6 Sheets—Sheet 1

S. A. CLEMENS.

PRESSING COTTON AND OTHER SUBSTANCES INTO BALES.

No. 7,612. Patented Sept. 3, 1850.

Fig. 1.

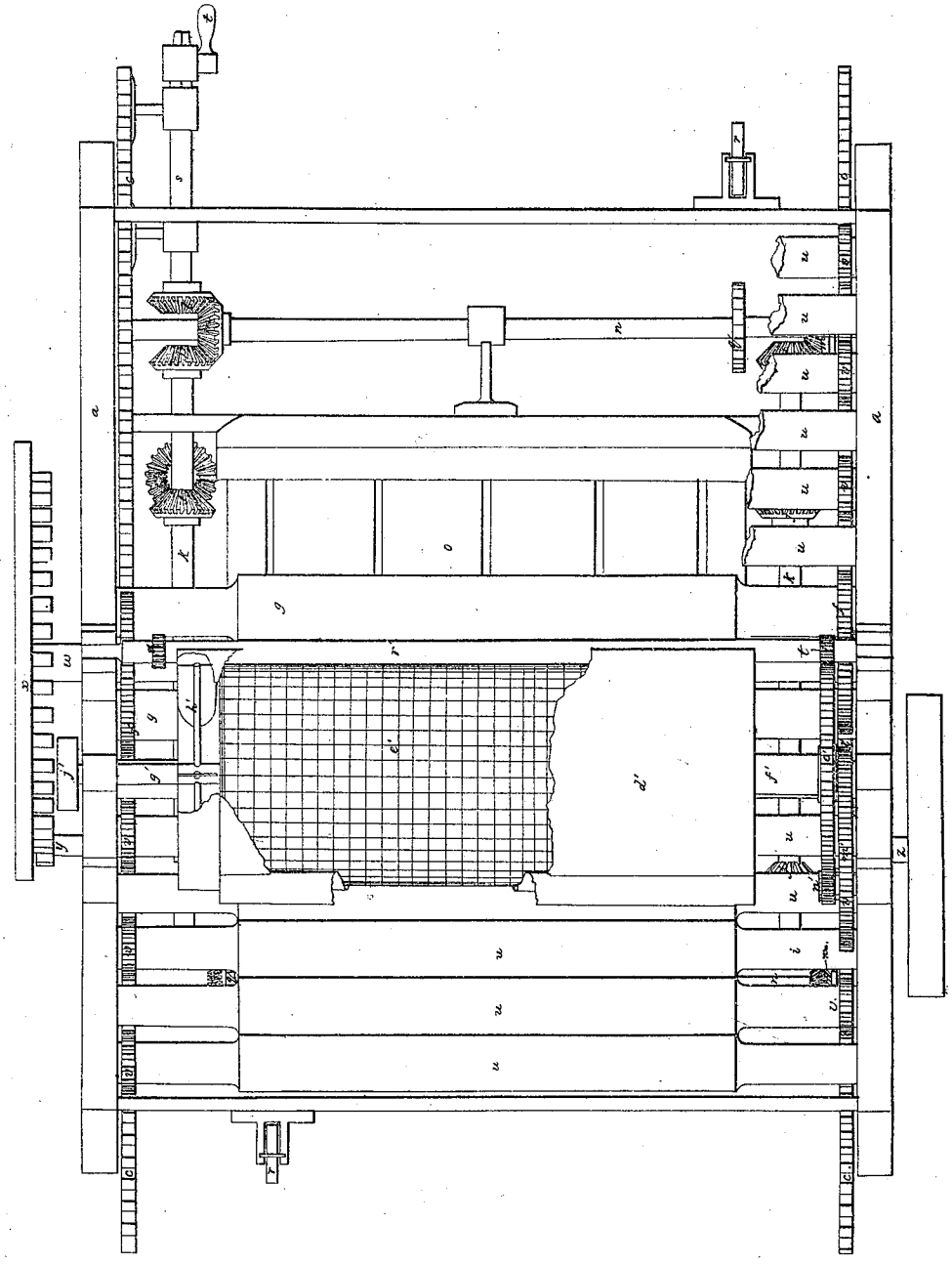

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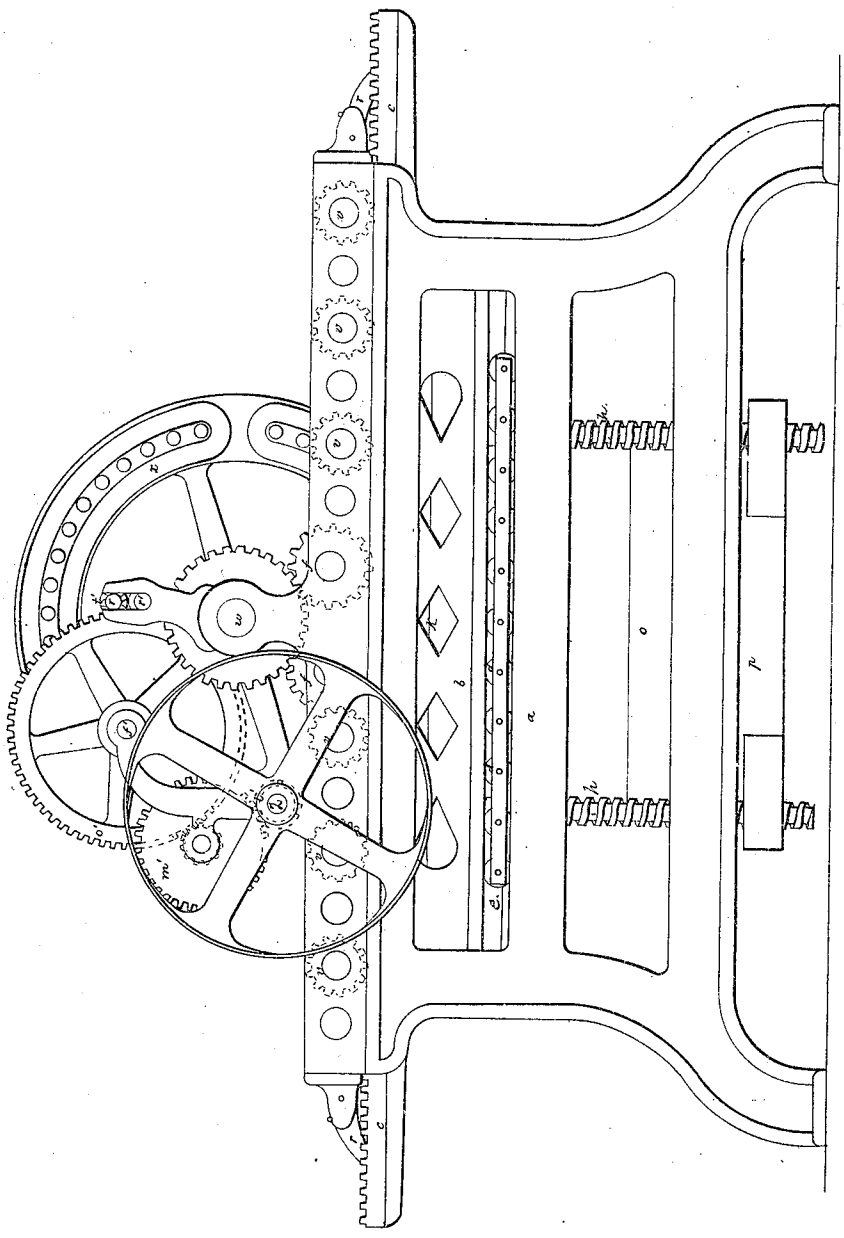
Fig. 2.



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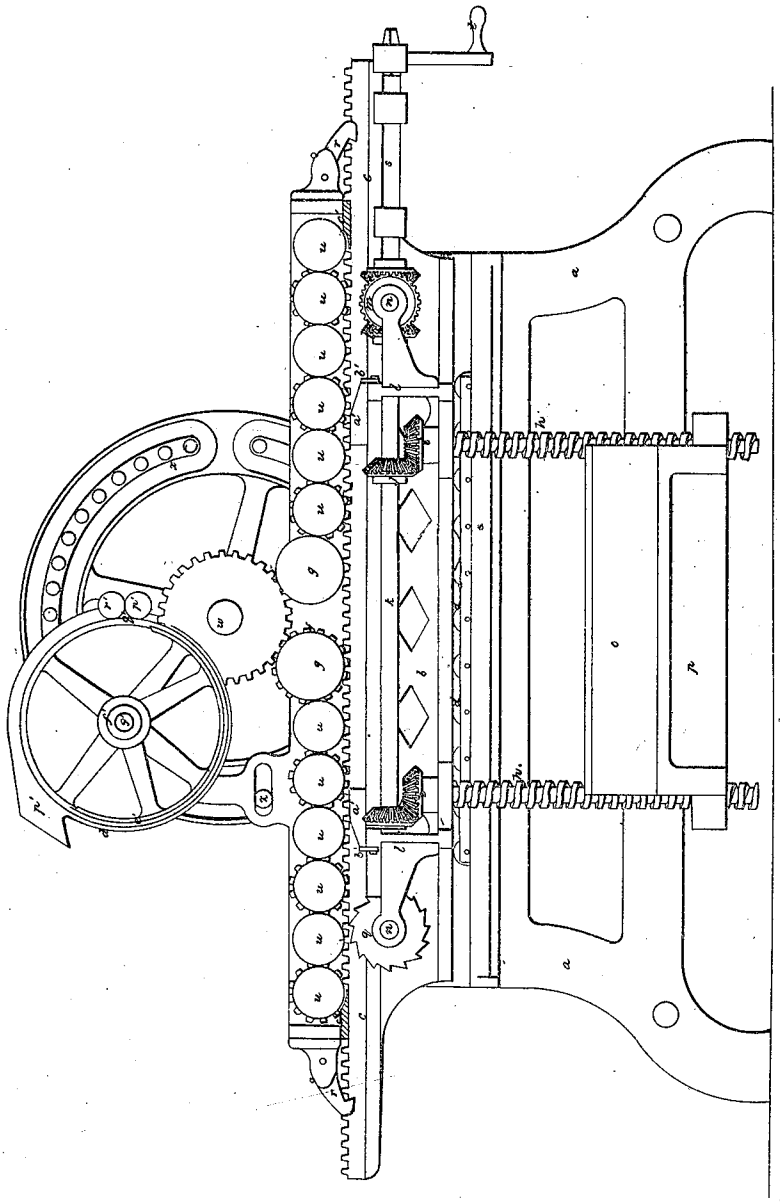

Fig. 3.

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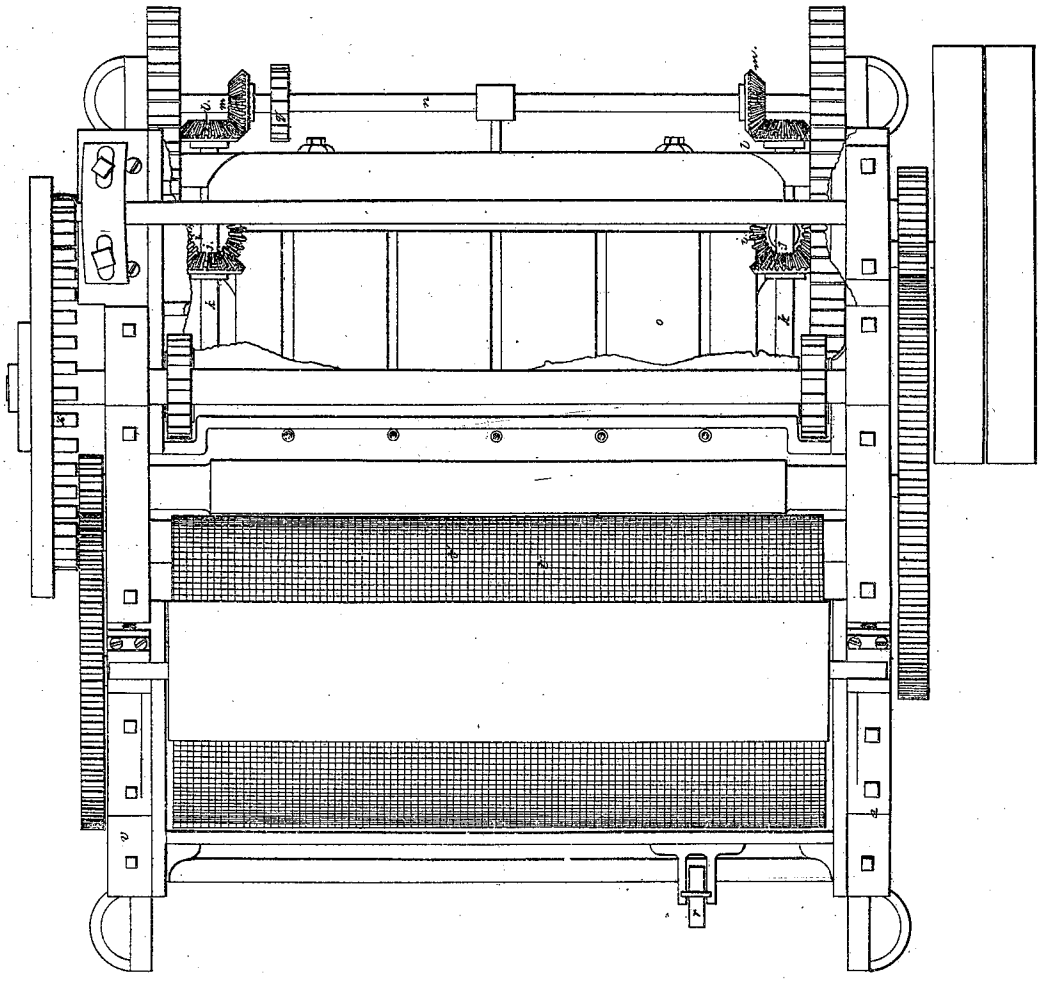
Fig. 4.



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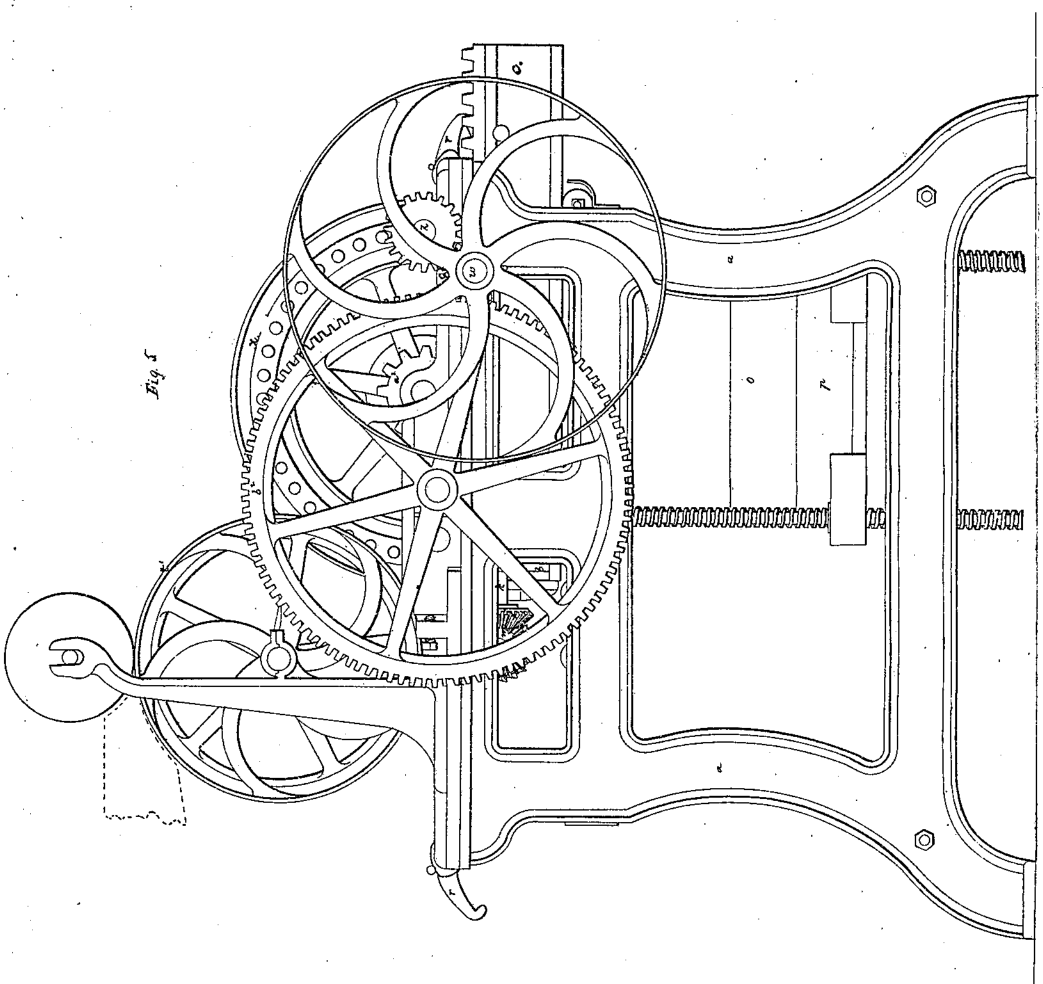

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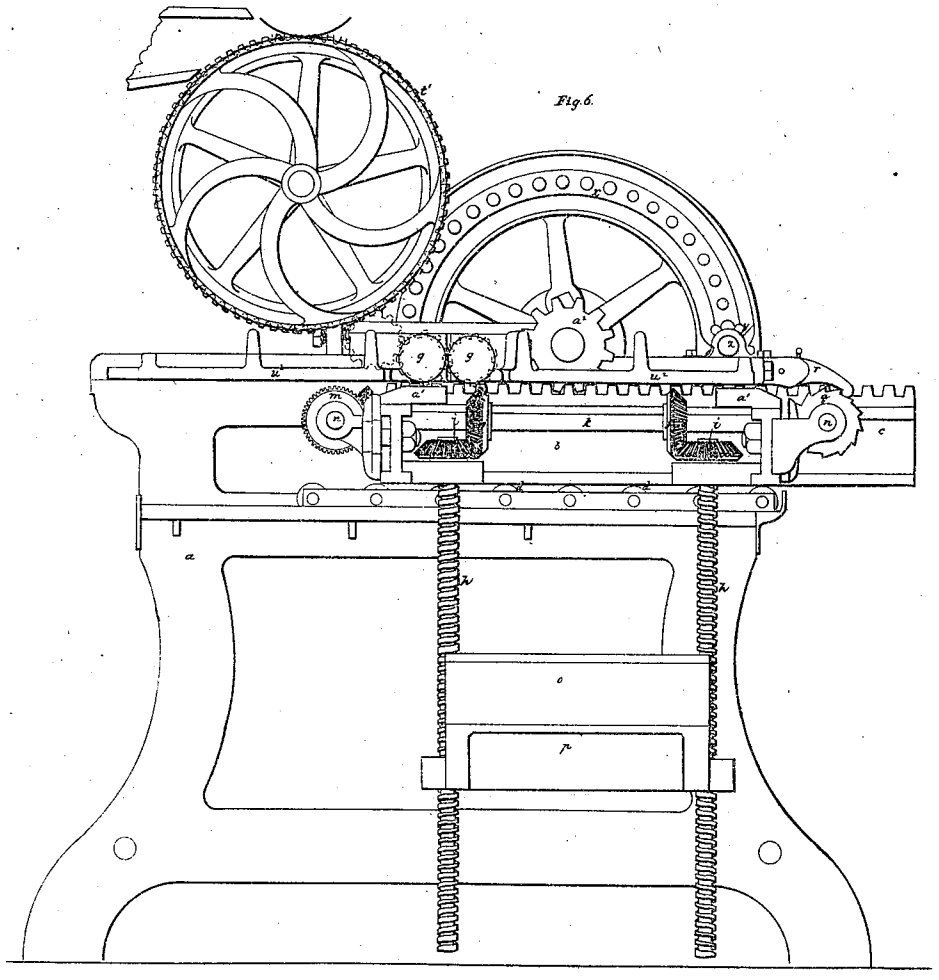
Fig. 6.



UNITED STATES PATENT OFFICE.

S. A. CLEMENS, OF GRANBY, CONNECTICUT.

IMPROVEMENT IN PRESSING COTTON AND OTHER SUBSTANCES INTO BALES.

Specification forming part of Letters Patent No. 7,612, dated September 3, 1850.

To all whom it may concern:

Be it known that I, S. A. CLEMENS, of Granby, in the county of Hartford and State of Connecticut, have invented a new and useful method of baling and pressing cotton and other fibrous substances, such as wool, fur, flax, and hemp, and which may also be applied to the packing and pressing of hides, leather, rags, hay, and other substances; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes my invention from all other things before known, and of the method of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan, Fig. 2 a side elevation, and Fig. 3 a longitudinal vertical section, of one of the modes in which I have applied the principle of my invention; and Figs. 4, 5, and 6 are like representations of another mode of application.

The same letters indicate like parts in all the figures.

Cotton and the other substances above enumerated have always heretofore been packed and pressed by pressure applied by a platen or follower directly to the whole mass. This of necessity requires great power, and if the substance or substances be matted and in uneven lumps the whole mass cannot be well condensed. By my invention I am enabled to condense the mass into a much smaller compass, and by much less power than heretofore, while at the same time the substance or substances can be unpacked to more advantage for the purposes of manufacture, particularly when applied to cotton.

The first part of my invention consists in packing the substances above enumerated and all others of a like character in a series of successive layers or strata by the action of a roller or rollers, or cylinders, or curved or beveled faces on the surface thereof, the pressure being in succession applied to one or more of such layers or strata, whereby the substance or substances to be pressed and packed are more evenly distributed, and therefore in a condition to be condensed into a more compact mass and with less power, for the reason that the power is divided and applied by the surface of the roller or rollers or cylinders, or their equivalents, to a small portion of the surface of each layer or layers, instead of the whole mass at once.

The second part of my invention, which relates to the means for applying the first part of my invention, consists in combining with rollers or cylinders or their equivalents for laying and compressing in successive layers or strata a bed which shall recede from the surface of the rollers or cylinders as the layers or strata accumulate, and which either traverses back and forth under them, or over which they traverse from end to end to distribute the layers or strata.

The third part of my invention consists in combining with a press for packing and pressing substances in successive layers or strata, by means of rollers or cylinders or their equivalents, a lapping-machine for laying or forming the fibrous substance or substances to be packed into a lap or laps preparatory to the operation of laying and pressing.

The fourth part of my invention consists in combining with each of the laying and compressing rollers or their equivalents a series of rollers or their equivalents for retaining the layers in their compressed state as the bed traverses under them.

The fifth part of my invention consists in making the bed of the press without sides or ends, to admit of the traversing motion for laying and the depressing motion for yielding as the substance is packed, and to give free access to the ends and sides for baling, in combination with a carriage which is provided with the requisite means for giving the required movements, the said carriage being provided with end plates to adjust the ends of the layers or strata as they are laid and pressed; and the last part of my invention consists in combining, with the end plates attached to the carriage for adjusting the ends of the layers, a permanent plate at the outer end of each series of rollers, and a little below them, so located that the upper surface of the end adjusting-plates, with the carriage, shall pass under and in contact with them, to push into place any portion of the layers which may have been carried by the rollers onto the upper surface of the end plates.

In the accompanying drawings, *a* represents an appropriate frame, which may, however, be varied at the discretion of the constructor, and *b* a carriage adapted to slide longitudinally between the sides thereof. This carriage

is a quadrangular frame, the bars *c c* of which project beyond the ends, with their under edges flat and straight, to run on truck-rollers *d*, which in turn rest and run on appropriate ways *e e*, attached to the inner surface of the side frames, or made part thereof, of sufficient strength to resist with safety the pressure to be applied. The upper edges of the bars *c c* are formed with rack-teeth, which are engaged by the cogs of two wheels, *f f*—one for each rack, and on the opposite ends of the two laying and pressing cylinders *g g*—and by means of which the carriage receives its reciprocating movements, in manner to be hereinafter described.

The frame of the carriage carries four vertical screws, *h h h h*, arranged near the four corners, the said screws being provided with journals near their upper ends, fitted to turn in appropriate boxes secured to the carriage-frame. The upper ends of these screws have bevel-pinions *i i i i*, which are engaged by corresponding pinions, *j j j j*, on two line-shafts, *k k*, which have their bearings in the end pieces of the carriage-frame, and which project beyond them and carry other bevel-pinions, *l l l l*, which engage corresponding pinions, *m m m m*, on two cross-shafts, *n n*, one at each end, so as to gear together the four shafts, that all may turn in unison, and thereby cause the four screws to turn in unison also.

The bed *o* of the press, properly grooved to receive the cords, hoops, or other means for tying up the bales, is secured to the top of a plate, *p*, or made part thereof, the four corners of which are threaded to fit into the four screws, so that as these are turned to the right or left the said bed is elevated or depressed. The two cross-shafts *n n* each carry a toothed or ratchet wheel, *q q*, the cogs of which, as the carriage reciprocates, alternately strike two hands or catches, *r r*, attached to the frame, and thus turn the system of pinions and shafts, and by them the four screws by which the bed is depressed at each operation the distance required for one layer. For the purpose of elevating or depressing the bed independently of the reciprocating motion of the carriage, which is required at each complete operation, one of the cross-shafts *n* is geared with a short shaft, *s*, provided at its outer end with a crank-handle or winch, *t*. The bed can be carried up by the four screws so high as to come in contact with the periphery of the two cylinders, and down so low as to discharge freely a bale of the required size after it has been packed thereon. The two cylinders are placed sufficiently far apart to leave a space between them for the free passage of a lap of the substance or substances to be packed. Outside of the two cylinders, and on the same horizontal plane as the lower part thereof, there are two series of rollers, *u u*, arranged in parallel lines, with their peripheries nearly touching. They have each a pinion, *v*, on one end, the cogs of which engage the racks on the carriage, so as to be turned thereby. The said pinions are arranged alternately on opposite ends, and the diameters of the rollers and cylinders must be the same as the pitch-line of their cog-wheels and pinions, so that they shall move with the same velocity as the carriage. Just above the space between the two cylinders there is a main shaft, *w*, having its bearings in the side frames, and this shaft carries two cog-wheels which engage and turn the two cog-wheels on the two cylinders; and on the outer end of this main shaft there is a mangle-wheel, *x*, of the usual construction, operated by a mangle-pinion, *y*, on the driving-shaft *z*, which carries the driving-pulley. By the continuous rotation of the driving-shaft the mangle-wheel gives the required reciprocating rotary motion to the cylinders and rollers, and rectilinear to the carriage and bed, in consequence of which the carriage and bed traverse back and forth their whole length under the cylinders and rollers, which have a rolling action on the surface of the bed, or any substance placed thereon.

At each end of the carriage there is a plate, *a'*, laid on the top thereof, and held in place by turn-buttons *b' b'*. The inner edges of these plates serve the purpose of adjusting the edges of the lap as it is folded over at each motion of the carriage, and at each end of the frame, just below each series of rollers, there is a permanent plate, *c' c'*, so located that toward the end of each motion of the carriage one of the adjusting-plates passes under one of them, and in contact with it, to push within its inner edge any portion of the substance to be packed which may have lodged on the surface of the adjusting-plate, which, if not removed, would in a short time clog the operation of the machine, and finally break it.

Within a cylindrical casing, *d'*, placed above the machine and in front of the main shaft, there is a cylinder, *e'*, made of wire-gauze or perforated sheet metal, hung on a hollow shaft, *f'*, that turns on an inner shaft, *g'*, which has its bearings in the side frames. The inner shaft carries an exhausting-fan, *h'*, of the usual construction, which is rotated by a band passing around a pulley, *j'*, from some first mover, that it may rotate with sufficient velocity to exhaust the inside of the perforated cylinder, which is turned with a slow motion by a train of wheels and pinions, *l' m' n' o'*, deriving motion from the driving-shaft. The casing of the lap-cylinder has a large opening, *p'*, in front, to receive cotton or other fibers from a cotton-gin or other picker, and a narrow opening, *q'*, on the opposite side, in front of which is placed a pair of rollers, *r' r'*, geared together at one end by two pinions, *s' s'*, and the upper one having a like pinion, *t'*, on the opposite end, which engages the cog-wheel *o'* on the shaft of the perforated cylinder by which the rollers are operated.

When the machine is used for packing, pressing, and baling cotton—the purpose for which it was mainly intended—it is so located relatively to a cotton-gin that the fibers of

cotton from the brush of the gin will be thrown through the aperture or opening p' onto the surface of the perforated cylinder as it rotates slowly, and there held by the pressure of air due to the exhaustion of the cylinder inside, thus forming a lap of cotton, which is drawn out partly condensed by the two rollers $r' r'$. From these the lap of cotton is carried through the space between the two laying and pressing cylinders onto the bed o of the carriage, on which has previously been placed the piece of canvas or other cloth for making the bale, with the ropes or hoops for binding up the bale lying in the grooves. As the bed is moved along by the carriage the lap of cotton is carried along between the bed and the rolling surface of one of the cylinders, and is there laid the whole length of the bed and compressed. At the end of this motion the lap of cotton is carried against the inner edge of one of the adjusting-plates a'. The motion of the carriage is then reversed by the shifting of the mangle-motion, as also the cylinders, which folds the lap over and carries it under the other cylinder, to lay and press the second layer onto the first, and so layer after layer until the thickness required for a bale has been obtained. At the end of each operation the bed is let down to an extent equal to the thickness of a compressed layer of lap by the turning of the four screws simultaneously as one of the ratchet-wheels on one of the cross-shafts strikes one of the catches or hands $r r$. So soon as the thickness required for a bale has been obtained the machine is stopped at the end of one of the traverse motions, the lap is cut off, and then one of the adjusting-plates is removed. One end of a piece of canvas for the top of the bale, with the ropes or hoops, is passed through, in the same manner as a lap, a sufficient distance over the edge of the bale to be attached to the canvas and ropes or hoops for the bottom. The carriage is then traversed once, the other adjusting-plate removed, and the other end of the canvas and ropes or hoops passed through over the other edge of the bale, to be secured to the bottom canvas, &c., at this end to complete the bale. The bed o is then let down by turning the handle or winch t and the bale discharged. The bed is then carried up by the handle or winch to the required distance from the bottom of the cylinders, to receive and press the first lap of another bale. As the laps are successively laid and compressed by the cylinders, they are retained in their compressed state by the series of rollers beyond the cylinders, which thus constitute continuous and rolling platens; but at the end of each motion of the carriage, when the lap is turned over, some portions of it are liable to remain on the upper surface of the adjusting-plates, and when on the return motion these adjusting-plates pass under the stationary plates $c' c'$, attached to the frame, all that lies on the surface of the adjusting-plates is pushed off within their inner edges, and thus all tendency to clog or choke the operation of the machine is removed.

Before introducing the canvas, &c., for the top of the bale, the adjusting-plates must be removed to admit of the insertion of the canvas, &c., and for that reason they are made movable, as above specified. As the laps are successively compressed by the rolling action of the cylinders, they have no tendency to expand or spread out laterally, and hence there is no necessity for closing up the sides and ends of the bed; but I have contemplated in some instances preventing the lateral spreading of each lap at the time the pressure is applied by either making the cylinders and rollers, or their equivalents, with end flanges, or providing the sides of the carriage with bars similar to the end adjusting-plates.

I have also applied some of the principles of my invention in the mode represented in Figs. 4, 5, and 6, which only differ from the mode above described in dispensing with the exhausting apparatus for making the lap and substituting the ordinary lapping-cylinder t', in bringing the two laying and pressing cylinders sufficiently close together to make them answer the additional purpose of the two condensing-rollers $r' r'$, Figs. 1, 2, and 3, in which case the carriage is driven directly by a pinion, a^2, on the mangle-shaft, which meshes into the cogs of the rack on the carriage, and the cylinders at one end are geared together to move in opposite directions, and one of them has a large cog-wheel, b^2, on one end, which is driven by a pinion, c^2, on the driving-shaft; and this mode also differs in substituting for the two series of rollers $u u$ two permanent plates, $u^2 u^2$, to retain the layers of laps in a compressed state after passing under the laying and compressing cylinders.

It will be obvious from the foregoing that any other mode of making the lap may be substituted for those represented in the accompanying drawings, and that when the general principle of my invention is applied to the packing and pressing of substances which cannot be formed into a lap by the same means as cotton, then the lapping cylinder is to be dispensed with, and such other method adopted of forming a lap is to be substituted as will be applicable to this purpose, or such substance or substances may be prepared by hand and delivered to the laying and pressing cylinders.

I have above described and pointed out the modes of applying my invention, which I have essayed with success as applied to the packing and pressing of cotton; but it will be obvious that these may be greatly varied without going beyond the limits of my invention, and therefore I do not wish to confine myself to these special modes. Nor do I wish to limit myself to the employment of the general and first part of my invention in connection with the other parts of my invention, as they (the other parts) are only subordinate to and re-

late merely to the modes which I have invented for practically applying the chief principle of my invention, which is specified as constituting the first part thereof. Nor, in short, do I wish to be understood as limiting myself to the use of all the subordinate parts of my invention in connection, as in some instances some of these may be dispensed with.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of packing and compressing substances into bales or packages in a series of successive layers or strata by means of rolling pressure or its equivalent, substantially as herein specified.

2. Combining with the laying and compressing rollers or cylinders, or their equivalents, a bed which shall be gradually separated from the rollers or cylinders as the layers or strata accumulate, and which shall also traverse from end to end under the rollers or cylinders, or vice versa, substantially as specified.

3. In combination with the cylinders for packing and pressing substances in successive layers, a lapping apparatus for forming such substance or substances into a lap or laps, to be delivered to the rollers or cylinders, or their equivalents, to be laid and pressed into the bed, substantially as described.

4. In combination with the laying and compressing cylinders, or their equivalents, the series of rollers, or their equivalents, for retaining the layers or strata as they are successively compressed, substantially as specified.

5. The bed made without sides or ends, substantially as and for the purpose specified, in combination with the carriage provided with adjusting-plates at the ends, for the purpose and in the manner substantially as described.

6. In combination with the adjusting-plates at the ends of the carriage, the stationary plates at the ends of the frame, under which the adjusting-plates pass to remove any substance that may have accumulated on them, substantially as described.

S. A. CLEMENS.

Witnesses:
ALEX. PORTER BROWNE,
CHAS. BROWNE.