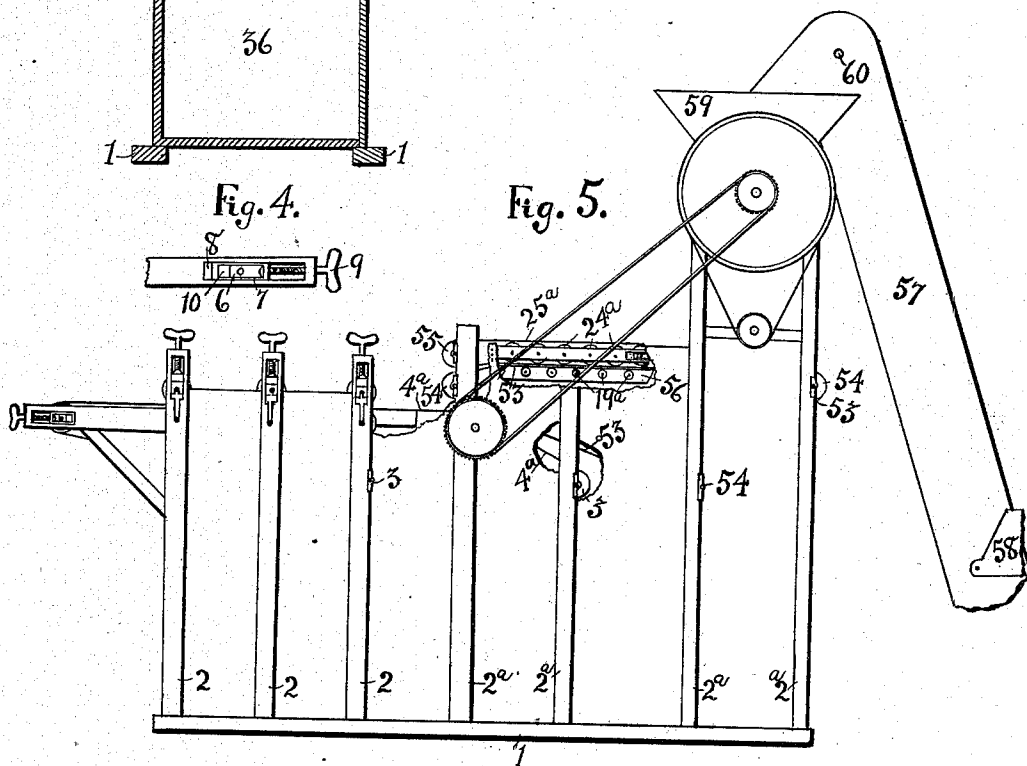


Fig. 5.



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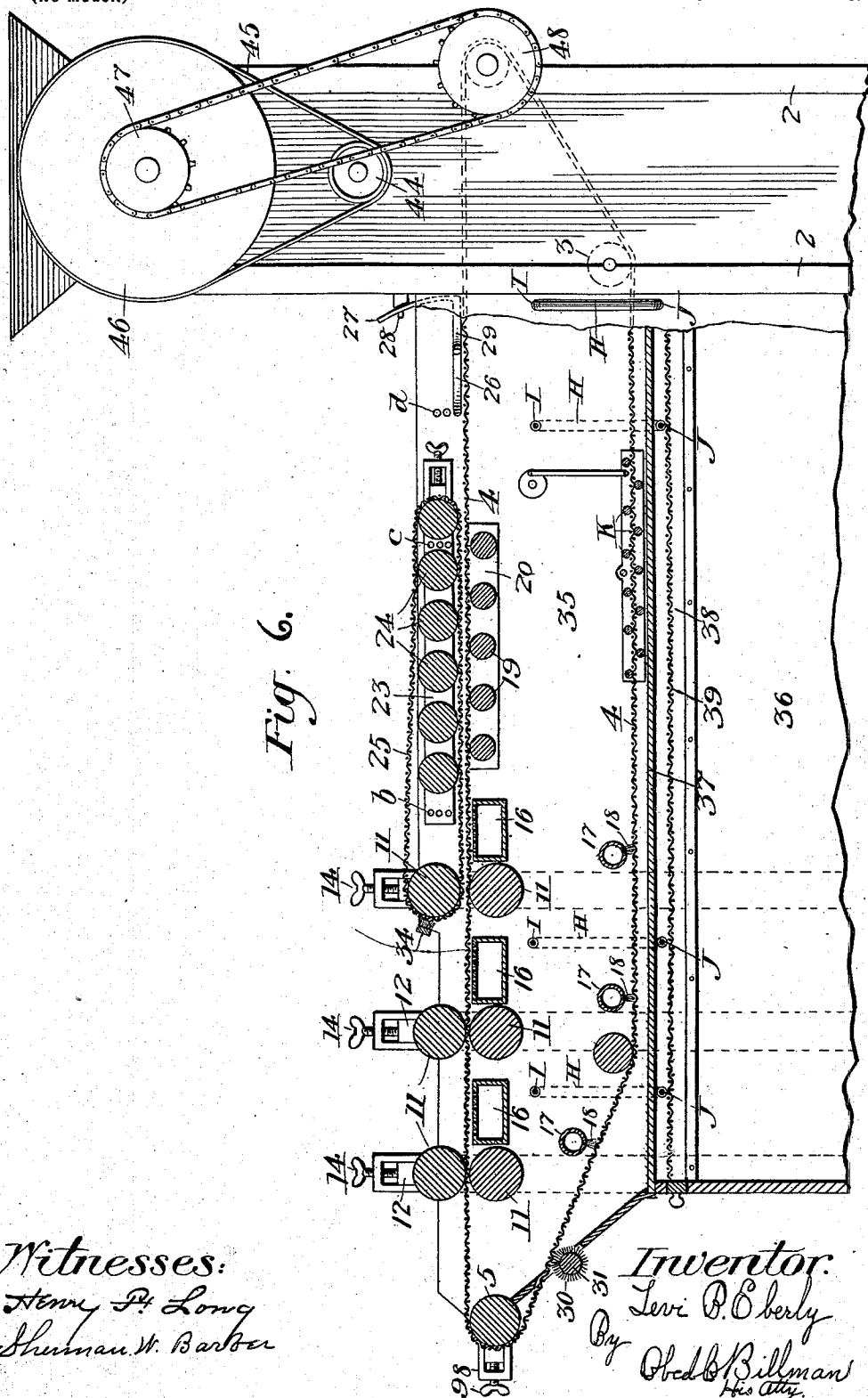
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(No Model.)

3 Sheets—Sheet 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

LEVI B. EBERLY, OF SMITHVILLE, OHIO.

BELT-AND-ROLLER PRESS.

SPECIFICATION forming part of Letters Patent No. 714,679, dated December 2, 1902.

Application filed February 27, 1902. Serial No. 96,008. (No model.)

To all whom it may concern:

Be it known that I, LEVI B. EBERLY, a citizen of the United States, residing at Smithville, in the county of Wayne and State of Ohio, have invented certain new and useful Improvements in Belt-and-Roller Presses, of which the following is a specification.

The object of my invention is to extract liquids from solids when the latter are reduced to a granular, ground, pulverized, or pulpy state.

While my invention relates, primarily, to improvements in that class of machines known as "belt-and-roller cider-mills," in which grinder and press are combined and operated simultaneously, it may be found equally useful used singly or in partial combination with other machines in desiccating many substances, such as salt, sugar, exhaust barley malt, commercial fertilizer, &c.

With this end in view my invention consists in the novel construction, arrangement, and combination of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

Referring to the drawings, Figure 1 is a side elevation of the press, a portion of its side wall being broken away in order that the construction and arrangement of some of its parts may be more readily seen. Fig. 2 is a plan view, a portion of the endless carrier-apron and one of the upper presser-rollers being broken away and the upper frame of rollers removed for a similar purpose. Fig. 3 is a transverse sectional view taken on line *a b* of Fig. 1. Fig. 4 is a detail view of the adjustable bearings for regulating the tension of the endless aprons. Fig. 5 is a side elevation of a modification of the press. Fig. 6 is a sectional longitudinal view of the press.

Similar characters of reference indicate like parts throughout all the figures of the drawings.

1 designates the base-frame, to which the lower ends of the upright posts 2 are attached.

3 designates carrier-rollers mounted in suitable bearings attached to the frame of the press and over which moves an endless carrier-apron 4. For the purpose of adjusting the tension of the endless carrier-apron 4, to be made of foraminous material, a carrier-

roller 5 is mounted in adjustable bearings 6, (see Fig. 4,) carried by a boxing or frame 7, which is held in position by ways formed in the sides of the slot 8 of the supporting-frame, which frame 7 is adjustable by means of a thumb-screw or bolt 9. Behind the bearings 6 is interposed a piece of rubber 10 or a spring, if preferable, for the purpose of giving elasticity to the bearings 6.

11 designates a series of sets of presser-rollers mounted in suitable bearings formed near the top of the upright posts 2^a.

For the purpose of regulating the pressure of the upper presser-rollers upon the lower ones the ends of the shafts of the upper presser-rollers are mounted in bearings 12, mounted in slots 13 and held in position by means of ways formed in the sides of said slots, (which will thus permit of a vertical movement of the bearings 12,) and the thumb-screws 14, the ends of which rest upon a piece of rubber 15, or a spring, if preferable, resting upon the bearings 12.

In order to prevent an accumulation of material before the presser-rollers 11 and hasten the flow of fluid through the carrier-apron 4, vacuum-boxes 16, covered with metallic screens, are placed immediately in front of said presser-rollers, over which passes the endless carrier-apron 4. These boxes are exhausted by means of a suitable pump L, and the fluid thus pumped from the vacuum-boxes is pumped and thrown in jets against the top side (or under, if preferable) of the returning endless carrier-apron 4 by means of pipes 17, provided with perforations or tubes 18, or by some other suitable and convenient device for throwing jets, for the purpose of removing and disengaging from the meshes of the endless carrier-apron any material or pulp that may have adhered to it.

Beneath the endless carrier-apron 4 and in front of the first vacuum-box 16 is mounted a series of rollers 19, mounted in suitable bearings of a frame 20, as shown in Fig. 3, attached to the insides of the upwardly-extending edge 21 of the walls or sides 22 of the press.

23 designates a frame containing and carrying a series of rollers 24, mounted in suitable bearings therein and pivotally attached at its rear end near the front set of presser-

rollers 11, as at *b*, to the upwardly-extending edge 21.

Passing around and covering the series of rollers 24 and carried by them is an endless apron 25, which receives its motion from the first upper presser-roller 11, around which it extends and revolves, transmitting power to the entire series of rollers 24 and moving in conjunction with the main endless carrying-apron 4.

In order to provide for the adjustment of the endless apron 25, the last of the series of rollers 24 at the free end of the frame 23 is mounted, like carrier-roller 5, in an adjustable bearing 26^a with thumb-screw. (See Fig. 4.) The endless apron 25 may be made pervious or impervious to fluid, as may be found most practical. Furthermore, if desirable, the endless apron 25 need not pass over and receive its motion from the first upper presser-roller 11, as shown in Fig. 1, but may pass over the series of rollers 24 only, and any one or more of them may be provided with a suitable pulley and belting communicating with some other suitable source of power.

It will be seen that the rollers of the series of rollers 24 and 19, unlike presser-rollers 11, do not bear or press directly against each other, but between each other, on the endless aprons 4 and 25. This is done for the purpose of hastening the flow or percolation of the fluid through the endless carrier-apron 4 and also to prepare and distribute the material or pulp for the action of the presser-rollers 11, hereinbefore described.

The free end of the frame 23 is attached, as at *c*, to the upwardly-extending edge 21 by means of a spring-latch or some other suitable and convenient device, whereby the series of rollers 24 may be set at any desirable height from the endless carrier-apron 4, and the pressure of the same upon the endless carrier-apron 4 may be regulated under spring tension, so that if a large mass of pulp or material is passed between the endless aprons 4 and 25 the upper frame 23, carrying the series of rollers 24, will be caused to move or yield upwardly.

26 designates a substantially V-shaped adjustable spreader having its outwardly and rearwardly extending arms pivotally attached, as at *d*, to the upwardly-extending edge 21 of the side walls 22 of the press. It is disposed horizontally just above the endless carrier-apron 4, with its vertex just above the center of the same and extending forward and provided with an upwardly-extending spring-arm 27, having a series of openings adapted to take over a pin 28, attached to the wall of the press.

29 designates forwardly and outwardly extending arms attached to or integral with the rearwardly-extending arms of the spreader 26 and designed to prevent the shoving of the material or pulp to the margin of the carrier-apron 4. The function of the adjustable

spreader 26 is to evenly distribute the material or pulp on the carrier-apron 4, and being adjustably attached, as at *d* and 28, it may be readily set at any desired elevation from the carrier-apron 4, so as to regulate the thickness of the layer of the material or pulp as it comes from the front on the carrier-apron, where it has fallen from the grinding-cylinder above.

In order to preclude the possibility of any material or pulp clinging to the endless aprons 4 and 25, there is mounted at the rear of the press a rotary brush 30, mounted on a shaft and journaled in suitable bearings and provided with a pulley 31, to which motion is imparted by a belt 32, connected with a pulley 33, mounted on the shaft of the roller 3, and at the rear of the first presser-roller 11 there is adjustably mounted on the edges of the upwardly-extending edge 21 of the walls 22 of the press a brush 34, which will brush from the endless apron 25 any material or pulp that may have adhered to it, and the material or pulp thus detached will fall upon the endless apron 4 and be carried through the succeeding presser-rollers 11. Brushes may be attached at any other suitable and convenient places, if found necessary or desirable, and any suitable means may be provided for regulating the pressure of the brushes on the endless aprons 4 and 25. 35 designates the upper tank, and 36 the lower tank, for containing the extracted fluid, and 37 designates the bottom of the upper tank. (See Fig. 3.)

As a further means of removing and disengaging from the meshes of the returning endless carrier-apron 4 any material or pulp that may have adhered to it it will be seen that I return the apron 4 through the fluid contained in the upper tank 35 near its bottom 37, and the same may be passed through a series of rollers K, similar to 19 and 24, hereinbefore described, or some other suitable means for freeing its meshes of any material or pulp that may have adhered to it, and, furthermore, any suitable and convenient device may be attached to said rollers whereby the same may be given a vertical motion and the carrier-apron 4 be thus agitated while passing through the same.

38 designates a filter box or drawer (shown in Fig. 3) designed to serve as a cover for the lower tank 36. This filter-box has a wire or metallic bottom and is covered with a suitable filtering-cloth 39, fastened to its sides and ends. It acts as a cover for the entire lower tank 36 and receives and filters the fluid from the upper tank. The fluid from the upper tank is conducted to the lower tank by means of pipes H, which carry the fluid from the openings I, in the side walls, to the lower tank, and is discharged through the openings J, just above the filtering-cloth 39.

The endless carrier-apron 4 has a cord or rope 40 in a hem in each margin which runs in an annular groove 41 near each end of the lower presser-rollers 11 and a groove 42 in

the strips 43, over which the margin of the endless carrier-apron 4 passes when in motion. This is to add strength to the apron 4 and keep it in position.

5 The grinding-cylinder is of the usual pattern placed near the front end of the press just above the carrier-apron 4 and provided at one end of its shaft with a pulley and belting communicating with a suitable source of power. At the other end it is provided with a pulley 44, provided with a belt 45, which runs over a large pulley 46, fastened to the end of a shaft which extends through the feed-hopper above the cylinder and has mounted thereon a feed-cylinder (not shown in drawings) which aids and regulates the feed to the grinding-cylinder below. Mounted on the same shaft or attached to the large pulley 46 is a sprocket-wheel 47, which transmits its motion to a sprocket-wheel 48, mounted on one end of the shaft of the carrier-roller 3, over which passes the endless carrier-apron 4. Upon the opposite end of the shaft of this carrier-roller 3 is mounted a sprocket-wheel 49, which transmits its motion to the first set of presser-rollers 11 by means of a sprocket-chain 50, running thereon and over a sprocket-wheel 51, mounted on the lower presser-roller 11.

30 From the first set of presser-rollers 11 motion is transmitted in a similar manner to the remaining sets of presser-rollers 11 by means of sprocket-chains 52.

If found necessary or desirable, cog-wheels meshing with each other may be mounted on the ends of the shafts of the presser-rollers 11.

In the operation of the machine the material or pulp drops from the grinder upon the endless carrier-apron 4 and is carried to the front end of the endless apron 25, traveling in the same direction, passing thereunder, and is subjected to the pressing action of the series of rollers 19 and 24, where a considerable portion of its fluid is extracted and forced through the meshes of the endless carrier-apron 4. After passing between the rollers 19 and 24 it is brought over and above the first vacuum-box 16 in front of the first of the series of presser-rollers 11, where the fluid yet remaining is subjected to the suction exerted by the action of the vacuum-box and is drawn through the meshes of the carrier-apron 4 into the vacuum-box, and the fluid thus extracted is forced by a suitable pump L through a pipe 17 and is thrown from the openings 18 in a series of jets against the returning endless carrier-apron 4 to free its meshes of any material or pulp that may have been forced therein by the action of the presser-rollers 11.

60 In "belt-and-roller presses," heretofore invented there has been a tendency to an accumulation of material or slush before the presser-rollers; but by means of the action of the devices just described I aim to overcome this tendency. There has also been a tendency in machines of this class to a filling up of the meshes of the endless aprons with ma-

terial or pulp, and by means of the construction of the machine as herein described, I aim to overcome this tendency. As the material or pulp is passed along and is subjected to the action of the presser-rollers 11 and vacuum-boxes 16, placed in front of each set of presser-rollers 11, the fluid contained therein is effectually pressed and extracted therefrom. It will be understood that, if necessary, or desirable more presser-rollers and vacuum-boxes may be added than shown in the drawings and the machine may be correspondingly lengthened.

Fig. 5 represents a modification of my improved press.

As shown, instead of having the endless carrier-apron 4^a extending the entire length of the machine I mount it as shown, and it is simply used in carrying the pulp or material through the presser-rollers.

53 designates an auxiliary endless carrier-apron, made of non-corrosive woven wire and mounted on the carrier-rollers 54 and designed to carry the pulp or material from beneath the grinding-cylinder and over the series of rollers 19^a and beneath the series of rollers 24^a and endless apron 25^a, carried thereby.

It will be seen that the series of rollers 24^a are mounted in a similar manner to that hereinbefore described; but instead of the endless apron 25^a passing around and receiving its motion from the first upper presser-roller it passes around and receives its motion from a carrier-roller 55, mounted on a shaft and journaled to the upright posts 2^a, as shown, and may be provided with pulleys and belting communicating with any suitable source of power.

56 designates a wide and shallow vacuum-box operated in a similar manner to those hereinbefore described and designed to assist the series of rollers 19^a and 24^a in hastening the flow or percolation of the fluid through the endless carrier-apron 53.

57 designates an elevator-box provided near its lower end with a pivoted box 58 to receive the material to be ground from below and carry it to the feed-hopper 59, where it is fed to the grinding-cylinder below by means of the feed-cylinder hereinbefore mentioned. The elevator-belt receives its motion from a shaft 60 at its upper end, provided with a pulley and belting communicating with a pulley mounted on one end of the shaft of the feed-cylinder. (Not shown in drawings.)

I do not desire to limit myself to the exact details of construction and form and proportion of parts herein shown and described, as I am aware that many changes therein can be made without departing from the principles or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A roller-press consisting of a suitable

frame, carrier-rollers mounted thereon, an endless carrier-apron of foraminous material carried by the said carrier-rollers; a series of presser-rollers properly mounted and adapted to receive the endless carrier-apron, vacuum-boxes mounted in front of said presser-rollers and beneath the endless carrier-apron, a second series of rollers mounted beneath the endless carrier-apron and in front of the first set of presser-rollers and first vacuum-box, a frame carrying a third series of rollers pivotally mounted above the said endless carrier-apron in front of the first set of presser-rollers, an endless apron carried by and passing over the said third series of rollers and over the first upper presser-roller, and a spreader mounted above the endless carrier-apron and in front of said series of rollers.

2. A roller-press consisting of a suitable frame provided with side and end walls, an upper and a lower tank formed within said walls, carrier-rollers mounted on said frame, an endless carrier-apron of foraminous material carried by said carrier-rollers and adapted to be returned within said upper tank, a series of presser-rollers properly mounted and adapted to receive the endless carrier-apron, vacuum-boxes mounted in front of said presser-rollers and beneath the endless carrier-apron, a second series of rollers mounted beneath the endless carrier-apron, a frame carrying a third series of rollers pivotally mounted above the said endless carrier-apron and said second series of rollers, an endless apron carried by and passing over the said third series of rollers and over the first upper presser-roller, and a spreader mounted above the endless carrier-apron.

3. A roller-press consisting of a suitable frame provided with side and end walls, an upper and a lower tank formed within said walls, a filter box or drawer slidably mounted and interposed between said side walls and above the lower tank, carrier-rollers mounted on said frame, an endless carrier-apron of foraminous material mounted thereon and returned on carrier-rollers within said upper tank, a series of presser-rollers properly mounted and receiving said carrier-apron, vacuum-boxes mounted beneath the endless carrier-apron, a second series of rollers mounted beneath said carrier-apron, a third series of rollers mounted above the said carrier-apron and said second series of rollers, and an endless apron carried by and passing over the said third series of rollers.

4. In a roller-press, the combination with a suitable frame provided with side and end walls, an upper and a lower tank formed within said walls, a filter box or drawer mounted and interposed between said side walls forming a cover for said lower tank, carrier-rollers mounted on said frame and carrying an endless carrier-apron of foraminous material returned within said upper tank; of a series of presser-rollers properly mounted and

receiving said carrier-apron, vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron, a second series of rollers mounted beneath the carrier-apron, a frame carrying a third series of rollers mounted above said carrier-apron and said second series of rollers, an endless apron carried by and passing over the said third series of rollers and over the first upper presser-roller, and a spreader mounted above the carrier-apron and in front of said series of rollers.

5. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a suitable frame, and a series of presser-rollers properly mounted and receiving said carrier-apron; of a second series of rollers mounted beneath the carrier-apron, a third series of rollers mounted above said carrier-apron and said second series of rollers, and an endless apron carried by and passing over said third series of rollers and above said carrier-apron.

6. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a suitable frame; of a series of presser-rollers properly mounted and receiving said carrier-apron, and vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron.

7. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a suitable frame; of a series of presser-rollers properly mounted and receiving said carrier-apron, vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron, a second series of rollers mounted beneath the carrier-apron, a frame carrying a third series of rollers mounted above said carrier-apron and said second series of rollers, and an endless apron carried by and passing over the said third series of rollers and over the first upper presser-roller.

8. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a suitable frame; of presser-rollers properly mounted and receiving said carrier-apron, a vacuum-box mounted in front of said presser-rollers and beneath said carrier-apron, and means for creating a vacuum in said vacuum-box.

9. In a roller-press, the combination with a suitable frame provided with side and end walls forming a suitable tank, an endless carrier-apron of foraminous material carried by carrier-rollers mounted on said frame and returned through the extracted fluid contained in said tank, presser-rollers properly mounted and receiving said carrier-apron, and a vacuum-box mounted in front of said presser-rollers and beneath said carrier-apron; of means for creating a vacuum in said vacuum-box, and means for agitating the carrier-apron while returning in said extracted fluid.

10. In a roller-press, the combination with

an endless carrier-apron of foraminous material; of a vacuum box or boxes mounted beneath said carrier-apron, and means for creating a vacuum in said vacuum box or boxes.

11. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a suitable frame and returned in the extracted fluid; of a series of presser-rollers properly mounted and adapted to receive said carrier-apron, a series of vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron, a second series of rollers mounted beneath said carrier-apron, and a frame carrying a third series of rollers and an endless apron passing over said rollers, mounted above said second series of rollers and said carrier-apron.

12. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers properly mounted on a suitable frame, a series of presser-rollers properly mounted and receiving said carrier-apron, a series of vacuum-boxes mounted in front of said presser-rollers, and beneath said carrier-apron; of a second series of rollers mounted beneath said carrier-apron; and a frame carrying a third series of rollers and an endless apron passing over said rollers, mounted above said second series of rollers and carrier-apron.

13. In a roller-press, the combination with an endless carrier-apron of foraminous material; of a series of vacuum-boxes and rollers mounted beneath the carrier-apron, and a frame carrying a series of rollers and an endless apron passing over said rollers, mounted above said first-mentioned rollers and carrier-apron.

14. In a roller-press, the combination with an endless carrier-apron of foraminous material mounted on a suitable frame, a series of presser-rollers properly mounted and receiving said carrier-apron, a vacuum-box or series of vacuum-boxes mounted beneath said carrier-apron, and a second series of rollers mounted beneath said carrier-apron; of a frame carrying a third series of rollers and an endless apron passing over said rollers, mounted above said endless carrying-apron.

15. In a roller-press, the combination with an endless carrier-apron of foraminous material mounted on a suitable frame, vacuum-boxes mounted beneath said carrier-apron, and suitable pumps for creating a vacuum in said vacuum-boxes and adapted to throw the extracted fluid against the returning carrier-apron; of means for agitating the returning carrier-apron while returning in the extracted fluid.

16. In a roller-press, the combination with a suitable frame provided with side and end walls, an upper and a lower tank formed within said walls, and an endless carrier-apron of foraminous material carried by carrier-rollers mounted on said frame and returned through

the extracted fluid contained in said upper tank; of a series of vacuum-boxes mounted beneath said carrier-apron, suitable pumps for emptying said vacuum-boxes and adapted to throw the extracted fluid against said carrier-apron while returning in said upper tank, and means for agitating the carrier-apron while returning in said extracted fluid.

17. In a roller-press, the combination with an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a frame; of a series of presser-rollers properly mounted and receiving said carrier-apron, vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron, a second series of rollers mounted beneath the carrier-apron, a frame carrying a third series of rollers mounted above said carrier-apron and said second series of rollers, and an endless apron carried by and passing over the said third series of rollers carried in said frame.

18. In a roller-press, the combination with an endless carrier-apron of foraminous material, and a series of presser-rollers properly mounted and receiving said carrier-apron; of a series of vacuum-boxes mounted in front of said presser-rollers and beneath the carrier-apron, suitable pumps for emptying said vacuum-boxes, and pipes leading from said pumps and mounted in the upper tank, above the returning endless carrier-apron, and adapted to throw the extracted fluid against said returning endless carrier-apron.

19. In a roller-press, an endless carrier-apron of foraminous material carried by carrier-rollers mounted on a frame, and a substantially V-shaped spreader adjustably mounted above the carrier-apron and provided with forwardly and outwardly extending arms to prevent the shoving of the material or pulp to the margin of the carrier-apron.

20. In a roller-press, the combination with an endless carrier-apron; of an approximately V-shaped spreader adjustably mounted above the carrier-apron and adapted to evenly distribute the material or pulp upon the same.

21. In a roller-press, the combination with a suitable frame provided with side and end walls, and an upper and a lower tank formed within said walls; of an endless carrier-apron carried by carrier-rollers mounted on said frame and returned through the fluid contained in said upper tank, and means for agitating the same while returning therein for the purpose of removing and disengaging from its meshes any material that may have adhered to it.

22. In a roller-press, the combination with an endless carrier-apron of foraminous material and a series of presser-rollers properly mounted and adapted to receive the same; of a second series of rollers mounted beneath said carrier-apron, a vacuum-box or series of vacuum-boxes mounted beneath said carrier-apron, and a frame carrying a third series of

rollers and an endless apron passing over said rollers mounted above said second series of rollers and said carrier-apron.

23. In a roller-press, the combination with
5 an endless carrier-apron of foraminous material; of a series of vacuum-boxes mounted beneath said carrier-apron, suitable pumps for emptying said vacuum-boxes, and pipes
10 leading from said pumps and mounted in the upper tank, above the returning endless carrier-apron, and adapted to throw the extracted fluid against said returning endless carrier-apron.

24. In a roller-press, the combination with an endless carrier-apron of foraminous material; of a vacuum-box or series of vacuum-boxes mounted beneath said carrier-apron, and suitable pumps for creating a vacuum in said vacuum box or boxes.

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

LEVI B. EBERLY.

Witnesses:

GERRY G. GALLAGHER,
JOSEPH GALLAGHER.