

A. S. MACKENZIE.
PRESS FOR EXTRACTING LIQUID FROM MATERIALS.
APPLICATION FILED JUNE 23, 1910.

1,030,594.

Patented June 25, 1912.

2 SHEETS—SHEET 1.

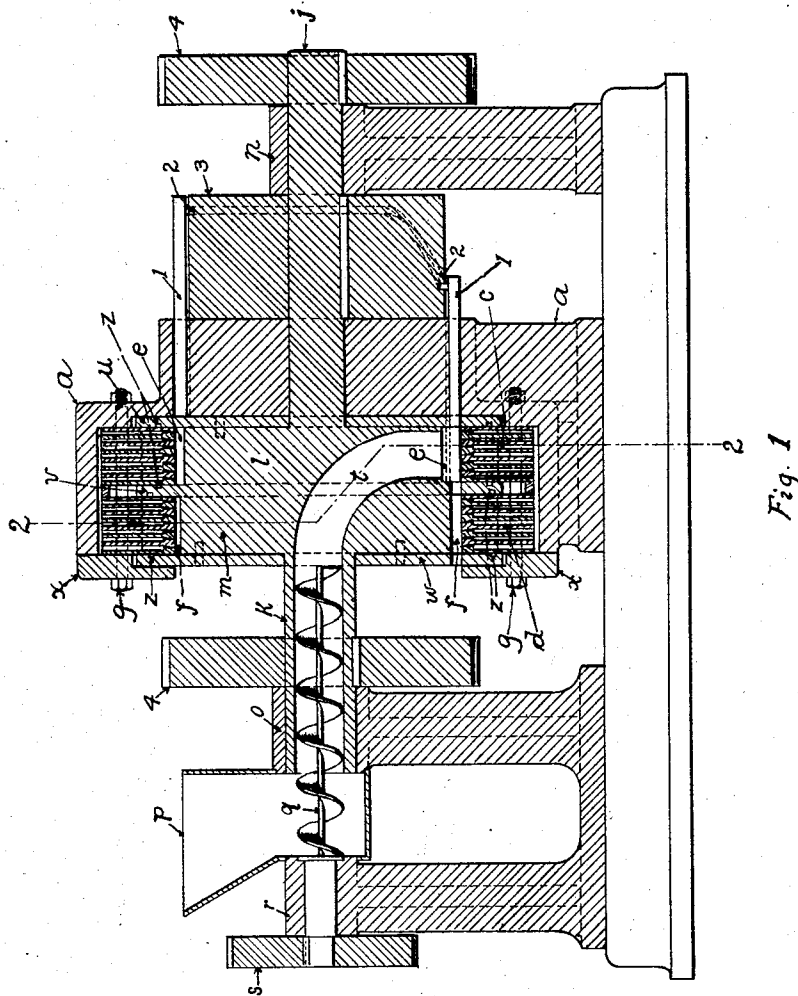


Fig. 1

WITNESSES:

L. F. Browning
M. Dutton.

INVENTOR

Alexander S. Mackenzie
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Edward C. Davidson
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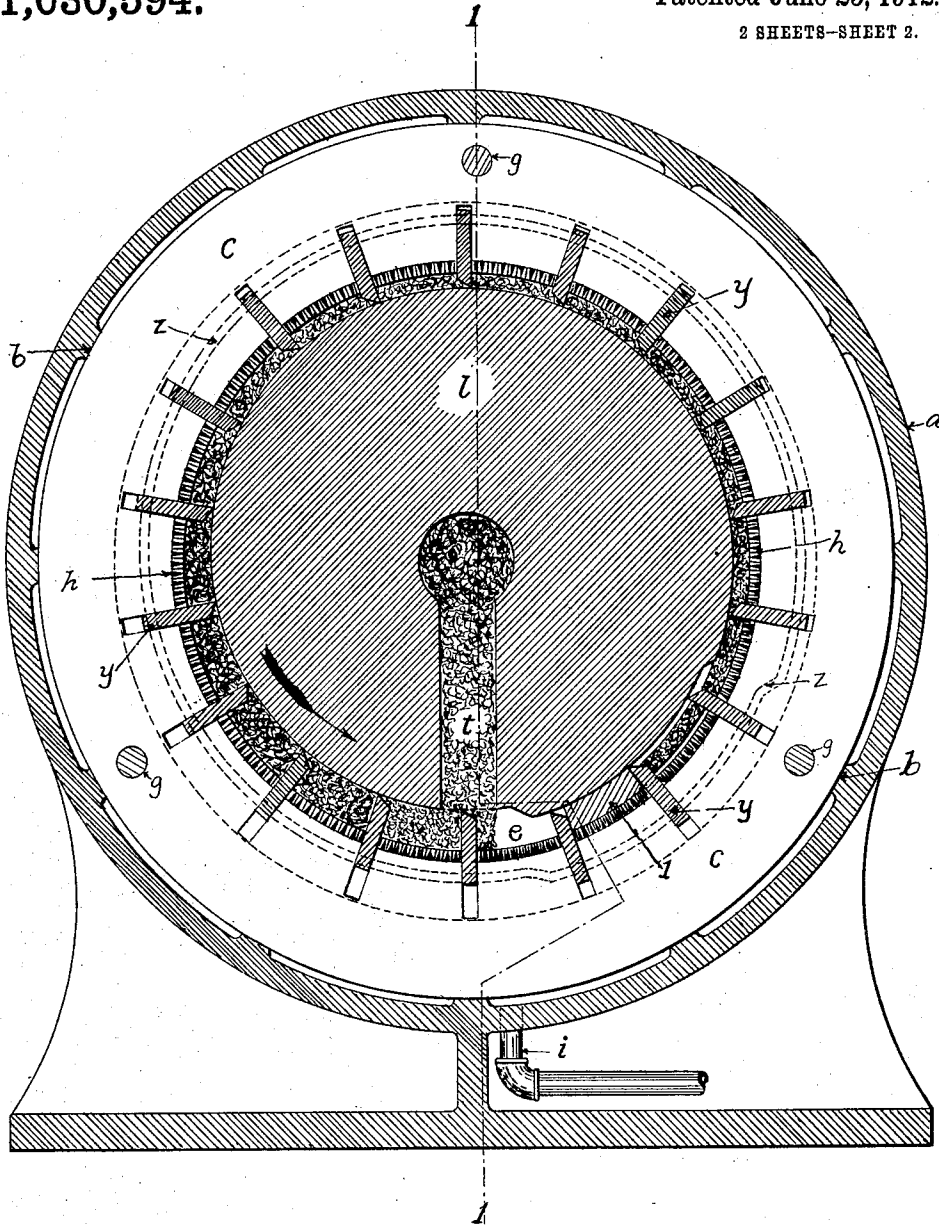


Fig. 2

WITNESSES:

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M. Dutton

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UNITED STATES PATENT OFFICE.

ALEXANDER S. MACKENZIE, OF ELIZABETH, NEW JERSEY, ASSIGNOR OF ONE-HALF TO
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PRESS FOR EXTRACTING LIQUID FROM MATERIALS.

1,030,594.

Specification of Letters Patent.

Patented June 25, 1912.

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To all whom it may concern:

Be it known that I, ALEXANDER S. MACKENZIE, a citizen of the United States of America, residing in Elizabeth, in the county of Union, State of New Jersey, have invented a certain new and useful Improved Press for Extracting Liquid from Materials, of which the following is a specification.

The press forming the subject matter of this invention comprises an annular compressing chamber having circumferential walls so formed and related that the radial dimensions of the chamber vary in different parts thereof, and the material fed to the chamber is gradually compressed as the circumferential walls are circularly relatively moved; means for dividing the annular chamber into compartments, such as partitions fitted to radially slide in one of the circumferential walls: means for feeding the material to be compressed to the compartments when at their greatest width; and means for discharging the compressed material from the compartments after being reduced to their minimum width or thickness. A press embodying these features is particularly adapted to compress pulposus or juicy materials. One or more of the walls of the annular chamber may be perforated for the escape of liquids extracted from the material by compression.

An important feature pertaining to this press is that the annular chamber may be so formed that the material after being compressed may be held in a compressed quiescent condition for a desired period of time thereby permitting a gradual and complete seepage or drainage of the liquids or juices from the pulp or moist material being treated.

In treating some pulps or other moist material it may be advantageous to submit them to a further compression and drainage after treatment in an annular chamber as hereinbefore suggested, and to accomplish this it is proposed to provide a second annular chamber arranged by the side of, and having the same character as, but of less width than the first mentioned chamber. The means for discharging compressed material from the first mentioned chamber may be adapted to deliver it to the second annular chamber and to discharge the finally

compressed material from the latter chamber.

The accompanying drawings illustrate a practical embodiment of this invention.

Figure 1 is a longitudinal section on the line 1, 1 of Fig. 2. Fig. 2, a transverse section on an enlarged scale on the line 2, 2 of Fig. 1.

The machine shown is of a duplex character, that is, it has two annular chambers, and provides for a double compression and drainage of the pulp, etc., under treatment; but of course it will be understood that the omission of the parts forming the second annular compression chamber will in no way interfere with or detract from the operation of the other annular compression chamber.

The body or main frame *a* of the press has a cylindrical opening provided with a series of transverse ribs *b b*, which centralizes the two sets of flattened rings *c* and *d*, the inner circumferential surfaces of which constitute the outer stationary circular walls of the two annular compression chambers *e* and *f* respectively. Bolts or rods *g* are passed through the rings *c* and *d* and the body *a* to hold the rings stationary. When pulp or moist material is to be treated it is proposed to provide screens or sieves at one or more of the faces of the walls of the annular chamber; and this may be accomplished in a machine constructed as here described by making the inner edges of the rings *c* and *d* broader than their body portions by the formation of beads or ribs at said edges, the faces of which are scored or grooved, as shown at *h* Fig. 2, thus affording means for the flow of fluids or juices from the annular chamber between the narrow portions of the rings and from the cylindrical opening in the main frame *a* through the discharge pipe *i*.

Carried by the shafts *j*, *k*, are the solid disk pistons *l* and *m*, whose peripheries constitute the inner circumferential walls of the annular chambers. The shaft *j* has a bearing in the main frame *a* and is fitted to rotate in an out-bearing *n*. The shaft *k* is hollow, is supported by an out-bearing *o*, and is in communication with a feed hopper *p*. A feeding device, as a worm *q*, is located in the shaft *k* and its journal is supported in another out-bearing *r*, and it is driven by a gear or pulley *s*. The inner end of the pas-

sage in the shaft *k* is, by a curved continuation *t*, extended to the periphery of the disk piston *l* at the widest part of the annular chamber, so that the material placed in the hopper *p* will be fed to said wide part of the chamber. To provide side walls for the annular chambers *e* and *f* disks *u*, *v* and *w* are secured to and carried by the disk pistons, and the disks embrace the outer ones of the flattened rings *c* and *d*. A flange cover *x* secured to the main frame *a* holds the pistons *l* *m*, disks *u*, *v* and *w* and rings *c* and *d* in the circular opening of the frame.

At regular intervals in radial grooves formed in the rings *c* and *d* are fitted to slide gates or partitions *y*, that divide the annular compression chambers into compartments. These gates are controlled by cam grooves *z* formed in the sides of the disks *u*, *v*, and *w*, and embracing studs or rollers on their sides, and cause their extended edges to bear against the peripheries of the disk piston *l* and *m*.

As shown in Fig. 2, a portion of the annular chamber *e* has a gradually decreasing width from the widest part of the chamber by an increase in length of the radii of the disk piston *l* for about one-half of its circumference, and from the point about opposite the widest part the width of the chamber is uniform for a considerable portion of the circumference of the piston, and at the end of this latter portion is an enlargement connecting the uniform annular part of the chamber to its widest part. At this enlarged portion the compressed material is laterally discharged from the compartments of the chamber by the plunger 1 that is in line with said enlarged portion of the chamber; there being as many plungers 1 as there are compartments—each arranged to slide through the frame *a* and an opening in the disk *u* as said opening is successively set in front of the plungers. These plungers 1 are provided with rollers at their outer ends fitted to be acted upon by the groove 2 of the cam 3, secured to the shaft *j* to revolve with the disk pistons *l* and *m*. The acting plunger 1 pushes the compressed cake or plug of material through an opening in the disk *v*, into the widest part of the annular chamber *f* and at the same time the plug from the chamber *e* discharges a compressed plug of the material from the chamber *f* through an opening in the disk *w*.

As before stated the second compression chamber *f* and the parts of the machine belonging to it are in all essentials similar to the chamber *e* and its corresponding parts, with the exception that the chamber *f* is narrower than the chamber *e*, as clearly shown in Fig. 1.

Rotary motion is imparted to the disk pistons *l* and *m* through the medium of the gears or pulleys 4.

I claim:—

1. A press comprising an inclosed continuous annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform width in radial directions and means for changing in circular direction the relative position of the circumferential walls of the chamber.

2. A press comprising an inclosed continuous annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform width in radial directions and a third section or portion connecting the end of the narrow section to the wide end of the variable width section and means for changing in circular direction the relative position of the circumferential walls of the chamber, whereby the material in said annular chamber is compressed in the variable width section, held compressed in the uniform width section and released in compressed condition in the connecting enlarged section.

3. A press comprising an inclosed continuous annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform width in radial directions and a third section or portion connecting the end of the narrow section to the wide end of the variable width section, means for changing in circular direction the relative position of the circumferential walls of the chamber, whereby the material in said annular chamber is compressed in the variable width section, held compressed in the uniform width section and released in compressed condition in the connecting enlarged section and means for feeding the material to be compressed at its widest part.

4. A press comprising an inclosed continuous annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform width in radial directions and a third section or portion connecting the end of the narrow section to the wide end of the variable width section, means for changing in circular direction the relative position of the circumferential walls of the chamber, whereby the material in said annular chamber is compressed in the variable width section, held compressed in the uniform width section and released in compressed condition in the connecting enlarged section, means for feeding the material to be compressed at its widest part, gates or partitions slidably extending through one of the circumferential walls and abutting against the other wall of the chamber and so dividing

the chamber into pockets or compartments, means for controlling the partitions to keep their extended edges against the said other wall of the chamber, and means for dis-

5 charging the compressed material from the third section of the chamber or portion thereof connecting the end of the narrow section to the wide end of the variable width section.

10 5. A press comprising an inclosed continuous annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform
15 width in radial directions and a third section or portion connecting the end of the narrow section to the wide end of the variable width section, one of said walls being perforated for the escape of the liquid constituent of the material being compressed,
20 means for feeding pulposus material to the widest part of the chamber, means for changing in circular direction the relative position of the circumferential walls of the chamber, whereby the material in said
25 chamber is compressed in the variable width section, held compressed in the uniform width section and released in compressed condition in the connecting enlarged section,
30 sliding partitions extending through one of the circumferential walls, means for holding their free extending edges against the other circumferential wall and means for discharging the compressed material
35 from that portion of the annular chamber connecting the end of the narrow section to the wide end of the variable section.

6. A press comprising an inclosed continuous annular chamber having one of the circumferential walls circular and stationary,
40 the other circumferential wall being rotatable and having an irregular contour, means for circularly moving the irregular wall whereby all parts of the varying widths of
45 the annular chamber are successively set relatively to all parts of the stationary circular wall, sliding partitions extending through one of the circumferential walls, means for holding their extending edges
50 against the other circumferential wall, means for feeding the material to be compressed to the compartment formed by two of the partitions constituting the widest portion of the annular chamber and means
55 for discharging the compressed material as it leaves the narrowest part of said chamber.

7. A press comprising an inclosed continuous annular chamber having one of the circumferential walls circular and stationary,
60 the other circumferential wall being rotatable and having an irregular contour, one of said circumferential walls being perforated, means for circularly moving the irregular wall whereby all parts of the varying
65 widths of the annular chamber are succes-

sively set relatively to all parts of the stationary circular wall, sliding partitions extending through one of the circumferential walls and means for holding their extending edges against the other circumferential wall,
70 means for feeding the material to be compressed to the compartment formed by two of the partitions constituting the widest portion of the annular chamber and means for discharging the compressed material as
75 it leaves the narrowest part of said chamber.

8. A press comprising an annular chamber varying in width between the circumferential walls, another annular chamber by the side of and having the same characteristics as, but of lesser width than, the first
80 mentioned chamber, means for changing in circular direction the relative positions of the two circumferential walls of each of the annular chambers, means for feeding the
85 material to be compressed to the widest part of the first mentioned chamber, and means for transferring the compressed material from the first chamber to the other chamber and discharging the material, finally com-
90 pressed, from said other chamber.

9. A press comprising an annular chamber varying in width between the circumferential walls, one section or portion of it gradually decreasing in width in radial
95 directions, followed by another section or portion of uniform width in radial direction, another annular chamber by the side of it and having the same characteristics as, but of less width in all corresponding parts
100 than, the first mentioned chamber, means for changing in circular direction the relative positions of the two circumferential walls of each of the annular chambers, means for feeding the material to be com-
105 pressed to the widest part of the first mentioned chamber, and means for transferring the compressed material from the first chamber to the other chamber and discharging the material, finally compressed, from
110 said other chamber.

10. A press comprising an annular chamber varying in width between the circumferential walls, one section or portion of it gradually decreasing in width in radial
115 directions followed by another section or portion of uniform width in radial directions and a third section or portion connecting the end of the narrow section to the wide end of the variable width section, another
120 annular chamber by the side of and having the same characteristics as, but of less width in all corresponding parts than, the first mentioned chamber, means for changing in circular direction the relative positions of
125 the two circumferential walls of each of the annular chambers, means for feeding the material to be compressed to the widest part of the first mentioned chamber, and means for transferring the compressed ma-
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terial from the first chamber to the other chamber and discharging the material, finally compressed, from said other chamber.

5 11. A press comprising an annular chamber varying in width between the circumferential walls, another annular chamber by the side of and having the same characteristics as, but of less width than, the first
10 mentioned chamber, means for changing in circular direction the relative positions of the two circumferential walls of each of the annular chambers, gates or partitions
15 slidably extending through one of the circumferential walls of each of the chambers and abutting against the other walls of the chambers and so dividing the chambers into
20 pockets or compartments, means for controlling the partitions of each chamber to keep their extended edges against said other
walls of the respective chambers, means for feeding the material to be compressed to the widest part of the first mentioned chamber,
25 and means for transferring the compressed material from the first chamber to the other chamber and discharging the material, finally compressed, from said other chamber.

12. A press comprising an annular compression chamber having a section or portion gradually decreasing in width in radial directions which is followed by another section or portion of uniform width in radial directions and a third section or portion
30 connecting the end of the narrow section to the wide end of the variable width section, another compression chamber along-side of and having the same characteristics as, but with the corresponding parts of less width
35 than, the first mentioned chamber, means for changing in circular direction the relative position of the circumferential walls of the two chambers, whereby the material in said annular chamber is compressed in the
40 variable width section of each of the chambers, held compressed in the uniform width section of each of the chambers and released in compressed condition in the connecting enlarged section of each of the chambers,
45 means for feeding the material to be compressed to the first mentioned chamber, at its widest part, gates or partitions slidably extending through one of the circumferential walls and abutting against the other wall of
50 each of the chambers and so dividing the two chambers into pockets or compartments and means for controlling the partitions to keep their extended edges against the said other wall of each of the chambers.

60 13. A pulp press comprising an annular chamber varying in width between the circumferential walls, another annular chamber by the side of and having the same characteristics as, but of less width than the
65 first mentioned chamber, said chambers be-

ing of uniform width between their sides or end walls, one or more of the walls of each chamber being perforated for the escape of the fluids of the pulposus material being treated, means for changing in circular direction the relative positions of the two circumferential walls of each of the annular chambers, means for feeding the material to be compressed to the widest part of the first mentioned chamber, and means for transferring the compressed material from the first chamber to the other chamber and discharging the material, finally compressed, from said other chamber, sliding partitions extending through one of the circumferential walls of each of the chambers,
70 and means for holding their free extending edges against the other circumferential walls of the two chambers.

14. A press comprising an annular chamber having one of the circumferential walls circular and stationary, the other circumferential wall being rotatable and having an irregular contour, another annular chamber at the side of and having the same characteristics as the first mentioned chamber and means for circularly moving the irregular wall of each of the chambers whereby all parts of the varying widths of the two annular chambers are successively set
85 relatively to all parts of the stationary circular wall respectively of each of the chambers and means for feeding material that has been compressed in one chamber to the other chamber to be compressed therein.

15. A press comprising an annular chamber having one of the circumferential walls circular and stationary, the other circumferential wall being rotatable and having an irregular contour, another annular chamber at the side of and having the same characteristics as the first mentioned chamber and means for circularly moving the irregular wall of each of the chambers whereby all parts of the varying widths of the two annular chambers are successively set
100 relatively to all parts of the stationary circular wall respectively of each of the chambers, sliding partitions extending radially through one of the circumferential walls of each of the chambers, means for holding their extended edges against the other circumferential walls of the chambers, means for feeding the material to be compressed to the compartment formed by the portions constituting the widest part of the first mentioned chamber, and means for discharging the compressed material as it leaves the narrowest part of this chamber into the widest part of the other chamber.

16. A press comprising an inclosed continuous annular chamber having one of the circumferential walls circular and stationary, the other circumferential wall being rotatable and having an irregular contour,
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one of said circumferential walls being perforated, means for circularly moving the irregular wall whereby all parts of the varying widths of the annular chamber are successively set relatively to all parts of the stationary circular wall, sliding partitions extending through one of the circumferential walls, a flat disk at each side of the annular chamber, constituting the side walls thereof and provided with cam grooves into which work studs or rollers on the side edges of the sliding partitions.

17. A press comprising an inclosed continuous annular chamber having one of the circumferential walls circular and stationary, the other circumferential wall being rotatable and having an irregular contour, one of said circumferential walls being perforated, means for circularly moving the irregular wall whereby all parts of the varying widths of the annular chamber are successively set relatively to all parts of the stationary circular wall, sliding partitions extending through one of the circumferential walls, a flat disk at each side of and secured to the rotating irregular circumferential wall of the annular chamber constituting the side walls thereof and provided with cam grooves into which work studs or rollers on the side edges of the sliding partitions.

18. A press comprising an inclosed continuous annular chamber having its outer circumferential wall circular and stationary, and the other circumferential wall irregular in contour and forming the periphery of a rotatable piston whose bearings coincide with the axis of the stationary wall, sliding partitions extending through the circular stationary wall, and flat disks secured to the sides of the rotatable piston, constituting the side walls of the annular chamber and provided with cam grooves into which fit studs or rollers extending from the side edges of the sliding partitions, whereby the extended free edges of the partitions are held against the irregular shaped periphery of the piston.

19. A press comprising an annular chamber having its outer circumferential wall circular and stationary, and the other circumferential wall irregular in contour and forming the periphery of a rotatable piston whose bearings coincide with the axis of the stationary wall, one of said bearings being hollow and connected by a passage to the portion of the periphery of the piston which with the circular stationary wall constitutes the widest part of the annular chamber, a feeding device for forcing the material to be treated through the hollow bearing and the passage to the annular chamber, sliding partitions extending through the circular stationary wall, and flat disks secured to the sides of the rotatable piston, constituting the side walls of the annular chamber

and provided with cam grooves into which fit studs or rollers extending from the side edges of the sliding partitions, whereby the extended free edges of the partitions are held against the irregular shaped periphery of the piston.

20. A press comprising an annular chamber having its outer circumferential wall circular and stationary, and the other circumferential wall irregular in contour and forming the periphery of a rotatable piston whose bearings coincide with the axis of the stationary wall, one of said bearings being hollow and connected by a passage to the portion of the periphery of the piston which with the circular stationary wall constitutes the widest part of the annular chamber, a feeding device for forcing the material to be treated through the hollow bearing and the passage to the annular chamber, sliding partitions extending through the circular stationary wall, and flat disks secured to the sides of the rotatable piston, constituting the side walls of the annular chamber and provided with cam grooves into which fit studs or rollers extending from the side edges of the sliding partitions, whereby the extended free edges of the partitions are held against the irregular shaped periphery of the piston, openings in the flat disks at the wide part just following the narrowest part of the annular chamber, a laterally acting plunger for each of the compartments formed by two of the partitions, a cam on the shaft of the rotating piston adapted to push the plunger that is in line with the openings in the flat disks through the wide part of the annular chamber and so discharge the compressed material therefrom.

21. A press comprising an annular chamber having one of the circumferential walls circular and stationary composed of a series of rings whose inner circular edges are wider than their other parts and grooved or scored at their adjacent faces thereby imparting to the circular circumferential face of the annular chamber the nature of a strainer or sieve for the escape of fluids from pulpy materials treated in the press, the other circumferential wall being rotatable and having an irregular contour, means for circularly moving the irregular wall whereby all parts of the varying widths of the annular chamber are successively set relatively to all parts of the stationary circular wall, sliding partitions extending through one of the circumferential walls and means for holding their extending edges against the other circumferential wall.

22. A press comprising an annular chamber having its outer circumferential wall circular and stationary composed of a series of rings whose inner circular edges are wider than their other parts and grooved or scored

at their adjacent faces thereby imparting to the circular circumferential face of the annular chamber the nature of a strainer or sieve for the escape of fluids from pulposus materials treated in the press.

23. A press comprising an annular chamber having its outer circumferential wall circular and stationary composed of a series of rings whose inner circular edges are wider than their other parts and grooved or scored at their adjacent faces thereby imparting to the circular circumferential face of the annular chamber the nature of a strainer or sieve for the escape of fluids from pulposus materials treated in the press, and the other circumferential wall irregular in contour and forming the periphery of a rotatable piston whose bearings coincide with the axis of the stationary wall, one of said bearings being hollow and connected by a passage to the portion of the periphery of the piston which with the circular stationary wall constitutes the widest part of the annular chamber, a feeding device for forcing the material to be treated through the hollow bearing and the passage to the annular chamber, sliding partitions extending through the circular stationary wall, and flat disks secured to the sides of the rotatable piston, constituting the side walls of the annular chamber and provided with cam grooves which fit studs or rollers extending from the side edges of the sliding partitions, whereby the extended free edges of the partitions are held against the irregular shaped periphery of the piston.

24. A press comprising an annular chamber varying in width between the circumferential walls, another annular chamber by the side of and having the same characteristics as, but of lesser width than, the first mentioned chamber, a flat disk at the outer sides of the two chambers constituting their outer side walls and a flat disk between the two chambers and constituting the inner walls of the chambers, means for changing in circular direction the relative positions of the two circumferential walls of each of the annular chambers, means for feeding the material to be compressed to the widest part of the first mentioned chamber, and means for transferring the compressed material

from the first chamber to the other chamber and discharging the material, finally compressed, from said other chamber through openings formed in the flat disks.

25. A press comprising an annular chamber having its outer circumferential walls circular and stationary composed of a series of rings whose inner circular edges are wider than their other parts and grooved or scored at their adjacent faces thereby imparting to the circular circumferential face of the annular chamber the nature of a strainer for the escape of fluids from pulposus materials treated in the press, and the other circumferential wall irregular in contour and forming the periphery of a rotatable piston whose bearings coincide with the axis of the stationary wall, another annular chamber at the side of, and having the same characteristics as, but of less width than, the first mentioned chamber and whose irregular contour wall is a part of said rotatable piston, sliding partitions extending through the circular stationary wall of each of the annular chambers and flat disks secured to the sides of the rotatable piston constituting the side walls of the two annular chambers and provided with cam grooves into which fit studs or rollers extending from the side edges of the sliding partitions whereby the extended free edges of the partitions are held against the irregular shaped periphery of the piston constituting the inner circumferential wall of each of the chambers.

26. A press comprising an annular chamber of varying width one wall of which is composed of a series of rings whose abutting edges are grooved or scored to give the wall the nature of a strainer for escape of fluid from pulposus material treated in the press and means acting to change the position of the two walls of the chamber relatively to one another, whereby compression action is obtained.

In testimony whereof, I have hereunto subscribed my name.

ALEXANDER S. MACKENZIE.

Witnesses:

JOHN J. MADDEN,
PETER HOLDENTH.