

965,371.

A. G. CUMMINGS.
POWDER PRESS.
APPLICATION FILED MAR. 13, 1909.

Patented July 26, 1910.

3 SHEETS—SHEET 1.

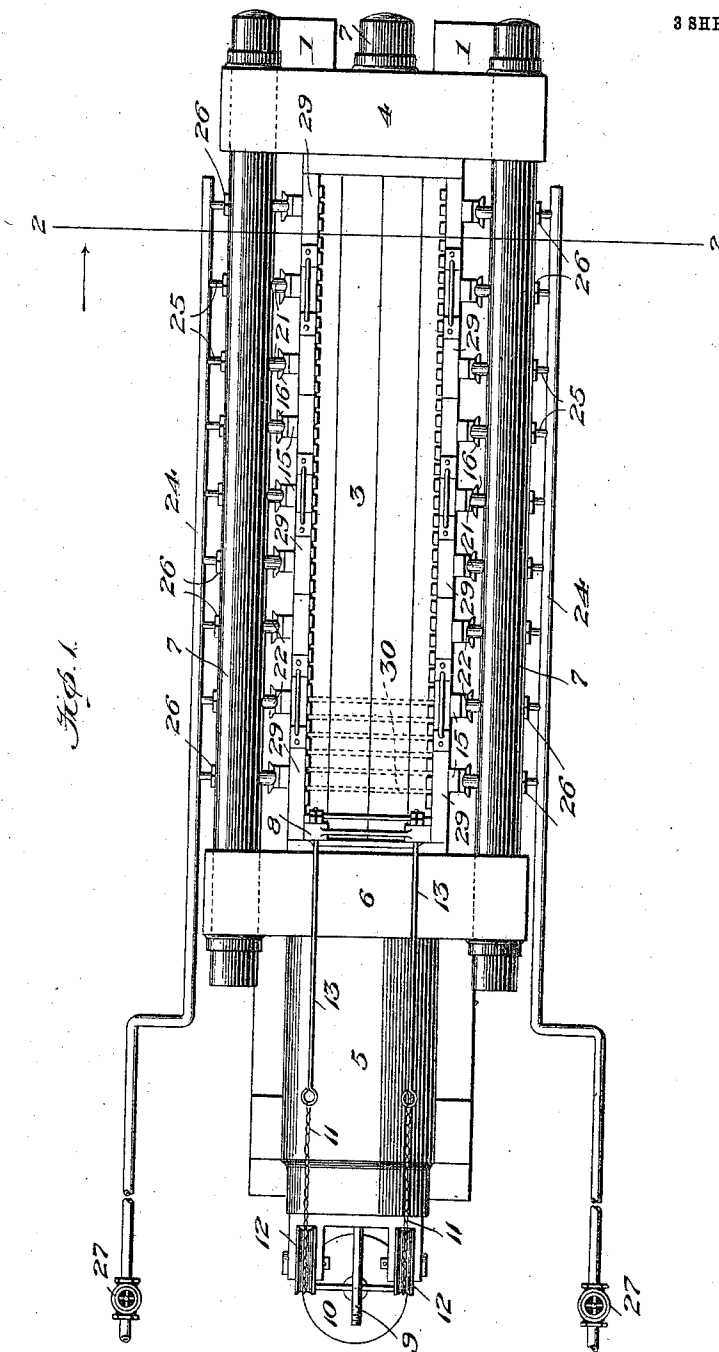


Fig. 1.

Witnesses

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334

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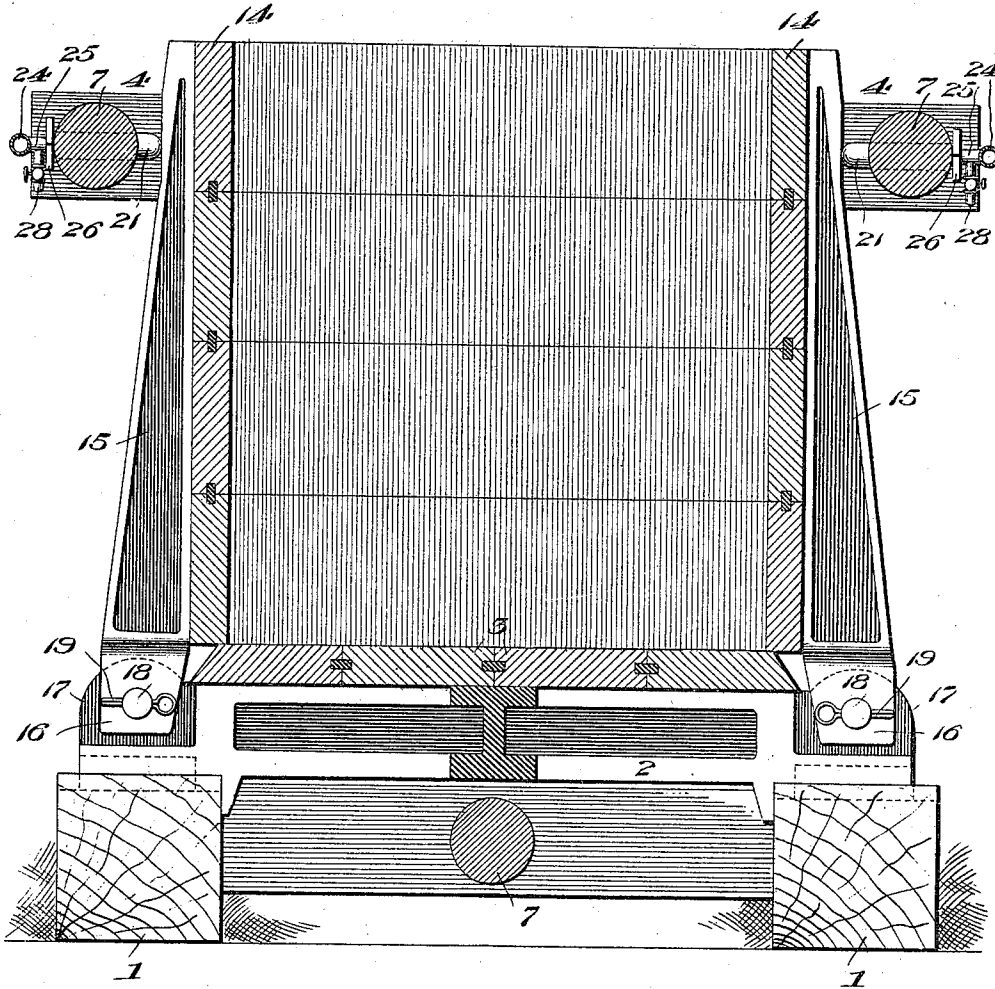
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3 SHEETS—SHEET 2.

Fig. 2.



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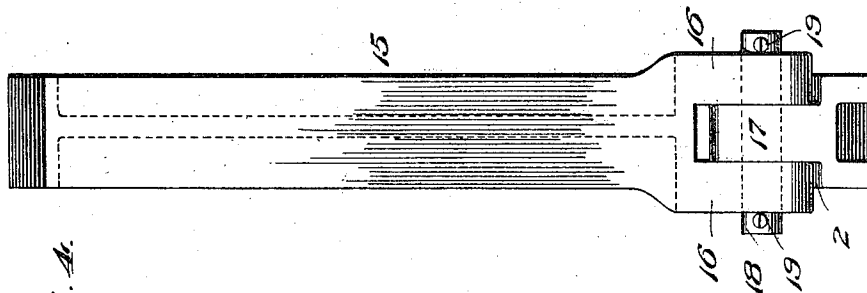


Fig. 4.

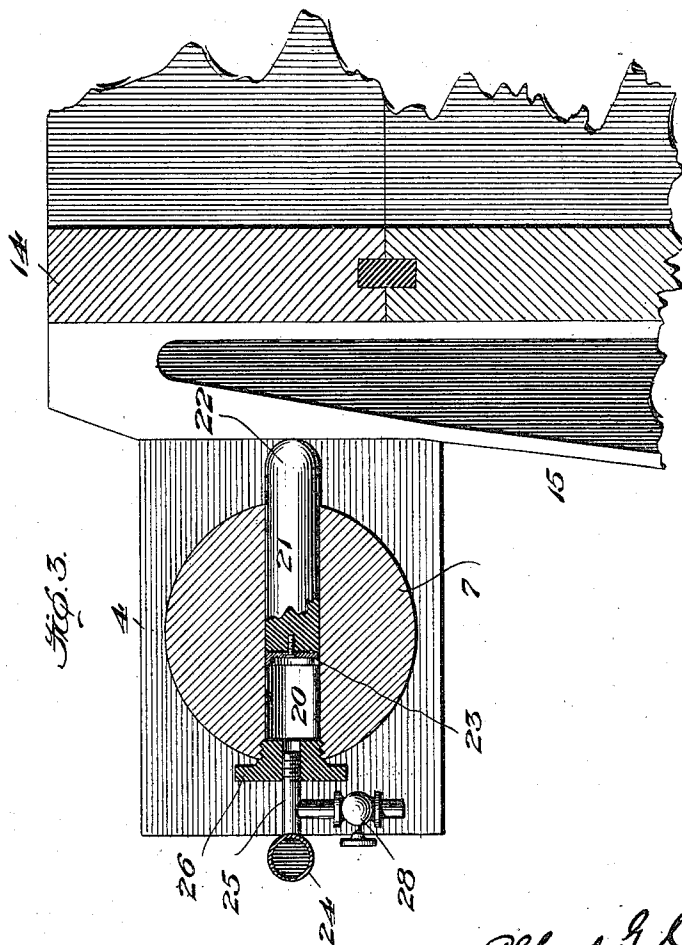


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALFRED G. CUMMINGS, OF TERRE HAUTE, INDIANA.

POWDER-PRESS.

965,371.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed March 13, 1909. Serial No. 483,251.

To all whom it may concern:

Be it known that I, ALFRED G. CUMMINGS, a citizen of the United States, residing at Terre Haute, county of Vigo, and State of Indiana, have invented certain new and useful Improvements in Powder-Presses, of which the following is a specification.

My invention relates to powder presses.

As heretofore generally constructed, presses for compressing powder have consisted of a box-like elongated structure having a tail block at one end, a hydraulically operated piston at the other end having a suitable plunger adapted to play in the box, loose sides for the compression box, suitable bracing or stay means, and means for releasably holding the sides of the box against the pressure exerted by the powder when under compression, which permit the said sides to be moved after the powder has been compressed so that the cakes of powder which have been formed may be conveniently removed.

In earlier constructions, wedges, cams or eccentrics, and screw pressure devices have been used for holding the movable sides in position and releasing them when desired, but these various means have had the very great disadvantage of generating a great deal of friction, or, as is the case with wedges, requiring blows and consequent vibration in releasing them from their engagement with the sides, and as sparks resulting from friction or blows are liable to explode a large mass of powder, the use of these earlier devices has been attended with great danger, but in addition to the danger involved, such earlier used means for holding the sides of the compression box, involve a very considerable amount of labor in bringing about the desired results.

In earlier constructions it has been proposed to support the sides of the compression box by standards which have a loose seating in cross-beams. This construction, while having advantages, has the disadvantage that the standards are liable to become accidentally unseated and either cause additional labor or imperfect formation of the cakes of powder.

Presses of the character set forth are more particularly adapted for use in forming previously mixed black powder into cakes, suitable partition plates being used in the compression chamber for this purpose, which are subsequently broken up into grains of the desired size.

The present invention has for one object the provision of novel means for holding the sides of the compression blocks in position and for positioning said sides or releasing them, as when the completed cakes are to be removed from the box, which may be controlled from a distance so that absolute safety of operation is insured.

Another object of the invention is to provide novel means for positioning, holding, and releasing the sides of the compression box, wherein the necessary frictional contact is reduced to a minimum and danger of sparking minimized and, further, whereby absolute evenness and accuracy of adjustment of the sides are obtained, the requisite resistance to the spreading pressure exerted on the sides of the box by the powder under compression is obtained, and great rapidity, ease, and safety of adjustment had.

In carrying out the foregoing objects, I provide motive fluid operated means, however constructed and disposed, adapted to cooperate with the movable sides of the compression box and controlled from any desired point, whether at a distance from the press (as is preferable), or at the press, and wherein the frictional contact of the parts is minimized, as will appear more fully hereinafter in the description of one form the invention may assume.

Another object of the invention is the provision of an improved connection between the standards and the cross-beams of the press, whereby accidental detachment of the standards is prevented, this object being accomplished by pivoting the standards to the cross-beams, preferably in a particular manner, as set forth fully hereinafter.

The invention is susceptible of many modifications, all of which are to be considered as included therein, one form of the invention being shown in the accompanying drawings, in which—

Figure 1 is a plan view of a powder press equipped with my improvements; Fig. 2, an enlarged section on line 2—2 of Fig. 1; Fig. 3, an enlarged section showing one of the operating mechanisms for the sides; and Fig. 4, a detail elevation of one of the standards, showing the manner in which it is pivoted to its cross-beam.

The compression box of the press is supported on a suitable foundation composed of timbers or concrete beams 1 which are

bridged by cross-beams or bolsters 2, preferably of bronze, whose ends rest on said timbers and are suitably connected thereto. The bottom 3 of the compression box rests

5 upon the bolsters or beams 2.

At one end of the compression box is a tail block 4 and at the other end is a cylinder 5 having a head block 6 which is rigidly connected to the tail block 4 by stay rods 7, affording a structure susceptible of standing the very high pressure, usually about four thousand pounds per square inch, which is exerted by the plunger 8, said plunger being of a shape conforming to that of the compression box and carried by the outer end of a piston which operates in the cylinder 5, the supply of oil, water or other suitable motive fluid to the interior of the cylinder 5 entering by way of pipe 9, under the control of a suitable valve. The plunger and piston will retract on release of the pressure by a counterweight 10 to which chains 11 running over pulleys 12 are connected, the chains being attached to the plunger 8 by stay rods 13.

The sides 14 of the compression box are loose so that they can move laterally.

As thus far described, with the exception of the end formation of the bolsters 2, the press is the same as those which have been heretofore used.

The sides 14 are supported by standards 15 which may be connected thereto or merely loosely positioned thereagainst, as desired, said standards being provided at their lower ends with twin ears 16 which lie on opposite sides of single ears 17 on the ends of the bolsters or cross-beams 2, being pivoted thereto by pins 18 and held against displacement by spring cotters 19. This construction is an improvement over the construction formerly used in that the standards cannot become accidentally detached, are always properly centered and hence cannot become forced out of position by the operating means, and afford a very strong connection.

I wish it understood that the motive fluid operated means employed to hold the sides in position may be used either on the sides or the standards, or on the stay rods and that such mechanism is susceptible of many modifications.

The stay rods, opposite the several standards 15, have transverse cylinders 20 in which slide plungers 21, whose outer ends are rounded at 22 and are adapted to bear against the said standards. On account of the formation of the ends 22, these plungers have an extremely slight area bearing against the standards—in fact, the contacting surface on the plunger is merely a point, in consequence of which the friction is reduced to a minimum. No matter how the plunger may be turned, its rounded end

always presents the same point to the standard and the slight relative shifting of the standard on account of its being pivoted when the standard moves, merely causes engagement of the standard with another point on the rounded end of the plunger. The plunger may be packed in any suitable manner as at 23.

The various cylinders 20 are connected to a motive fluid supply pipe 24 by branches 25 leading to suitably packed glands 26 screwed into the stay rod. The pipes 24 are provided with controlling valves 27 which may be located at any convenient point, any desired distance from the press so that the movement of the sides of the compression box can be controlled at a safe distance, thereby obviating the danger heretofore met in shifting wedges or cams, screws or the like, at the press. In this manner, all of the plungers are simultaneously controlled and the adjustment of the sides is accomplished very quickly and the labor and time heretofore spent in adjusting screws, cams, and wedges, are rendered unnecessary. Oil, water or other motive fluid can be employed in this connection. If desired, independent controlling valves could be employed in connection with any one or any series of plungers. The valves 27 may be made as three-way valves so that the pressure in the cylinders 20 can be relieved simultaneously, or, an independent relief valve 28 can be used in connection with each cylinder or each set of cylinders.

In using the press, the common practice is to employ independent gage boards 29, having suitable handles for their manipulation, which are placed on top of the sides 14, and division plates 30 are spaced by these gage boards, the powder being filled in between the division plates and the gage boards afterward removed. Thus, the entire mass of powder to be pressed is sub-divided into what will subsequently become cakes. Fluid under pressure is then let in through the pipe 9, the plunger moves forward and the compression of the powder occurs. Before the plunger is allowed to act, however, the operator opens the valves 27 and the motive fluid pressure thereupon forces the plungers outwardly, said plungers carrying the standards 15 and sides 14 into proper position, and the supply of motive fluid having been cut off by the valves 27, the motive fluid pressure in the various cylinders 20, holds the plungers so that the sides are maintained in proper position to resist the lateral pressure exerted by the powder while it is being compressed by the plunger 8. After compression, the motive fluid pressure in the pipes 24 and cylinders 20 is released by whatever relief device may be used, as heretofore described, whereupon the pressure existing between the edges of the formed powder cakes and the side boards 14 is relieved

and the operator may then readily pull back by hand the side boards and standards, which swing on the pivots 18. The compressed cakes of powder can then be readily removed.

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

1. In a powder press, the combination with a compression box open at its top for the introduction and removal of the powder and having a movable side, of a plurality of motive fluid operated devices positioned at different points lengthwise of said side for supporting said side and controlling means therefor.

2. In a powder press, the combination with a compression box open at its top for the introduction and removal of the powder and having a movable side, of a plurality of motive fluid operated devices positioned at different points lengthwise of said side for supporting said side, and means for simultaneously controlling the flow of the motive fluid utilized by said devices.

3. In a powder press, the combination with a compression box having a movable side, of a plurality of motive fluid operated devices positioned at different points lengthwise of said side for supporting said side, a pipe connected to all of said motive fluid operated devices, and a single valve for controlling the flow of the motive fluid through the pipe to the said supporting devices, whereby the said devices are simultaneously controlled.

4. In a powder press, the combination with a compression box having a movable side, of hinged standards coöperating with said movable side at different points of the length thereof, a support or abutment, and a plurality of independent motive fluid operated devices interposed between the support or abutment and the respective standards.

5. In a powder press, the combination with a compression box having a movable side, of hinged standards coöperating with said movable side at different points of the length thereof, a support or abutment, a plurality of independent motive fluid operated devices interposed between the support or abutment and the respective standards, pipe connections to all of said motive fluid operated devices, and controlling means therefor, whereby all of said devices may be simultaneously operated.

6. In a powder press, the combination with a support, of a compression box having a movable side, and a motive fluid operated plunger interposed between said movable side and said support which is adapted for sustaining said side, said plunger having a single point as its active contact part which is engageable with its abutment.

7. In a powder press, the combination with a compression box having a movable side, of a motive fluid operated plunger having a rounded end engaging said movable side.

8. In a powder press, the combination with a compression box having a movable side, a tail block at one end, and a head block at its other end, of a stay rod connecting the head block and the tail block, and motive fluid operated devices interposed between the stay rod and the movable side adapted for supporting or sustaining said movable side.

9. In a powder press, the combination with a compression box having a movable side, a tail block at one end, and a head block at its other end, of a stay rod connecting the head block and the tail block, and motive fluid operated plungers carried by the stay rod and coöperating with the said side.

10. In a powder press, the combination with a compression box having head and tail blocks and a movable side, of a stay rod connecting said head and tail blocks, and a plurality of motive fluid operated plungers working in cylinders in said stay rod and having rounded ends coöperating with the movable side.

11. In a powder press, the combination with a compression box having a movable side, of hinged standards coöperating with said side, and motive fluid operated plungers having rounded ends bearing against said standards.

12. In a powder press, the combination with a compression box, of bolsters or cross-beams disposed at intervals and supporting said box, a movable side for the box, and standards hinged to the respective cross-beams or bolsters and adapted for supporting the movable side.

13. In a powder press, the combination with a compression box having a movable side, of bolsters disposed at intervals and supporting said box each of which has an ear, standards for the movable side which have twin ears straddling the ears on the respective bolsters aforesaid, and pins passing through said ears.

14. In a powder press, the combination with a compression box open at its top for the introduction and removal of powder and having a hinged side, of motive fluid operated means for supporting or sustaining said side during the compression of the material in said compression box.

In testimony whereof, I hereunto affix my signature in presence of two witnesses.

ALFRED G. CUMMINGS.

Witnesses:

S. P. TUTT,
C. R. HANGER.