July 14, 1925. 1,545,818

A. E. ELFSTRUM ET AL

HIGH PRESSURE CONTINUOUS PRESS

Filed June 10, 1921 3 Sheets-Sheet 1

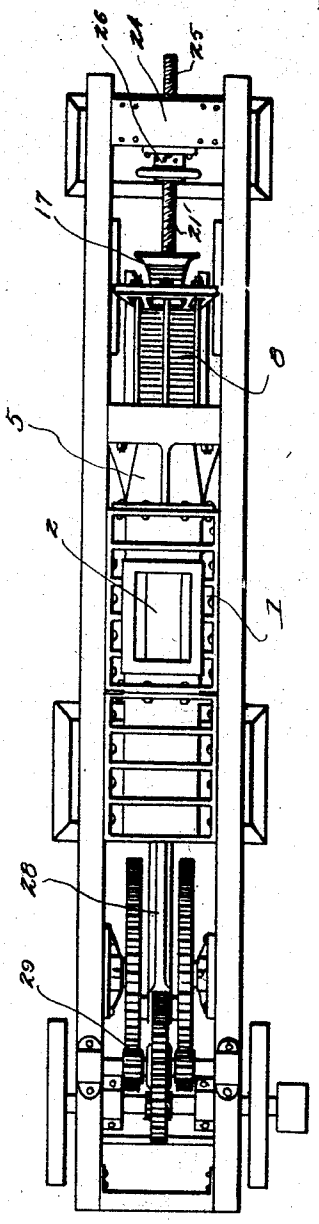


Fig. 1.

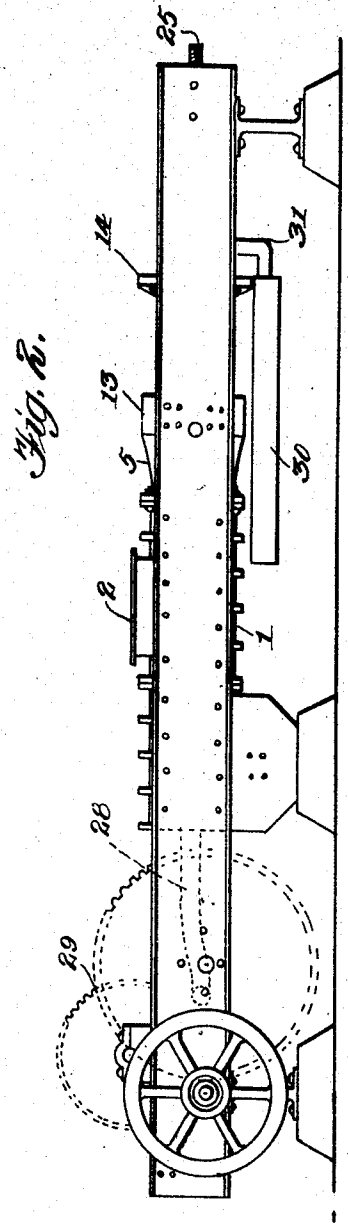


Fig. 2.

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Fig. 3.

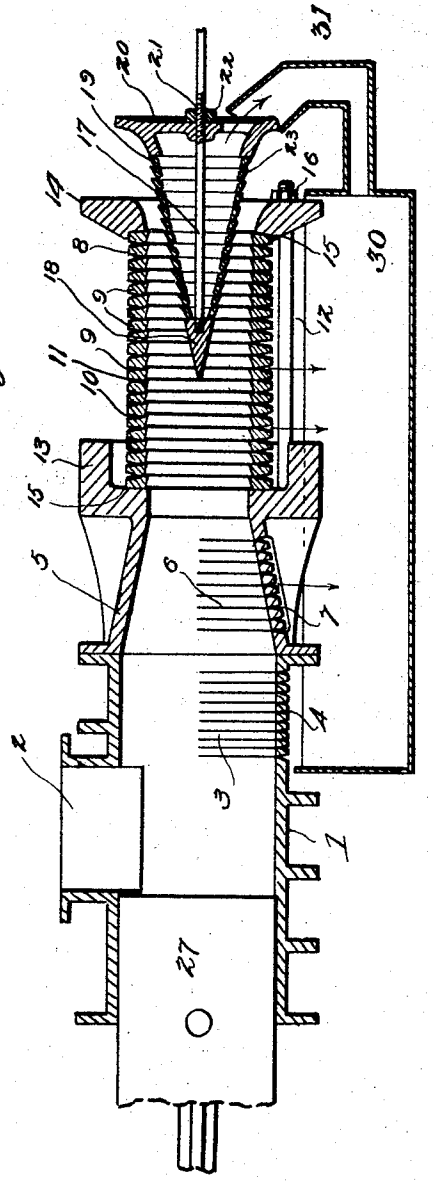
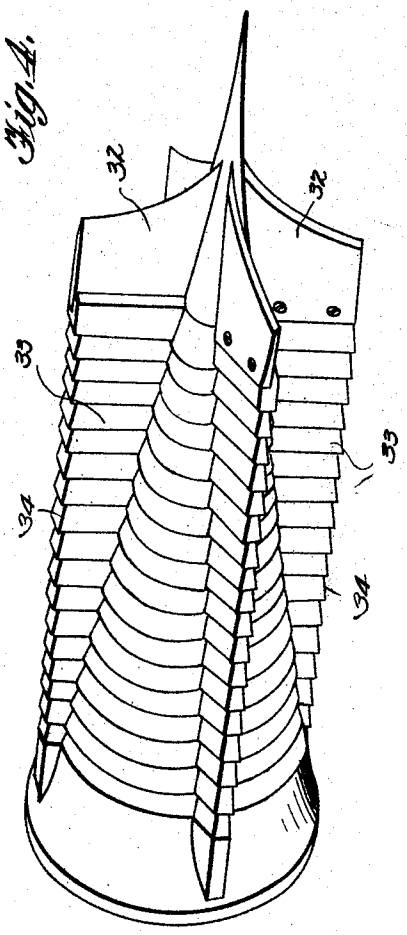


Fig. 4.



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1,545,818

A. E. ELFSTRUM ET AL

HIGH PRESSURE CONTINUOUS PRESS

Filed June 10, 1921

3 Sheets-Sheet 3

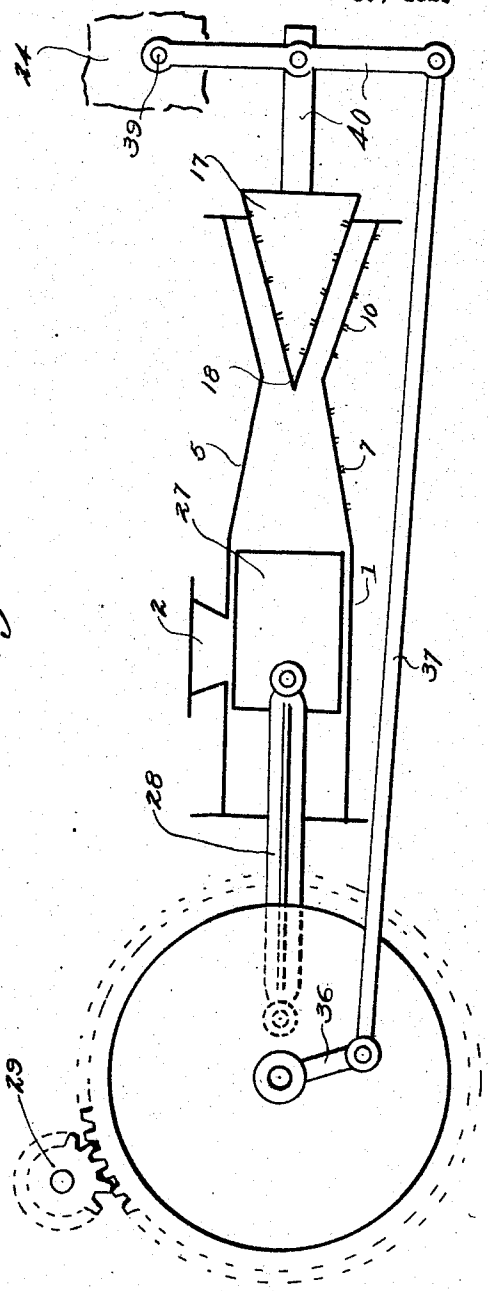


Fig. 5.

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Patented July 14, 1925. 1,545,818

UNITED STATES PATENT OFFICE.

AXEL E. ELFSTRUM AND HARRY D. STALEY, OF SAN FRANCISCO, CALIFORNIA.

HIGH-PRESSURE CONTINUOUS PRESS.

Application filed June 10, 1921. Serial No. 476,529.

To all whom it may concern:

Be it known that we, AXEL E. ELFSTRUM and HARRY D. STALEY, citizens of the United States, and residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in High-Pressure Continuous Presses, of which the following is a specification.

This invention relates to high pressure continuous press designed particularly for more or less perfectly expressing the juices from any material being handled, and separating the juices and solid material in their final delivery.

The press is of the plunger type, by means of which the material is forced past a section of gradually reduced area to exert an initial compressing action upon the material, the material being finally forced past an adjustable conical or pyramidal abutment arranged centrally within the cage proper of the press and of increasing dimension toward the outlet from the press. The material being forced between the cage wall and the outer surface of the abutment is continually compressed in its longitudinal travel in increasing degree, the cage proper being formed to provide for the escape of the juices during this compression.

In the drawings:—

Fig. 1 is a plan view of the improved press.

Fig. 2 is a side elevation of the same.

Fig. 3 is a longitudinal sectional view through the machine, driving parts being omitted.

Fig. 4 is a perspective view of a modified form of abutment and cage for cooperating therewith.

Fig. 5 is a sectional view in outline illustrating a modification.

The improved press comprises a suitable supporting frame on which is mounted a hollow body 1, formed with a material inlet 2. The body is of uniform interior diameter and is formed near its forward end with a series of annular slits 3 extending throughout an appreciable circumferential area of the body and providing an initial juice outlet. The exterior surface of the body between and within the margin of the slitted area 3 is cut away at 4 to provide the minimum interference with the escaping juices. A conical compressing section 5 is secured to the forward end of the hollow body 1, this compressing section converging in the direction of feed and being formed throughout an appreciable area with a juice escape 6 having exterior outlet formations 7 similar to juice escape 3 of the body.

A cage 8 is secured to the forward end of the compressing section 5, the cage being made up of a series of axial aligned annular members 9 providing for the escape of juices between them. The members are of truncated cone shape in cross section providing divergent adjacent edges 10 on their outer surfaces. The inner margin of each member is at an angle other than a right angle to the plane of the member, and the members are arranged with these inner sloping edges inclining toward the axial plane of the cage in the forward direction. This provides a series of pockets 11 on the inner surface of the cage, for a purpose which will hereinafter appear.

Cage members 9 are adapted to be adjustably held in cage forming relation in order that the size of the juice apertures may be, in a measure, controlled. This adjustable securing is through the medium of rods 12 passing through a flange 13 at the end of the compression member and the opposite end of the cage, the flange 13 and plate 14 being suitably recessed at 15 to receive the final cage members and the rods 12 being threaded for the reception of nuts 16, whereby to provide the adjustment in an obvious manner.

A conical abutment 17 is arranged within the cage, being made up of a terminal cone shaped element 18, a series of annular members 19 of increasing diameter, and a cap 20 bearing upon the final annular member. The members 19 are of a shape approximating that of the members 9 of the cage, such members 19 however being of gradually increasing diameter and being adjustably held with respect to their coacting pressure through a rod 21 threaded into the member 18 and provided with a nut 22 beyond the cap member 20. The abutment 17 is arranged within the cage and is of increasing diameter in the direction of feed of the material, so that in the outlet end of the machine there is a comparatively narrow annular margin between the cage and abutment. The exterior formation of the abutment provides the pockets 23 similar to the pockets 11 on the interior of the cage.

The abutment as a whole is mounted for

adjustment longitudinally of the cage through the use of the rod 21, which for this purpose is mounted beyond the cage in a support 24 and is formed with a thread 25 to receive an adjusting nut 26. Through the operation of the nut, the abutment may be adjusted longitudinally of the cage in an obvious manner.

A plunger 27 is mounted within the body for longitudinal movement through pitmen 28 operated by suitable driving means 29. The stroke of the plunger is substantially that of the length of the body 1 from the inlet 2 in the direction of feed of the material.

The juice receptacle 30 is removably supported beneath the juice outlets from the press, and a conduit 31 leads into this receptacle from the lower forward portion of the abutment.

In the handling of certain materials, it is advisable to divide the same during the operation of the press, and for this reason it has been found of advantage to provide the abutment with knives 32 and the interior of the cage with divisions 33 made up of members 34 corresponding in size, shape, and arrangement to the members 9 of the cage proper. With the use of this type of abutment, the material is divided so that the juices may be more readily expressed. This is particularly advantageous in handling fibrous materials, such as pineapples, beet pulp, whale meat or the like.

The operation of the device will be fully apparent from the above description taken in connection with the drawings. The material to be handled is fed through the inlet 2 into the body and the first thin liquids are discharged or drained through the juice outlet 3. The plunger moving forward gradually compresses the material expressing the juices, which escape through the outlet 6, the maximum compression of the plunger being exerted in the final portion of the stroke. The final pressure of the plunger so compacts the material that the entire mass is forced through the press, expressing the juices through the cage outlets and into the interior of the abutment and finally discharging the thoroughly dry material in ribbon form between the cage and abutment.

In the use of the press there is no grinding action and hence the liquid expressed is entirely free of fine or minute particles of material which would otherwise have to be strained from the liquid.

It is to be particularly noted that the abutment continuously increases the pressure on the solid material, thereby materially reducing the area of such material and permitting the liquid to be squeezed from the interior of the mass more readily than if the material were thicker.

Of course, the press and cooperating parts may be made of any desired length as required for different materials. For example, a naturally dry material will require a less cage length than a material having more inherent liquid.

The important details of the press are the plunger, the cage, the abutment, and the provision for discharge at the delivery end of the press. Any one of these parts may be independently adjusted until all of such parts are in such working cooperation as to perform the desired functions of the press. For instance, the plunger can be made to move faster or slower, and any desired pressure can be exerted thereon. The cage can be shortened or lengthened and any required drainage area provided. The opening at the material discharge or delivery end of the press can be made of any size. These reflexible co-related combinations constitute the underlying principles of the invention.

The pockets provided on the interior of the cage and the exterior of the abutment form juice collecting pockets. As the material passes over the sharp ridge immediately ahead of one of these pockets, such edge tends to liberate the juices from the cells, in which such juices are contained. The juice liberated from the cells will tend to escape into the pockets, which are formed by these ridges. On the rebound of the plunger, there will be a tendency for the material to rebound into these pockets, and thus force the liquid out thru the drainage area. On the next forward stroke of the plunger, the material will be forced out of these pockets, again leaving an open space for the juices to collect.

In Fig. 5, there is shown a slight modification, in which the abutment, indicated at 17, is movable during the movement of the plunger. To this end, the operating gear to which the pitman 28 is connected for the operation of the plunger 27, is provided with or operates a crank 36, connected by a rod 37 to a lever 38 pivotally mounted at 39 upon a fixture, and intermediately connected by a rod 40 to the abutment 17. The details of the structure shown in this figure are similar to those previously described, except in the specific instances above noted. From this construction, it will be apparent that an actual operation of the abutment during and with that of the plunger, is contemplated if desired.

Claims:

1. A material press, including a hollow body having a material inlet and juice outlets formed between the inlet and the front end of the body, a plunger adapted to reciprocate in said body for initially compressing and expressing juice from the material, a conical compressing section having juice outlets removably secured to the front end of the body for secondarily compress-

ing and expressing juice from said material by confining it within a smaller space, a cage having juice outlets removably secured to the last mentioned section, and a conical abutment formed of a plurality of members removably secured together and mounted in the end of the cage, said abutment being adjustable in length and formed with juice outlets between the members, whereby one portion of the cage maintains the material in compressed relation for draining the juice therefrom and the other portion coacts with the abutment for further compressing and expressing juice from the material, the adjustability of the length of the abutment permitting the varying of the force of compression on the material, said abutment also serving to drain juice therefrom.

2. A material press, including a body having a material inlet and means for initially compressing the material therein and subsequently confining said material within a reduced section for expressing juice therefrom, a cage removably secured to said body formed of a plurality of annular members removably secured together and having juice outlets between the members, said cage being adjustable in length by adding or removing members therefrom, and a conical abutment formed of a plurality of members removably secured together and mounted in the end of the cage, said abutment being adjustable in length and formed with juice outlets between the members, whereby one portion of the cage maintains the material in compressed and reduced section for draining the juice therefrom, being adjustable for varying the draining operation and the cage and abutment cooperate to subject the material to a further compression, reduction in thickness and draining action for expressing juice therefrom, the abutment being adjustable for varying the above mentioned action.

3. A cage for a material press, comprising a series of axially aligned annular members of truncated cone-shaped in cross section to provide divergent adjacent edges on their outer surfaces, the inner edge of each member being at an angle other than a right angle to the plane of the member, and a conical abutment seated in the outlet end of the cage and having its exterior surfaces formed with a series of annular shoulders to cooperate with the inner edges of the annular members of the cage for holding the material.

4. A cage for a material press, comprising a series of axially aligned annular members of truncated cone-shaped in cross section to provide divergent adjacent edges on their outer surfaces, the inner edge of each member inclining toward the axial plane of the cage in the forward direction, whereby to provide a series of annular pockets on the inner surface of the cage, and a conical abutment seated in the outlet end of the cage and having its exterior surfaces formed with a series of annular shoulders to cooperate with the inner edges of the annular members of the cage for holding the material.

In testimony whereof they affix their signatures in the presence of two witnesses.

AXEL E. ELFSTRUM.
HARRY D. STALEY.

Witnesses:
I. WALTER WALKER,
H. G. SQUIER.