Nov. 29, 1938. C. B. UPTON 2,138,670

PRESS CAGE CONSTRUCTION

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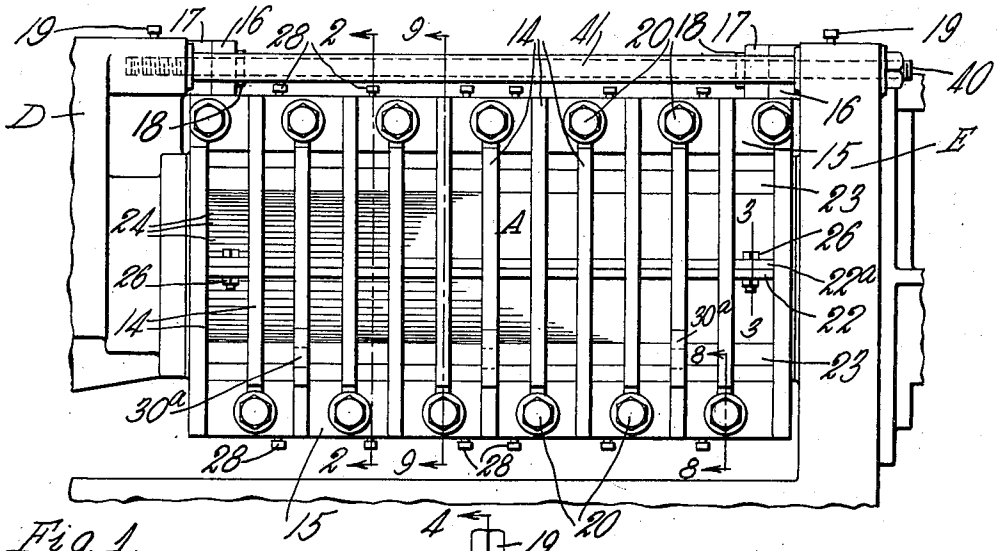


Fig. 1.

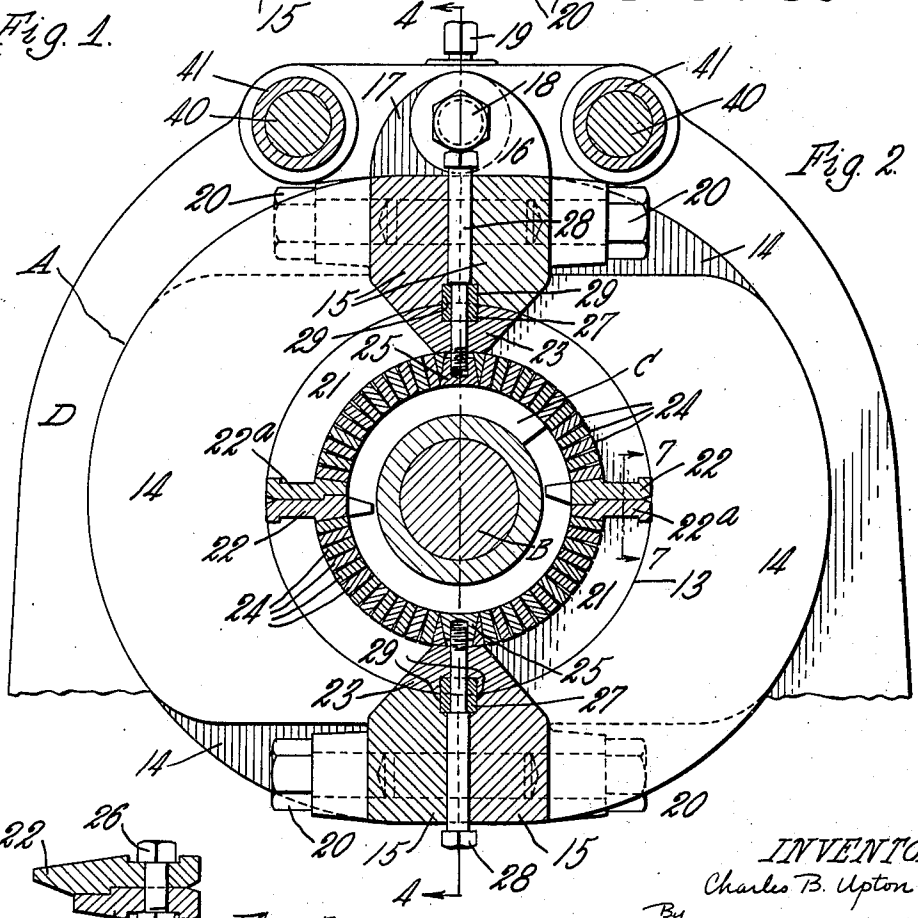


Fig. 2.

Fig. 3.

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Fig. 4.

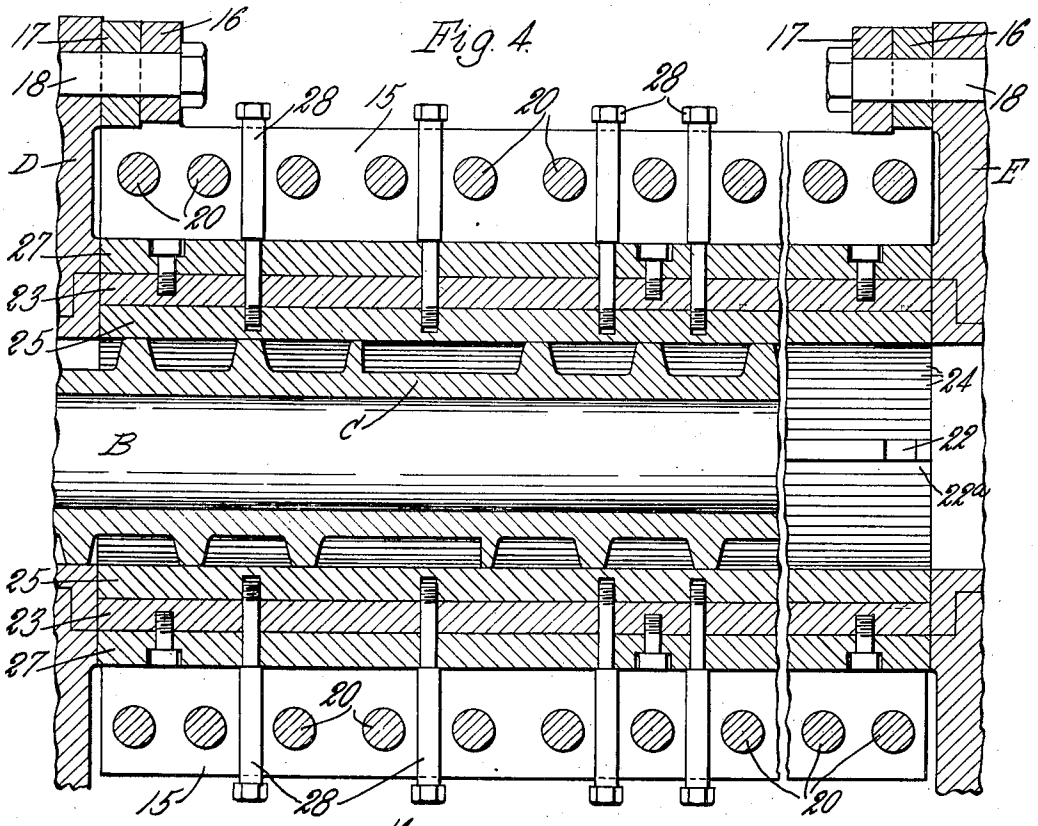


Fig. 5.

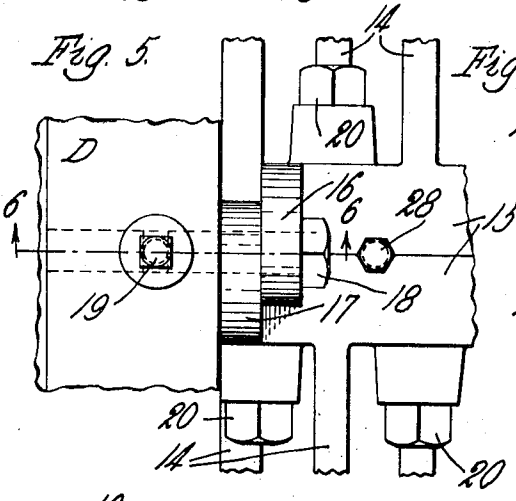
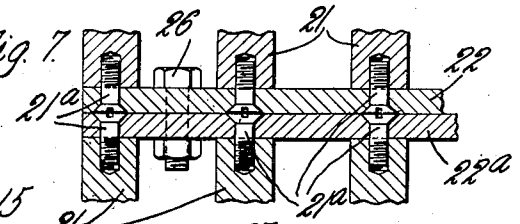


Fig. 7.



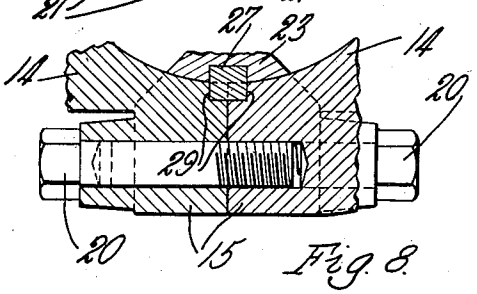


Fig. 8.

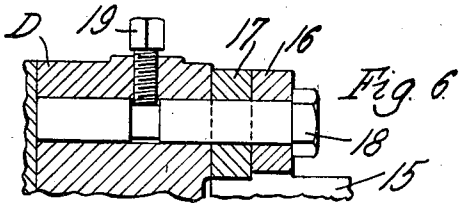


Fig. 6.

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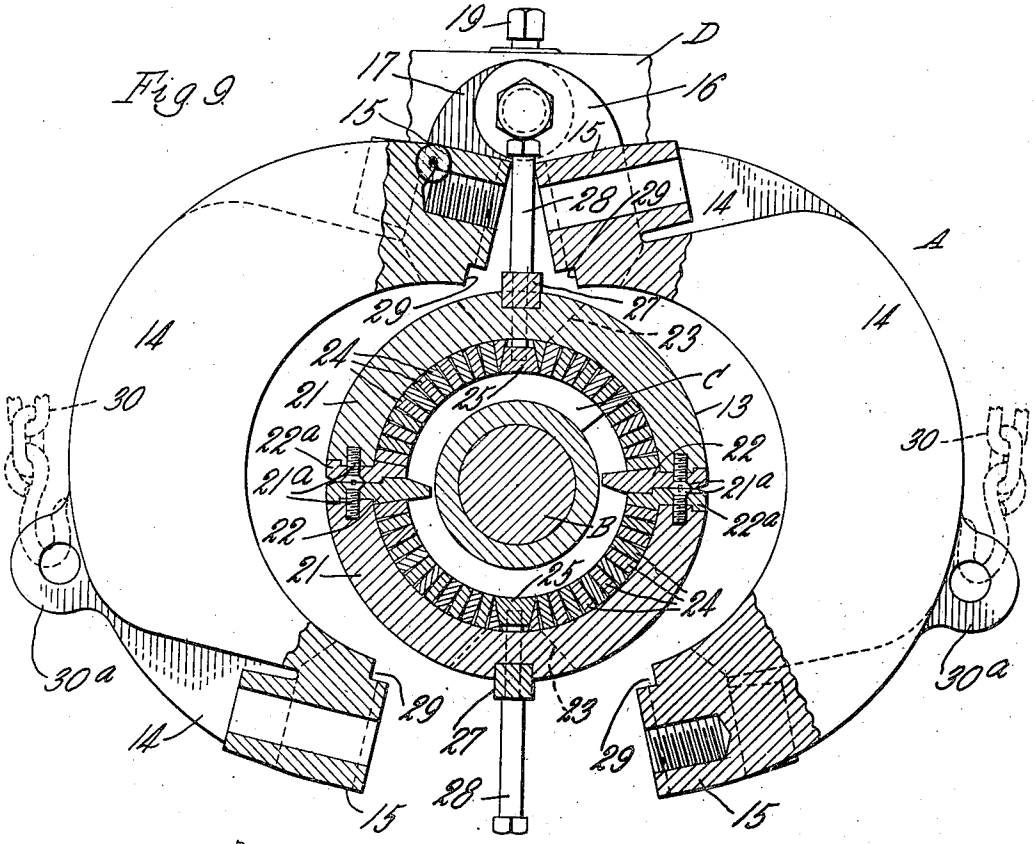
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Fig. 9.



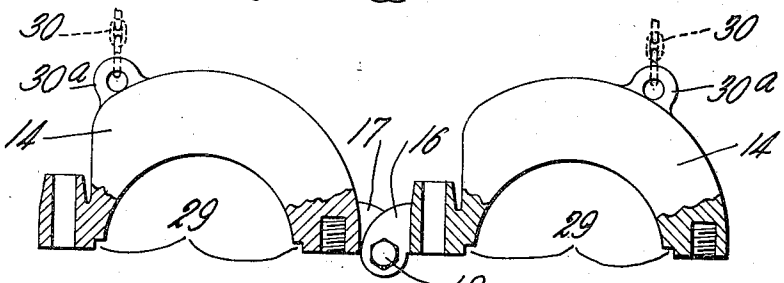
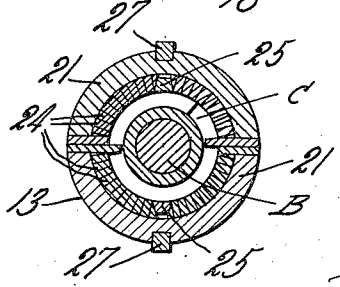


Fig. 10.



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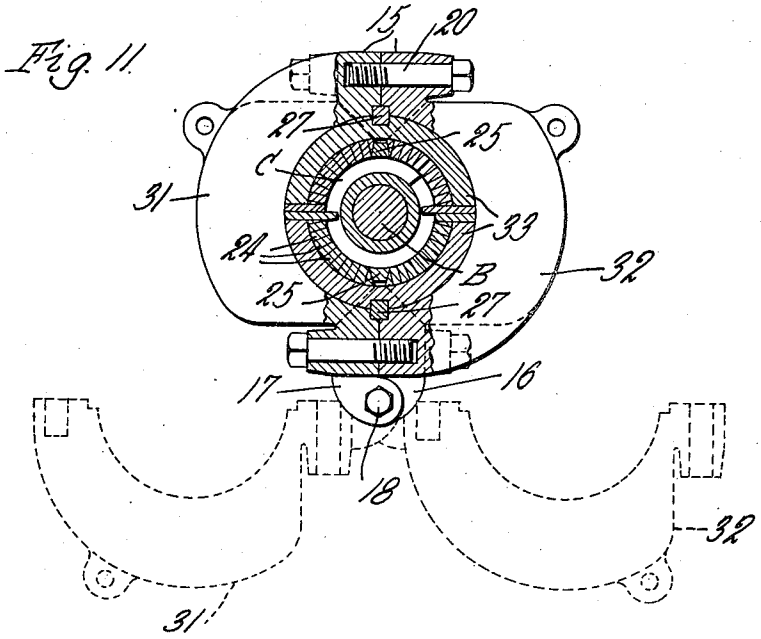
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Fig. 11.



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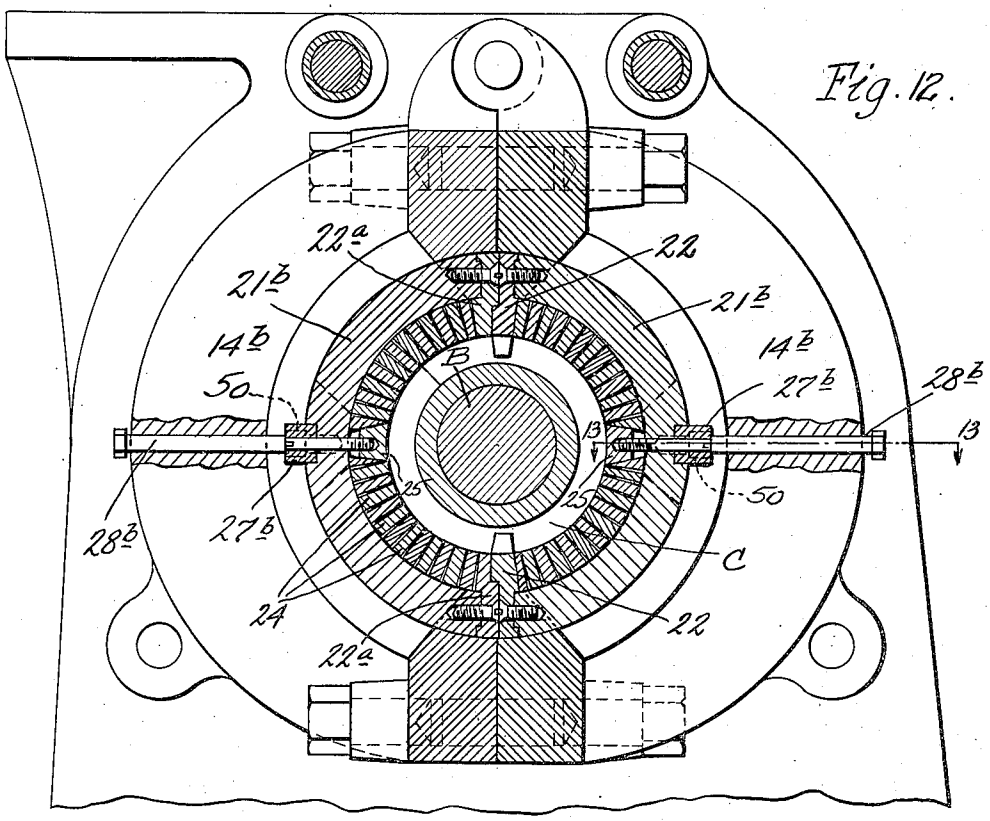


Fig. 12.

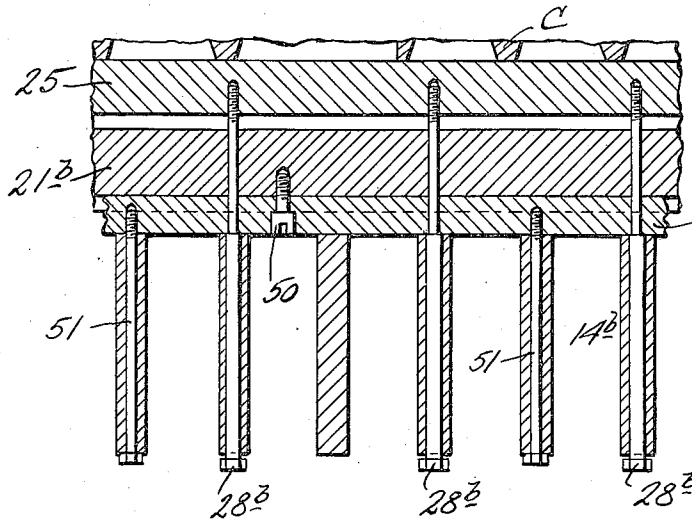


Fig. 13.

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UNITED STATES PATENT OFFICE

2,138,670

PRESS CAGE CONSTRUCTION

Charles B. Upton, Piqua, Ohio

Application October 15, 1935, Serial No. 45,014

5 Claims. (Cl. 100—48)

This invention relates to improvements in the cage construction of continuous or screw presses of that kind, used for expressing oil or liquid from materials, which comprise a drainage cage into which the material is fed more or less continuously and in which an axial rotating screw or worm advances the material lengthwise through the cage and extrudes the solid material through a restricted opening at one end of the cage, thus creating pressure which squeezes from the material its oil or liquid, which escapes through small drainage openings in the circumferential wall of the cage.

Such cages are commonly constructed with a circumferential wall or lining formed by closely spaced longitudinal bars or slats mounted in the skeleton reinforcing frame or structure of the cage, the narrow longitudinal slits or cracks between the bars forming the escape or drainage openings for the expressed liquid. These spaced drainage bars are usually removably clamped or secured in place in the surrounding reinforcing frame, and the cage is commonly made in longitudinally divided halves or sections which can be separated and removed to give access to the press screw or worm, and to enable the assembling or adjustment of the drainage bars in the cage and the replacement of worn or damaged bars.

One object of my invention is to provide a press cage of the sort mentioned which is of simple, strong and desirable, novel construction.

Other objects of the invention are to provide a press cage for screw presses which is composed of sections constructed and mounted so that the cage can be opened to enable access to or the removal of the screw shaft and its screws or worms, and the assembling, adjustment or replacement of the drainage bars in less time and with less labor than has been possible in previous constructions; in which the cage sections are mounted so that they can be readily opened for such purposes as mentioned without removal of the heavy sections of the cage or cage reinforcing frame from the press; in which the cage or structure comprises an inner, relatively light frame or unit in which the drainage bars are mounted and which is removably secured in an outer reinforcing clamp or frame composed of separable sections adapted to be readily opened to permit the removal of the inner unit for access to the screw or the securing, adjustment or replacement of the drainage bars therein without removal of the heavy outer clamp or frame from the press; and which has the other features of advantage and improvement hereinafter described and set forth in the claims.

In the accompanying drawings:

Fig. 1 is a fragmentary side elevation of a screw press provided with a press cage of one construction embodying my invention.

Fig. 2 is a transverse, sectional elevation thereof, on an enlarged scale, on line 2—2, Fig. 1.

Fig. 3 is a detail sectional view on line 3—3, Fig. 1.

Fig. 4 is a longitudinal, sectional elevation of the cage on line 4—4, Fig. 2.

Fig. 5 is a fragmentary plan view of one end portion of the cage, and adjacent stationary frame part.

Fig. 6 is a sectional elevation thereof on line 6—6, Fig. 5.

Fig. 7 is a fragmentary, longitudinal, sectional elevation of the cage on line 7—7, Fig. 2.

Fig. 8 is a transverse section of the cage on an enlarged scale on line 8—8, Fig. 1.

Fig. 9 is a transverse, sectional elevation of the cage on an enlarged scale on line 9—9, Fig. 1, showing the sections of the reinforcing clamp or frame partially opened or separated.

Fig. 10 is a similar view on a smaller scale showing the sections of the reinforcing clamp or frame moved up to release and permit the removal of the inner frame unit.

Fig. 11 is a transverse, sectional elevation of a cage of slightly modified construction embodying the invention.

Fig. 12 is a transverse, sectional elevation of the cage construction illustrating still another modification of the invention.

Fig. 13 is a fragmentary, longitudinal, sectional plan thereof on line 13—13, Fig. 12.

A represents the cage of the press and B the rotating worm shaft extending axially therethrough and equipped with the usual one or more pressure worms or screws C sleeved on the shaft. The cage is shown as mounted in the press between the parts D and E of the stationary press frame at opposite ends of the cage.

In the construction shown in Figs. 1 to 10, the press cage comprises a longitudinally divided, sectional or two-part outer skeletonized reinforcing clamp or frame, and a removable inner cage unit 13 which carries the drainage bars and is confined within and removable from the reinforcing frame. The two sections of the outer clamp or frame meet or are divided on the vertical, axial plane of the case. Each section of the clamp shown is made with spaced, transverse, semicircular ribs 14 joined at their opposite ends

by connecting bars or parts 15 extending lengthwise of the cage at top and bottom thereof. The ribs and connecting bars 15 of each section preferably are made in one integral casting or forging but each clamp section, if desired, could be constructed of separate ribs and connecting bars suitably secured together. The sections of the clamp illustrated in Figs. 1 to 10 are pivotally mounted or hinged at the upper side of the cage to swing toward and from each other. As shown, the clamp sections are provided at the opposite ends of their upper edge portions with hinge lugs 16 and 17 respectively, and the two hinge lugs 16 and 17 at one end of the clamp swing on a pivot stud 18 projecting from the adjacent press frame part D, while the hinge lugs at the opposite end of the clamp swing on a pivot stud 18 projecting from the other frame part E. Each pivot stud is removably secured in a hole in the frame part D or E as by a screw 19, see Figs. 5 and 6, so that the studs can be removed to permit dismounting and removal of the clamp sections if desired.

The two sections of the clamp may be rigidly secured together about the inner cage unit 13 by transverse screws or bolts 20 which pass through bolt holes in each connecting bar 15 of one clamp section and screw into threaded holes in the opposing connecting bar 15 of the other clamp section. Preferably, the bolts are arranged with the head ends of alternate bolts at opposite sides of the clamp, as this enables the bolts to be placed nearer together with ample room for the application of a wrench and ample space between bolt heads for drainage of the expressed liquid.

The removable inner unit 13 of the cage, as shown, comprises a longitudinally divided skeleton frame, each part or section of which has semi-circular, transverse ribs 21 fastened at their ends, as by screws 21*a*, Fig. 7, to longitudinal side bars 22 and 22*a* at opposite edges of the section, and the longitudinal spaced drainage bars 24 which are clamped or secured in each frame section between inwardly projecting portions of the bars 22 and 22*a*, which form abutments for the drainage bars 24. Each inner frame section shown is cast or made with a middle longitudinal bar or part 23 integral with and connecting the ribs 21. The drainage bars may be removably clamped in place between the side bars of each inner unit section, as usual, by a key bar 25 extending longitudinally of the section between the side bars and adapted by radial adjustment thereof to wedge or clamp the drainage bars between the same and the side bars. Suitable provision is made for spacing the drainage bars slightly apart to provide the narrow drainage slits between them, but as the spacing means form no part of this invention, they are not illustrated in detail. The ribs 21 of the inner cage unit are disposed in the transverse planes of the ribs 14 of the clamp so that when the clamp is closed and secured about the inner unit, the inner edges of the heavy, strong clamp ribs 14 and connecting bars will bear against the outer edges or peripheries of the ribs 21 and connecting bars of the inner unit and thus afford the reinforcement for the latter necessary to resist the outward pressure of the material on the drainage bars in the use of the press. Therefore, the frame of the inner cage unit may be made of relatively light weight construction. The two sections of the inner unit may be secured together as by bolts 26, see Figs. 1, 3 and 7, joining the adjacent connecting bars 22 and 22*a* at each side of the inner unit. Since the inner unit is reinforced and strengthened by the outer clamp or frame, it is only necessary to hold the sections of the inner unit together until the clamp is secured about the same. Therefore, it is sufficient to fasten the inner unit sections together by two of the bolts 26 at each side of the unit.

As shown, the inner cage unit is divided on the horizontal, longitudinal, axial plane of the cage and is provided externally at its top and bottom with longitudinal bars 27 secured in grooves in the outer periphery of the unit and provided with radial holes through which pass adjusting screws 28 for the key bars 25. The threaded inner ends of these screws turn in threaded holes in the key bars and the screws have shoulders bearing against the outer edges of the bars 27 so that by tightening the screws, the key bars 25 are adjusted outwardly for clamping the drainage bars in the inner unit frame. The adjusting screws 28 extend out to the exterior of the cage clamp through holes formed by registering transverse grooves in the meeting edges of the clamp sections so that the heads of the screws are exposed at the exterior of the clamp and can be readily turned to adjust the key bars. When the clamp is closed about the inner unit, the bars 27 fit in grooves formed by registering longitudinal rabbets 29 in the edges of the clamp sections, and thus serve as keys to hold the inner unit from turning in the clamp.

When the sections of the clamp or reinforcing frame of the cage are secured together about the removable inner unit, the latter is rigidly held in place in the clamp and reinforced and strengthened by the clamp, but when the clamp sections are unbolted and swung apart they release the inner cage unit, and when the clamp sections are swung up out of the way, the sections of the inner unit can be disconnected and readily removed from the press, as will be apparent from Figs. 9 and 10, which show the clamp opened. The sections of the clamp, which are heavy, can be readily swung up by suitable lifting tackle having chains 30, represented by dotted lines in Figs. 9 and 10, which may be hooked into eyes or loops 30*a* provided for the purpose at the outer sides of the two sections of the clamp. The clamp sections, though heavy, can thus be readily swung and held up out of the way to facilitate the removal and replacement of the inner cage unit. The latter being of relatively small size and light weight, can be easily removed to a bench or other support for the same while adjusting, securing or replacing the drainage bars in the sections of the inner unit.

In the construction above described, the sections of the cage reinforcing clamp or frame are pivoted on the vertical, axial plane and hinged above the longitudinal center of the cage to swing upwardly away from each other for access to the screw and the drainage bars of the cage. Instead of thus hinging the vertically divided sections above to swing upwardly, they could be pivoted or hinged at their lower edges, if desired, or below the longitudinal center of the cage to swing downwardly away from each other, as illustrated in Fig. 11. This modified construction, except for the bottom hinging of the cage clamp sections, is substantially the same as above described. The skeletonized cage clamp comprises the two vertically divided pivoted sections 31, 32 and the removable inner cage unit comprises longitudinally divided skeletonized frame sec-

tions 33 in which the drainage bars 24 are clamped or secured. In this construction, as in that first described, when the clamp sections are released and swung apart or away from each other, the inner unit is exposed and the sections can be separated and removed from around the press screw to afford access to and enable the removal of the latter or the screw shaft, or for the assembling, adjusting or replacing the drainage bars.

The upper portions of the frame parts D and E in the press construction shown are connected by tie bolts 40 and spacing sleeves or pipes 41 surrounding the bolts between the two frame parts. These tie bolts and spacing sleeves hold the frame parts rigidly in position and prevent them from spreading or opening the joints between the same and the ends of the cage under the pressure to which they are subjected in the use of the press. The tie bolts are screwed into threaded holes in the frame part D and can be removed so that they will not limit the upward swing of the hinged sections of the cage or reinforcing frame.

The first described construction has the additional advantage that the heavy swinging sections of the clamp or outer reinforcing cage frame do not have to be removed from the machine. By swinging one or both of the sections upwardly, the inner cage unit, which is much smaller and of much lighter weight than the clamp or outer frame, can be readily handled and taken out of the machine to adjust the drainage bars or replace worn or damaged bars, without removing the outer frame or clamp sections. Thus, in both constructions, the screw shaft with the screws can be taken out of the machine for repair or other purposes without removing the heavy cage frame or reinforcing structure from the machine. This cannot be done in previous constructions. The removable inner cage unit can be easily and quickly removed when this may be necessary, for whatever purpose, and since the inner unit is of much cheaper construction than previous constructions, in which the drainage bars are secured directly in the heavy reinforcing frame of the cage, a mill can have an extra set of the inner unit sections, thus enabling one inner unit section, which may be worn or damaged, to be removed, and a new section quickly slipped into position in the clamp or outer reinforcing frame, so that the press will be out of use for only a very short time. Repairs or replacements in the pressure screw or cage can, therefore, be made in very much less time, with less labor and at less cost than in previous constructions, in which the cage sections have to be removed from the machine, or in which the drainage bars are secured directly in the outer reinforcing cage frame.

The construction shown in Figs. 12 and 13 is another slight modification of the first construction illustrated in Figs. 1–10. It is similar to said first construction except that in the first construction the inner cage unit comprises sections which are divided on a horizontal plane and are disconnected from the outer clamp so that when the sections of the latter are swung apart, the inner cage unit is left surrounding the pressure screw, whereas in the construction of Figs. 12 and 13, the sections 21b of the inner cage unit are divided on the same vertical plane as the sections 14b, 14b of the outer clamp, and are not directly secured together, but each section of the inner cage unit is secured to one of the clamp sections and moves therewith, so that when the clamp is opened and its sections swung apart, the sections of the inner cage unit will also swing apart with the clamp sections. As in the first construction, the longitudinal drainage bars are secured between the abutment bars and a clamping bar in each skeletonized inner cage section 21b, and as before, key bars 27b seated in registering longitudinal grooves in the inner unit sections 21b and clamp sections, prevent the inner unit from turning in the clamp. These key bars, however, are located at opposite sides of the inner unit and are secured to the inner unit sections 21b by cap screws 50, and are also secured to the outer clamp sections as by screws 51, passing through certain of the ribs of the clamp sections, and screwed into threaded holes in the key bars 27b. The inner unit sections are thus fastened to the clamp sections to swing therewith, but can be detached and removed from the clamp sections by unscrewing the screws 51. In this construction, the adjusting screws 28b for the clamping bars 25 pass out through the ribs of the outer clamp where their outer ends are accessible for turning the screws to adjust the clamp bars to secure the drainage bars in place.

In this modification, as in the first construction described, the drainage bars are mounted in the relatively small and light weight separable sections of the inner unit, which can be readily removed from the machine, if necessary, when the outer clamp is opened.

I claim as my invention:

1. In a screw press, the combination of a main supporting frame, a press cage, and a rotary pressure screw disposed axially in the cage, said cage comprising an outer reinforcing skeleton frame divided longitudinally substantially on the vertical axial plane of the cage into separable sections and mounted on the main frame for one section to swing away from the other to open said outer frame, and a removable inner cage unit comprising longitudinally divided separable skeleton frame sections, separate longitudinal bars lining said inner unit sections and forming drainage slits between the bars, and means for removably securing the bars in said inner unit sections, said inner unit sections being removable from said outer frame with their bars and bar securing means intact when said outer frame is opened.

2. In a screw press, the combination of a main supporting frame, a press cage, and a rotary pressure screw disposed axially in the cage, said cage comprising an outer reinforcing skeleton frame divided longitudinally substantially on the vertical axial plane of the cage into separable sections and mounted on the main frame for one section to swing away from the other to open said outer frame, and a removable inner cage unit comprising longitudinally divided separable skeleton frame sections, separate longitudinal bars lining said inner unit sections and forming drainage slits between the bars, and clamping means removably clamping said separate bars in said inner unit sections and operable for securing the bars while said outer frame is closed about said inner unit, and said inner unit sections being removable from said outer frame with their bars and clamping means intact when said outer frame is opened.

3. In a screw press, the combination of a main supporting frame, a press cage, and a rotary pressure screw disposed axially in the cage, said

cage comprising an outer reinforcing skeleton frame divided longitudinally substantially on the vertical axial plane of the cage into separable sections mounted on the main frame for relative movement to open and close said frame, and a removable inner cage unit comprising longitudinally divided separable skeleton frame sections, separate longitudinal bars lining said inner unit sections and forming drainage slits between the bars, and means for removably securing the bars in said inner unit sections including operating members extending to the exterior of said outer frame between the sections thereof at their dividing plane, said inner unit sections being removable from said outer frame with their bars and bar securing means intact when said outer frame is opened.

4. In a screw press, the combination of a main supporting frame, a press cage, and a rotary pressure screw disposed axially in the cage, said cage comprising an outer reinforcing skeleton frame divided longitudinally substantially on the axial plane of the cage into separable sections mounted on the main frame for one section to swing away from the other to open said outer frame, and a removable inner cage unit comprising longitudinally divided separable skeleton frame sections, separate longitudinal bars lining said inner unit sections and forming drainage slits between the bars, and clamping means removably clamping said separate bars in said inner unit sections and including operating members extending to the exterior of said outer frame through passages provided between the sections thereof at their dividing plane, said inner unit sections being removable from said outer frame with their bars and bar clamping means intact when said outer frame is opened.

5. In a screw press, the combination of a main supporting frame, a press cage, and a rotary pressure screw disposed axially in the cage, said cage comprising an outer reinforcing skeleton frame divided longitudinally substantially on the vertical axial plane of the cage into separable sections and mounted on the main frame for one section to swing away from the other to open said outer frame, and a removable inner cage unit comprising a skeleton frame divided longitudinally substantially on the horizontal axial plane of the cage into separable frame sections, separate longitudinal bars lining said inner unit sections and forming drainage slits between the bars, and clamping means removably clamping said separate bars in said inner unit sections and including operating members extending to the exterior of said outer frame through passages provided between the sections thereof at their dividing plane, said inner unit sections being removable from said outer frame with their bars and bar clamping means intact when said outer frame is opened.

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