To all whom it may concern:

Be it known that I, SAMUEL J. WEBB, a citizen of the United States, residing at Minden, Webster parish, State of Louisiana, have invented certain new and useful Improvements in Compound-Lever Presses, of which the following is a specification.

My invention relates to compound-lever presses for compressing cotton and other material, and has for its object to improve and simplify the construction of such presses; and the invention consists in a press embodying the various features of construction and arrangement of parts operating substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a vertical section through a press embodying my invention. Fig. 2 is a similar view showing the parts in a different position. Fig. 3 is an end view. Fig. 4 is a vertical section of a modification. Figs. 5, 6, and 7 are detail views.

As above indicated, one of the objects of my invention is to provide a simple compact press and one in which the strains during the operation are inward or toward the main frame of the press.

Another object is to provide a press in which the pressure applied to the bale or other material rapidly increases during the first part of the operation and during the latter part the increased or maximum pressure is practically constant, so that bales may be pressed to a uniform density regardless of the ultimate thickness of the bale.

Another object is to provide a construction of the character above indicated in which are combined the advantages of a lever mechanism and a steam or other motive fluid actuating device, making what may be termed a "compound-lever and steam press." While such a press may be used for many and various purposes and the details of construction may be altered to adapt it for various purposes, it is more especially intended for compressing cotton-bales, and I will describe my invention as embodied in a press of this character.

The press comprises a suitable frame, which in the present instance includes four posts A, mounted on a suitable base A', and a main frame portion A, supported on the posts, as at a. This main frame portion may be differently constructed; but in the present instance it carries or has formed integral with it the stationary bed or platen A, and in this connection I provide brackets a', extending from the bed or platen A and secured to the posts A. This main frame portion forms a suitable support for the operating parts of the press, they preferably being attached to this portion substantially in the manner hereinafter pointed out. Supported upon the upper part of the main frame portion A there is a cylinder B, provided with a bottom b and a suitable inlet b and outlet port b for steam or other motive fluid and with a piston B' moving therein, to which is attached a piston-rod B, extending down through the recess of the main frame portion. This piston-rod at its lower end is provided with a head carrying one or more pins b b. The bottom or head of the cylinder is provided with a recess r around the opening for the piston-rod, which recess is connected with the outlet-port b, and the piston is provided with a projection p, which is adapted to enter the recess r and close it at or about the time the piston reaches the limit of its stroke, and thus forms a cushion. Also mounted on the main frame portion are two swinging or operating arms or levers C C', they being pivoted to the main frame portion, as at c c'. Connected to these swinging arms are the connecting-links D D', they being pivoted thereto, as at d d'. These links D D' are connected with the lifting-arms E E', which are pivoted to the main frame portion, at e e', and the links D and arms E and links D' and arms E', respectively, form a sort of toggle joint. In the present instance these links and arms are shown as pivoted together at their outer extremities, as by pivot-pins e e'; but they may be otherwise connected. Connected to these arms E E' are the lifting-rods F F', they being shown as mounted on the pivot-pins e e' and their other ends being connected to the movable bed or platen G, which slides between and is guided by the posts A. The arms C C' and links D D' are connected to the piston-rod B by means of links I I', which are pivoted to the said links at one end by pins d d' and to the piston-rod by means of pins b b. In this case I show two pins b b; but
these links I' may be connected to the piston-rod by one pin. These links may be operated by any other suitable motor device. Usually in mounting the press the upper face of the movable bed or platen G in its normal or downward position is preferably on a level with the floor or platform F, as this facilitates the handling of the bales or other material to be pressed.

H represents bumpers or stops arranged so that when the parts reach the end of their movement the upper ends of the lifting-rods F F' (in this case) strike against said bumpers, and thus prevent any further movement of the parts. These bumpers may be located so that some other moving part may strike them for the same purpose.

H' represents also bumpers located in the frame and arranged so that a projection on the piston-rod or the hubs of links D D' may strike them, and thus stop the movement of the press.

I represents supports for pins c and c'.

J represents tie-rods to strengthen the frame.

K' are valves connected to inlet and outlet ports b b and are operated by means of a lever L and connecting-rod L' to control the inlet and outlet of the motive fluid, and the exhaust-port b' is centrally arranged, so that a projection on the piston will close it and form a cushion.

It is not necessary to describe the valve mechanism in detail, as I have already described it in former patents and as it is well understood by those skilled in the art.

In Fig. 1 I have shown the parts in what I have termed their "normal" positions, ready to receive a bale or other material to be pressed.

When it is desired to operate the press, steam or other fluid is admitted into the cylinder B beneath the piston E', and the piston-rod is raised under the direct action of the steam, and as the piston-rod moves upward the swinging arms C C' rotate on their pivots c c' at a speed commensurate with or a little faster than the movement of the piston. This rotation of the swinging arms tends to draw the links D D' inward and upward. Their inward movement being resisted by the arms E E' tends to make the pivot-pins e e travel in the line indicated by the curves 1 1, Fig. 2, and this consequently causes the lifting-rods F F' to rise with a rapid motion at the first, when the resistance of the bale or other material is relatively small, so that the first part of the compression of the bale is accomplished in a relatively quick time, and as this continues the pressure increases and the upward movement of the movable platen decreases until the pivot-pins e e reach about the point 1', and it will be observed that the movement between the pivot-pins e e and b' and b' respectively, is relatively large, the former points traveling faster than the latter points, owing to the peculiar arrangement of the levers. As the piston-rod continues its movement upward, completing the stroke, the relative movement between the pivot-points b' b' and the pivot-points e e decreases until during the latter part of the upward movement of the piston they move upward for some distance in practically the same proportions—as, for instance, six to one—thereby causing a uniform pressure on the bale during a considerable portion of the latter part of the upward movement of the piston or while points e e are moving from point 1' to the end of a stroke or against the bumpers H, so that the bales will be compressed to practically the same degree independent of their ultimate thickness. The positions of the arms, links, and lifting-rods toward the close of the movement are indicated in Fig. 2, and it will be seen that the links D D', attached to the swinging arms C C', are nearly in a vertical line with the arms E E', attached to the main frame portion, while the lifting-rods F F' are in a nearly vertical position. It is manifest that in this relation the power of the swinging arms C C', through the links D D', has decreased, owing to the angle assumed by the parts, the maximum power being practically when the pivot-point of the swinging arm, the pivot-point c, and the pivot-point e are practically in a right line; but it will also be observed that as the power of the swinging arm decreases the power of the toggle joint or angle formed by the arms E and E' and the lifting-rod F F', attached thereto, is increasing, and this increase is practically in the ratio of the decreasing power of the swinging arm, so that, as before stated, the power exerted on the bale during the latter portion of the movement of the movable platen is practically uniform. This arrangement, it will be seen, is simple of construction, and the parts can be made strong and effective, and it will be seen that the tendency of the strains on the parts is inward toward the main frame portion, and it will further be observed that the operations are relatively rapid and require no special manipulation by the operator, who simply admits steam or other motive fluid to the cylinder. When the bale is completed, the exhaust is opened and the parts return to their normal positions by gravity.

It will be observed that other means for actuating the arms and connected levers may be used in place of the cylinder and piston; but I have found the arrangement shown to be satisfactory.

It will be observed that in the normal position the arms E E' and links D D' lie nearly parallel to each other and in a substantially horizontal position, and arms C C' are in a practically vertical position, while when the movable platen is in its upward position the arms E E' and links I I' and D D' are in
nearly-vertical positions and arms $C C'$ are in a nearly-horizontal position and the lifting-rod have been swung inward in a nearly-vertical position.

In Fig. 4 the construction and operation of the parts are substantially the same, except that the piston-rod $B^3$ is extended and the links $I I$ extend downward and connect with the piston-rod $B^2$ at a point below the pivot-points $d, d'$, so that in operation they may be said to push the swinging arms $C C'$ instead of pulling them, and the effect is practically the same in both instances.

What I claim is—

1. In a press, the combination with the frame of lifting-arms each having one end connected to a stationary part of the press, swinging arms also connected to a stationary part of the press, connections between the free ends of said lifting-arms and swinging arms, means for operating the swinging arms, a movable platen, and lifting-rod connecting the movable platen to the same ends of the lifting-arms which are connected to the swinging arms, substantially as described.

2. In a press, the combination with the frame of lifting-arms each having its inner end connected to a stationary part of the press and normally in a horizontal position, swinging arms connected to a stationary part of the press and being normally in a vertical position, connections between the lower ends of said swinging arms and the outer ends of the lifting-arms, a piston-rod, links connecting to the lower ends of the swinging arms to the piston-rod, a movable platen, and lifting-rod connecting the movable platen to the lifting-arms, substantially as described.

3. In a press, the combination with the frame of lifting-arms each having one end connected to a stationary part of the press, swinging arms each having one end and swinging arms, means for lifting the swinging arms, a movable platen, and connections between the movable platen and lifting-arms, the parts being so proportioned that the platen will move with an increasing power at the beginning of its upward movement and with a practically uniform power during its final upward movement, substantially as described.

4. In a press, the combination with the frame, of arms $E, E'$ each having one end connected to a stationary part of the press, a movable platen, lifting-rod connecting the movable platen with the outer ends of said arms, swinging arms $C, C'$ connected at their outer ends to a stationary part of the press, links connecting the free ends of said swinging arms with the first-mentioned arms, and connections between the links and the piston of the press, the arrangement being such that when the piston moves the arms and lifting-rod operate as a toggle with increasing power, while the swinging arms and links form a lifting-toggle with increasing power until the free ends of the arms are substantially in line with the pivotal points of said arms and said swinging arms, and then they form a toggle operating with decreasing power, substantially as described.

5. In a press, the combination with the plateaus, of a cylinder, a piston, connections between the piston and the movable platen, said cylinder being provided with a head having a recess, the piston being provided with a projection adapted to enter the recess and close the same, whereby a cushion is formed for the piston, an exhaust-port leading from the recess and a separate inlet-port, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL J. WEBB.

Witnesses:
W. Z. DECK,
ELMER W. DECK.