No. 808,776. PATENTED JAN. 2, 1906.

C. VON PELCHRZIM & J. THÜMMEL.

PROCESS AND PRESS FOR PRESSING PULVEROUS MATERIAL.

APPLICATION FILED SEPT. 8, 1904.

3 SHEETS—SHEET 1.

Fig.1.

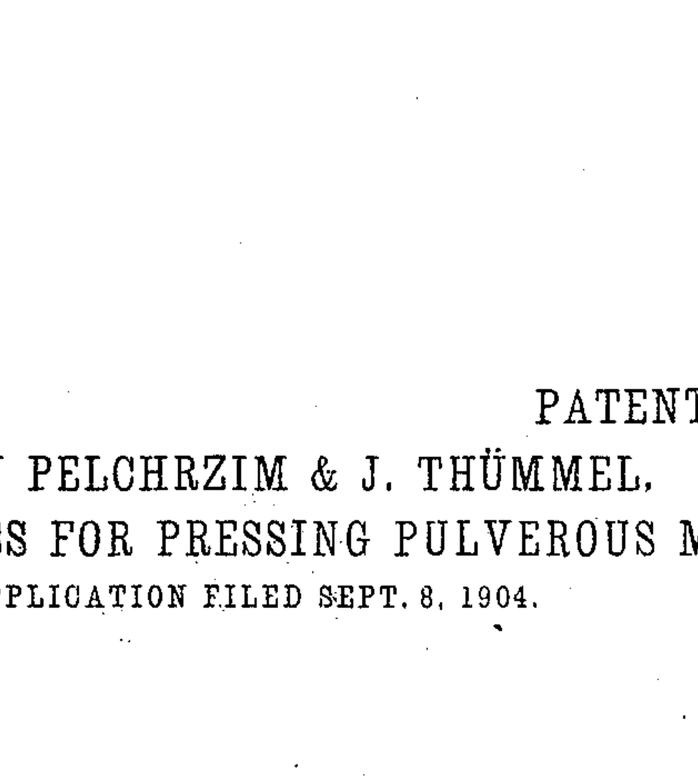


Fig.2.

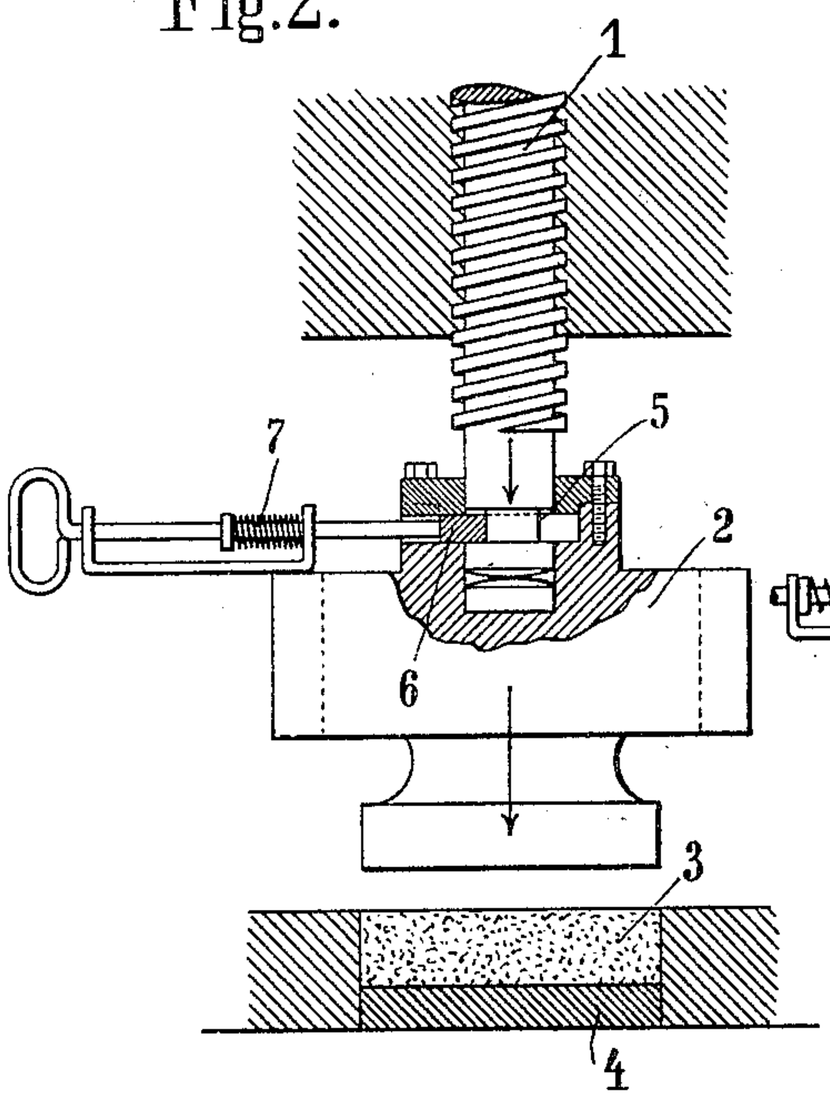


Fig.3.

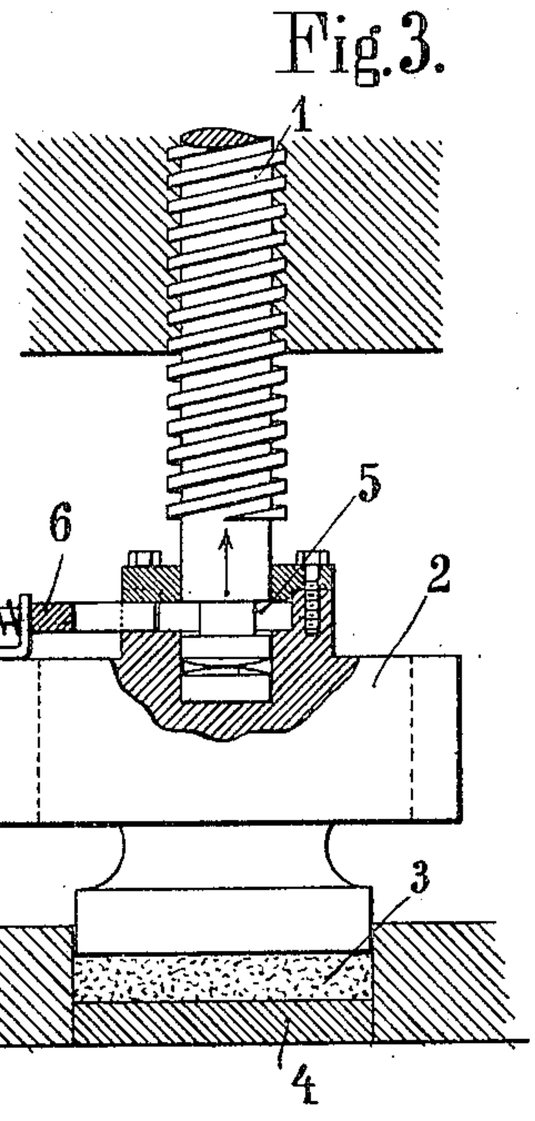


Fig.4.

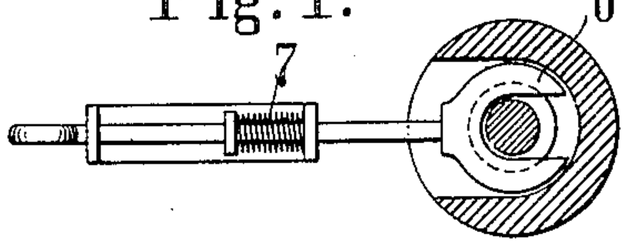
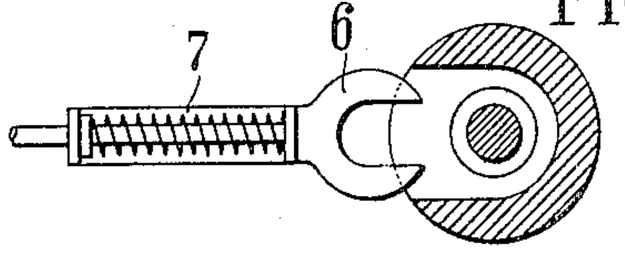


Fig.5.



WITNESSES:
A. L. O'Brien
Percy B. Mayer

Inventors:
CURT VON PELCHRZIM
AND
JOHANN THÜMMEL
By Dickerson, Brown, Raegener & Binney
Attys

No. 808,776. PATENTED JAN. 2, 1906.

C. VON PELCHRZIM & J. THÜMMEL.

PROCESS AND PRESS FOR PRESSING PULVEROUS MATERIAL.

APPLICATION FILED SEPT. 8, 1904.

3 SHEETS—SHEET 2.

Fig. 6.

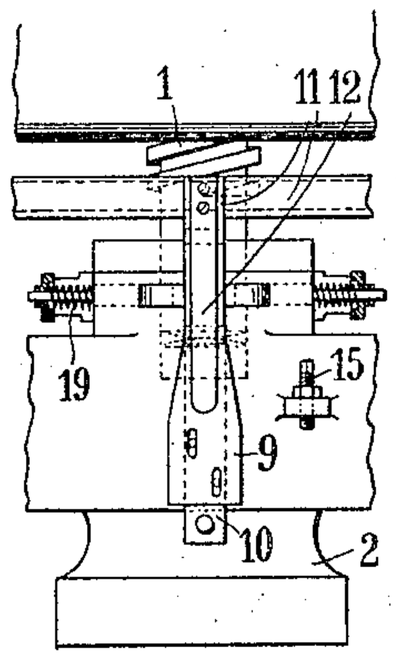


Fig. 7.

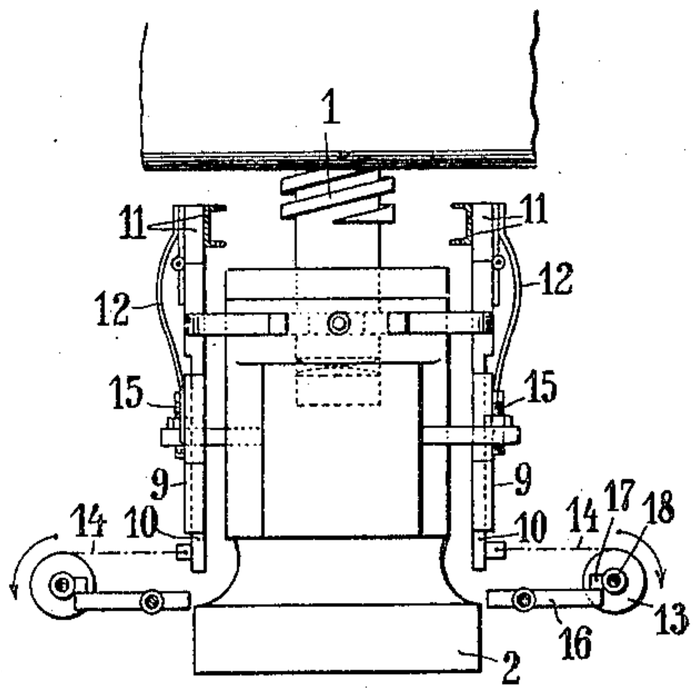


Fig. 8.

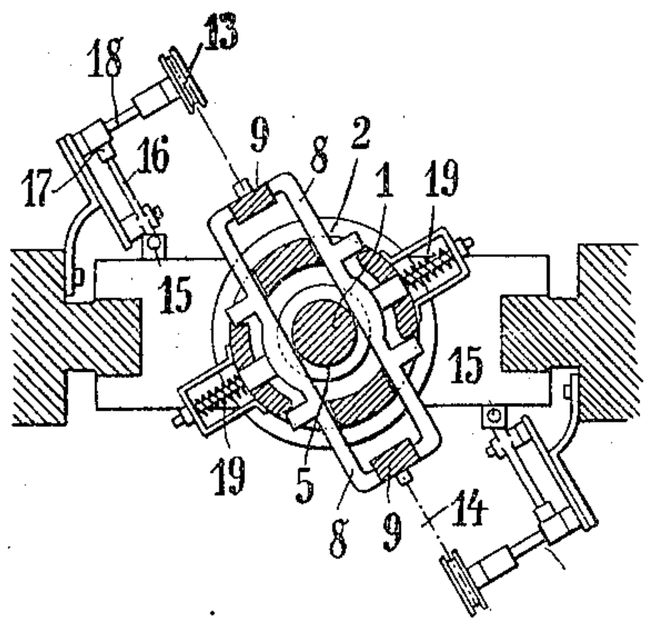
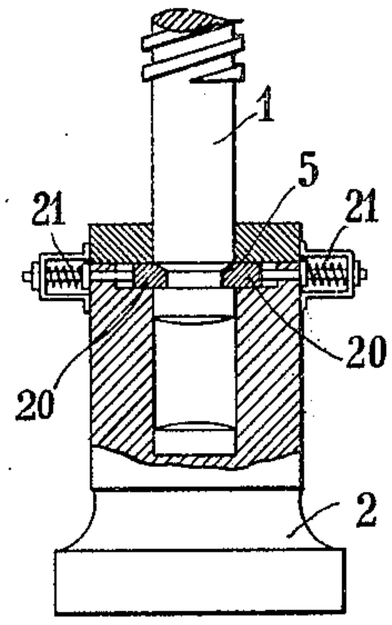


Fig. 9.



Witnesses:
A. L. O'Brien
Percy B. Mayer

Inventors
Curt von Pelchrzim
and Johann Thümmel
By Dickerson, Brown, Raegener & Binney
Attys

No. 808,776. PATENTED JAN. 2, 1906.

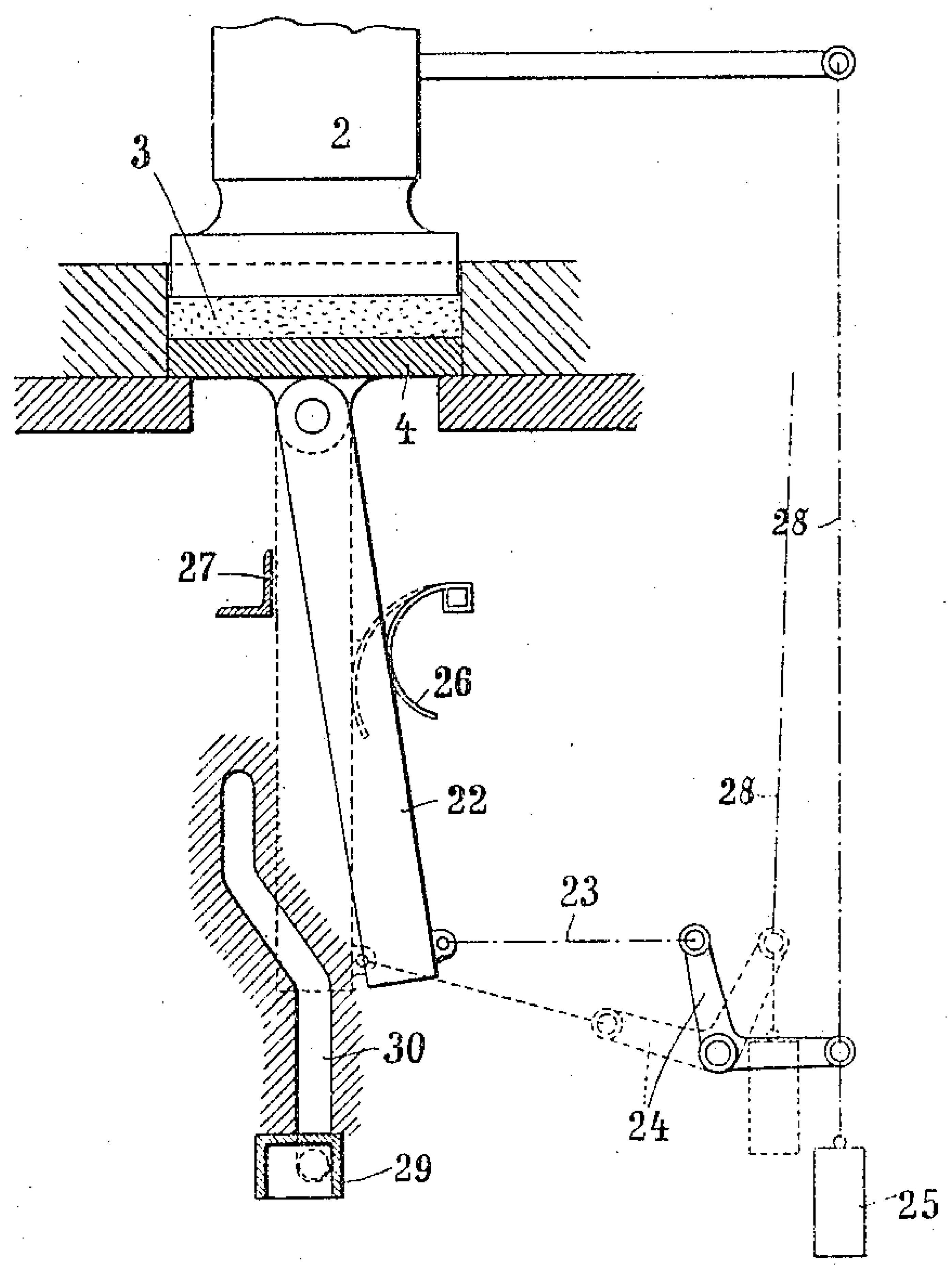
C. VON PELCHRZIM & J. THÜMMEL.

PROCESS AND PRESS FOR PRESSING PULVEROUS MATERIAL.

APPLICATION FILED SEPT. 8, 1904.

3 SHEETS—SHEET 3.

Fig. 10.



Witness
Olin A Foster
Edna P La Gay

Curt von Pelchrzim
Johann Thümmel
Inventors
by Dickerson, Brown,
Raegener & Binney
Atty.

UNITED STATES PATENT OFFICE.

CURT VON PELCHRZIM AND JOHANN THÜMMEL, OF EHRANG, GERMANY.

PROCESS AND PRESS FOR PRESSING PULVEROUS MATERIAL.

No. 808,776. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed September 8, 1904. Serial No. 223,806.

To all whom it may concern:

Be it known that we, CURT VON PELCHRZIM and JOHANN THÜMMEL, engineers, citizens of the German Empire, residing at Ehrang, Germany, have invented certain new and useful Improvements in Processes and Presses for Pressing Pulverous Material, of which the following is a specification.

This invention relates to improvements concerning the pressing of pulverous material under an alternate application of low pressure and high pressure.

The alternate application of low and high pressure when pressing articles out of dry pulverous material—for instance, clay slabs—is to be recommended, for the reason that if only one kind of pressure is used the air pressed out of the mass cannot sufficiently escape and as a result acts detrimentally on the pressing process and causes the objects pressed to become cracked. On the other hand, the alternate application of high pressure and low pressure with the presses now in use with mechanical actuation of the press-ram has thus far been hardly feasible, for the reason that the interruption in the pressure made it necessary to lift the press-ram from the pressed mass; but this should not be done, as the lifting of the press-ram from the mass as soon as the same has been compressed to a certain degree causes the surface of the object to appear unsightly.

The object of the present invention is to remove the said drawback and in a way that when subjecting the mass to be pressed alternately to low and high pressure the press-ram is not removed from the prepressed object during the interval between the two pressures. This is attained by connecting the press-ram to its actuating device in a manner that after the low-pressure stroke it can be detached from the actuating member and be coupled to it again as soon as everything is ready for the high pressure. This press, with a press-ram detachably connected to its actuating device, is preferably a screw-press, in which case it is only necessary to guide the spindle or screw in a cavity of the press-ram or press-block, so that it can move up and down in that cavity and may be drawn out of it, provided that no coupling-slide is inserted into a recess of the spindle, which connects the spindle to the press-block. If the spindle is drawn out of the recess of the press-block, it can be moved independently of the latter, while the insertion of the coupling-slide connects the spindle to the press-block.

In order to give with a screw-press alternately low pressure and high pressure, the fly-wheel must have an opportunity to collect *vis viva* after the low pressure in order that the high pressure may be effectively carried out. This is brought about without any further trouble if after the low pressure the spindle is moved upward again and thereupon screwed down again for effecting the high pressure; but the same object may also be attained without reversing the movement of the spindle if the spindle during a part of its descent is coupled to the press-block, then uncoupled, so that it will run empty until it strikes again against the press-block and presses the same with great force upon the material to be compressed.

On the accompanying drawings are shown the different modes of coupling the spindle to the press-block.

Figure 1 shows a piece of a spindle connected to the press-block by means of a coupling-slide inserted into a recess of the spindle. Fig. 2 shows a press-block coupled to the spindle in its raised position above the mold. Fig. 3 shows the spindle at the moment when after the low pressure and subsequent uncoupling from the press-block it ascends again. Figs. 4 and 5 are horizontal sections through Figs. 2 and 3 on the level of the coupling-slide. Figs. 6 and 7 are side views of press-blocks attached to the spindles with a self-acting device for uncoupling the press-block and spindle. Fig. 8 is a horizontal section through the coupling device. Fig. 9 shows an arrangement allowing the spindle to descend also during the pauses between low pressure and high pressure. Fig. 10 shows a device for pushing the pressed objects out of the mold during the ascent of the press-block after the high pressure.

Similar numbers refer to similar parts throughout the several views.

The spindle is in all the figures marked with 1, the press-block actuated by the same with 2, the material to be pressed with 3, and the abutment-plate forming the bottom of the mold, the under stamp, with 4. In all the forms of construction shown in the drawings the spindle has a recess 5 adapted to receive a coupling part for coupling the spindle to the press-block 2. This coupling part has in the forms of construction shown in Figs. 1 to

5 the shape of a fork 6 and stands under the pulling action of a spring 7, arranged on the handle of the fork. The prongs of the fork have a little play in the recess 5 of the spindle 1, so that the spring 7 is able to draw the fork out of the recess 5 as soon as the block 2 presses no longer with its whole weight upon the surface of the prongs of the fork, but is raised a little on striking against the mass to be pressed. In consequence of this arrangement the working of the press is as follows:

On the descent of the spindle the coupling-fork 6 enters the recess 5, so that the press-block 2 hangs on the prongs of the fork 6. As soon as the press-block strikes against the material 3 the fork 6 is no longer held back under the weight of the press-block and is rapidly drawn out of the recess by the spring 7. This withdrawal of the fork 6 has no influence on the low pressure; but if the spindle ascends again after the low pressure it is uncoupled from the press-block and can therefore not lift the latter. On a renewed descent of the spindle 1 high pressure is exerted upon the press-block 2, and the mass to be pressed is then ready. Now the fork 6 enters again the recess, so that the press-block will on the ascent of the spindle 1 be raised, it being held by the prongs of the fork. Instead of giving the coupling part the form of a to-and-fro-moving fork it may be of any other construction. It may, for instance, be formed by oscillatingly-arranged claws or clutches entering from both sides into the recess of the spindle.

In the described arrangement the uncoupling only of the spindle from the press-block is effected automatically, whereas the coupling requires to be effected by hand by pushing the coupling-fork 6.

In Figs. 6 to 9 are illustrated two other forms of construction in which not only the uncoupling but also the coupling of spindle and press-block is effected automatically.

In the forms of construction illustrated in Figs. 6 to 8 the coupling parts consist of two bars 8 of a peculiar shape, whose ends glide on the descent of the spindle over slides 9, broadening toward the bottom, which they push aside until they are quite out of the recess 5 of the spindle 1. The slides 9 may be made to be adjustable in their height in the guides 10 in order to be able to regulate within certain limits the moment of the uncoupling of spindle and block. The guides 10 are pivotally suspended on fixed parts 11 of the press and pressed by springs 12 against the press-block 2. Cords 14, running on pulleys 13, are connected to the guides 10 and are able to draw the same and the slides 9 out between the ends of the coupling-bars 8, so that the cords 14 are wound upon the pulleys 13. The winding of the cords 14 upon the pulleys 13 on the descent of the press-block is effected in that way that adjustable screws 15, arranged on the press-block, set against one end of levers 16, the other ends of which engage projections 17, arranged on the axles 18, which carry the pulleys 13.

The working of the device is as follows: On the descent of the spindle the coupling-bars 8, carrying the press-block 2 and entering the recess 5 of the spindle, glide upon the slanting surfaces of the slides 9 and are thus gradually pressed aside until they are quite out of the recess 5 of the spindle. The spindle is therefore now free and can ascend after the low pressure without lifting the press-block 2.

On the subsequent descent of the spindle for effecting the high pressure the press-block 2 is pressed a few millimeters farther down. This makes it possible for the screws 15 to set against the ends of the levers 16 and to turn these levers a little, and thereby also the pulleys 13. In consequence of this rotation of the pulleys 13 the cords 14 are wound upon the same and draw the guides 10 aside, so that the ends of the coupling-bars 8 recede behind the slides 9 and are thus able to enter again the recess of the spindle 1 under the action of the springs 19. The spindle 1 is thus coupled again with the press-block 2, so that the latter will be raised on the ascent of the spindle. During this ascent the ends of the coupling-bars 8 gradually get behind more and more narrow parts of the slides 9 until the latter and the guides 10 can again be pressed between the ends of the coupling-bars 8 by the springs 12. Now the original position has been reëstablished, and a new pressure in the above-described way may take place.

In the form of construction illustrated in Fig. 9 the entirely automatic working of the press is attained by having the coupling between spindle and press-block effected by spring-governed sliding pieces, whereas at the same time the size of the cavity of the press-block serving to receive the spindle is such that this cavity after the uncoupling of spindle and block allows the spindle to pass through it in a direction contrary to that in which the block moves. The spring-governed sliding pieces for coupling the spindle 1 with the press-block 2 are marked with 20. These sliding pieces are pushed by springs 21 against the spindle 1. If on the descent of the spindle the press-block 2 is placed upon the mass to be pressed, the pressure is first transmitted by the spring-governed sliding pieces 20 to the press-block, and thus to the material to be pressed. On the pressure increasing the springy sliding pieces are, however, pushed aside, so that the spindle can move freely up and down inside of the press-block 2. In the meantime the fly-wheel of the spindle can store up again *vis viva*, so that the spindle on completing its empty run is able to press with a great force upon the press-block and exert a high pressure upon the mass to be pressed. This arrangement has the advantage that the

spindle after exerting the low pressure need not first rise again to effect the high pressure, in consequence of which the press can do more work. This advantage of increased efficiency would still remain if the entirely automatic working were given up and if the coupling parts 20 were made rectangular instead of being provided with slanting surfaces. In this case the coupling parts would require to be drawn by hand out of the coupling position immediately after the low pressure. The coupling parts would then under the action of springs similar to the springs 21, but which in this case may be weaker, set against the shaft of the spindle and on the ascent of the spindle after the high pressure snap again into the recess 5 of the spindle, so that the latter would lift the press-block 2.

The pressed plate requires to be removed out of the mold by an ejecting device. This ejecting device must be so constructed that the plate is not ejected at every ascent of the spindle, but only at the ascent following a high pressure. A device is therefore needed which allows of raising the spindle without ejecting at the same time the pressed plate, but which ejects the plate whenever, with the spindle, the press-block is also raised. Such a device is illustrated in Fig. 10 of the drawings. The abutment-plate 4 is provided at the bottom with an oscillating ejecting-bar 22. This ejecting-bar is connected through a cord 23 with one arm of an angle-lever 24, at whose other arm is suspended a weight 25. By the pull of this weight the ejecting-bar 22 is turned out of the position which it tends to occupy under the action of a spring 26, which tends to press it against the check-piece 27. The angle-lever 24 is through a chain 28 connected with the press-block 2. As soon as the chain 28 on the ascent of the block 2 is stretched the angle-lever 24 is turned and the weight 25 raised at the same time. This allows the ejecting-bar 22 to follow the pressure of the spring 26, and above all its own weight, and rest against the check-piece 27. In this position, which is indicated by a dotted line in the drawings, the ejecting-traverse 29, which is connected with the spindle of the press, can set against the lower end of the ejecting-bar 22, and thus on the ascent of the spindle lift the ejecting-bar with the abutment-plate 4. The traverse 29 is in its ascent guided in a guide 30 and is gradually pressed sidewise, so that it releases the ejecting-bar 22, whereupon the latter and at the same time the abutment-plate 4 descend, and thereby make the mold ready for a new filling.

What we claim is—

1. In a press, in combination, a pressing-die, actuating means for said die, coupling means connecting said die and said actuating means, and means for bringing said coupling means into inoperative position while the die is resting on a support inclusive of the material to be pressed.

2. In a press, in combination, a pressing-die, actuating means for said die, coupling means connecting said die and said actuating means, and automatically-operated means for bringing said coupling means into inoperative position while the die is resting on a support inclusive of the material to be presed.

3. In a press, in combination, a pressing-die, means for actuating said die, automatically-operated means for coupling said die and said actuating means when the die is supported at a certain point, and means for automatically bringing said coupling means into inoperative position when the die is resting at a point above that first named.

4. In a press, in combination, a pressing-die, an actuating member for said die, means for alternately applying low pressure and high pressure to said die, and automatically-operated means for coupling said die and said actuating member during the ascent of the actuating member after each high-pressure stroke and for holding said parts uncoupled after each low-pressure stroke.

5. In a press, in combination, a pressing-die, a screw-spindle for actuating said die, coupling means connecting said die and said spindle, and means for bringing said coupling means into inoperative position while the die is resting on a support inclusive of the material to be pressed.

6. In a press, in combination, a pressing-die, a screw-spindle for actuating said die, coupling means connecting said die and said spindle, and automatically-operated means for bringing said coupling means into inoperative position while the die is resting on a support inclusive of the material to be pressed.

7. In a press, in combination, a pressing-die, a screw-spindle for actuating said die, means for automatically coupling said die and said screw-spindle while the die is resting at a certain point and for automatically uncoupling said parts when the die is resting at a higher point.

8. In a press, in combination, a pressing-die, a screw-spindle for actuating said die, means for alternately applying low pressure and high pressure to said die through said screw-spindle, and automatically-operated means for coupling said die and said screw-spindle during the ascent of said spindle after each high-pressure stroke and for holding said parts uncoupled after each low-pressure stroke.

9. In a press the combination of a pressing-die, a screw-spindle for actuating same, a hollow in said die adapted to receive the end of said spindle, recesses in said spindle and said die, a coupling member adapted to enter said recesses and means adapted to automatically withdraw said coupling member from the

spindle-recesses on depositing the die on a support inclusive of the material to be pressed and on further descending of the spindle.

10. In a press the combination of a pressing-die, a screw-spindle for actuating same, a hollow in said die adapted to receive the end of said spindle, recesses in said spindle and said die, a coupling device adapted to enter said recesses, a controlling member for said coupling device pivotally mounted on the frame of the press and adapted to gradually withdraw said coupling device from the recesses of the spindle on descending of said die and means to turn the controlling member on its pivot on continuation of the descending movement of the die substantially for the purpose described.

11. In a press the combination of a pressing-die, a screw-spindle for actuating same, a hollow in said die adapted to receive the end of said spindle, recesses in said spindle and said die, the recesses in the die being so positioned that the distance between the recesses and the bottom of the hollow exceeds the distance between the recesses in the spindle and the end of the spindle and a coupling member adapted to simultaneously enter said recesses in the spindle and in the die.

12. In a press the combination of a pressing-die, a screw-spindle for actuating same, a hollow in said die adapted to receive the end of said spindle, recesses in said spindle and said die, the recesses in the die being so positioned that the distance between the recesses and the bottom of the hollow exceeds the distance between the recesses in the spindle and the end of the spindle, a coupling member adapted to simultaneously enter said recesses in the spindle and in the die and means adapted to automatically withdraw said coupling member from the spindle-recesses on depositing the die on a support inclusive of the material to be pressed and on further descending of the spindle.

13. In a press the combination of a pressing-die, a screw-spindle for actuating same and coupling means adapted to throw said die and actuating-spindle at will into engagement and out of engagement while the die is resting on a support inclusive of the material to be pressed a mold, a bottom plate movable in the mold, an ejector-rod pivotally mounted on the under side of the bottom plate, an ejector, connections between the ejector and the spindle, other connections between said ejector-rod and said die, said last-named connections being adapted to hold said ejector-rod out of operative position when the die is in operative position, substantially for the purpose described.

14. In a press the combination of a pressing-die, a screw-spindle for actuating same and coupling means adapted to throw said die and actuating-spindle at will into engagement and out of engagement while the die is resting on a support inclusive of the material to be pressed, a mold, a bottom plate movable in the mold, an ejector-rod pivotally mounted on the under side of the bottom plate, an ejector, connections between the ejector and the spindle, other connections between said ejector-rod and said die, said last-named connections being adapted to hold said ejector-rod out of operative position when the die is in operative position and a guide for said ejector adapted to bring it gradually out of contact with the ejector-rod on rising of the press-spindle substantially for the purpose described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CURT VON PELCHRZIM.
JOHANN THÜMMEL.

Witnesses:
A. SCHNEIDER,
N. SCHNEIDER.