(No Model.) 5 Sheets—Sheet 1.

H. E. SMITH & B. A. DARE.

COTTON BALING MACHINE.

No. 529,968. Patented Nov. 27, 1894.

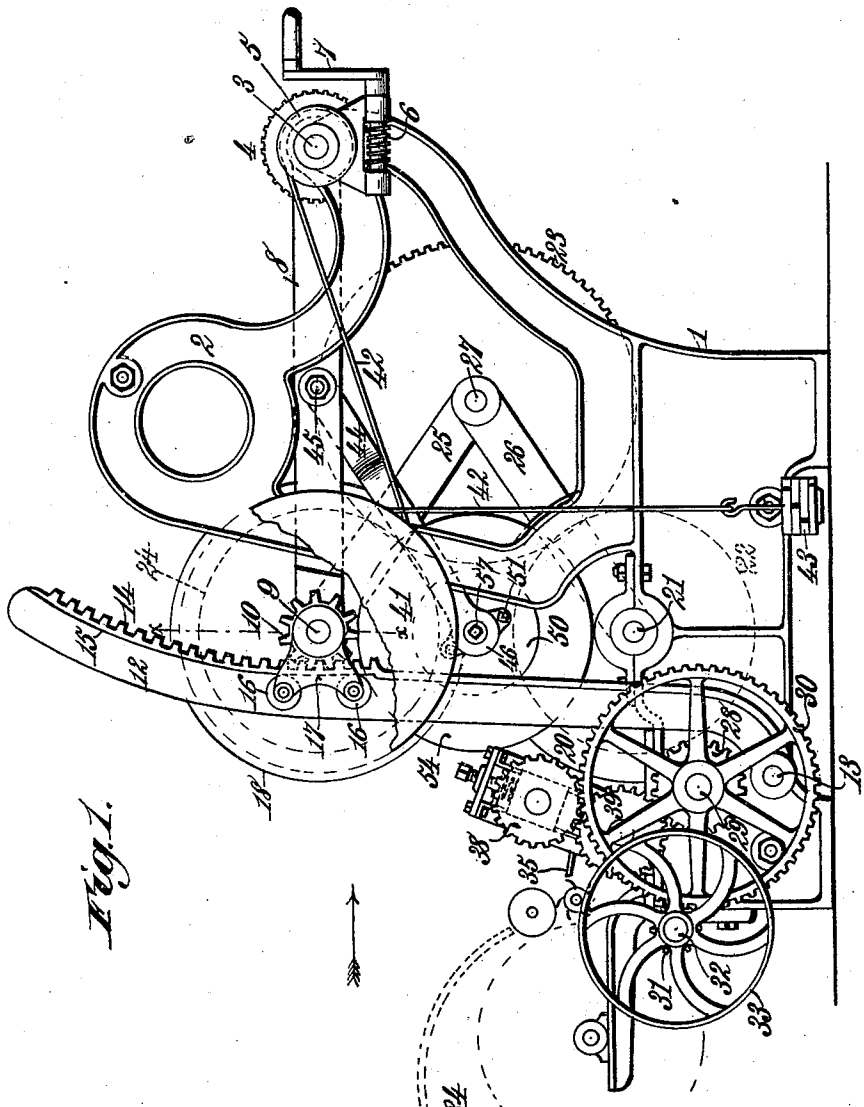

Fig. 1.

Witnesses.
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(No Model.) 5 Sheets—Sheet 2.

H. E. SMITH & B. A. DARE.

COTTON BALING MACHINE.

No. 529,968. Patented Nov. 27, 1894.

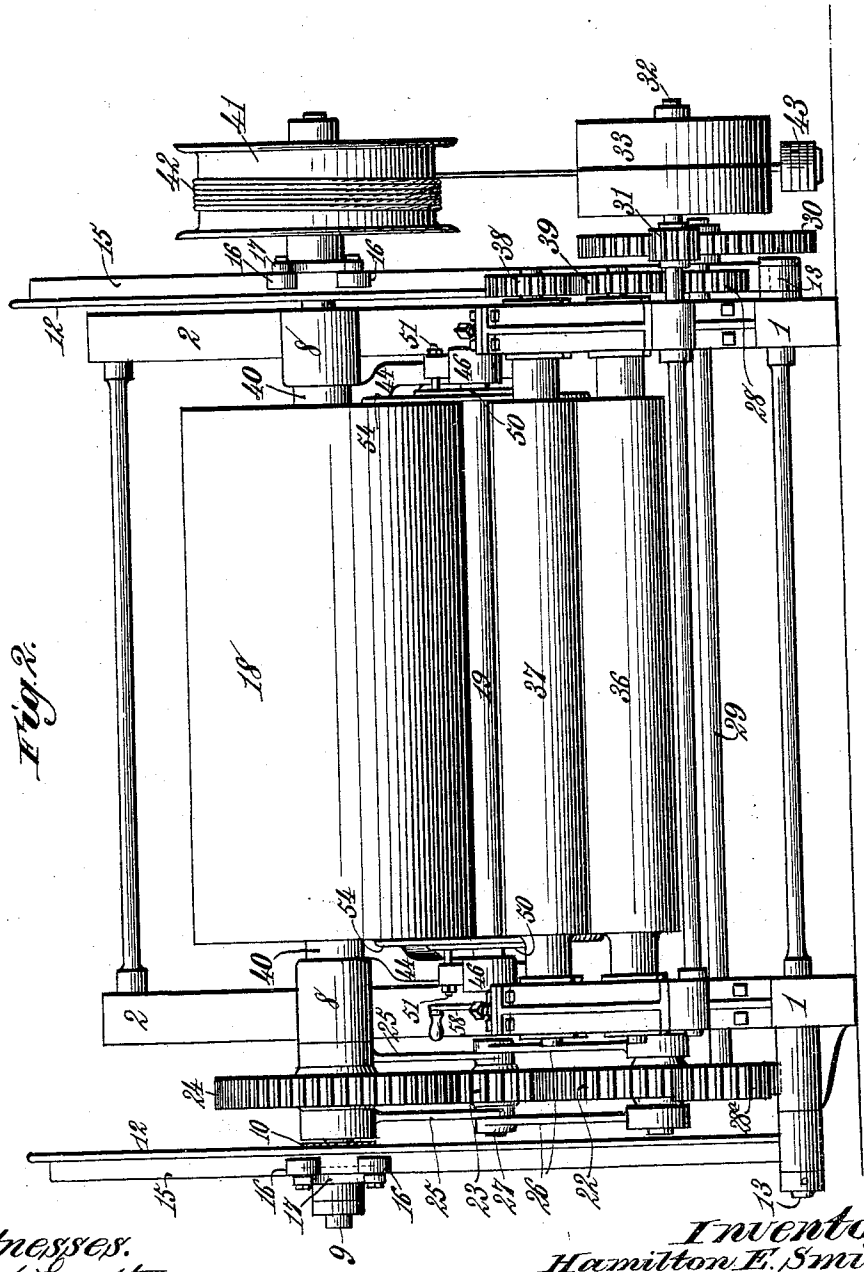

Fig. 2.

Witnesses.
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(No Model.) 5 Sheets—Sheet 3.

H. E. SMITH & B. A. DARE.

COTTON BALING MACHINE.

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Fig. 3.

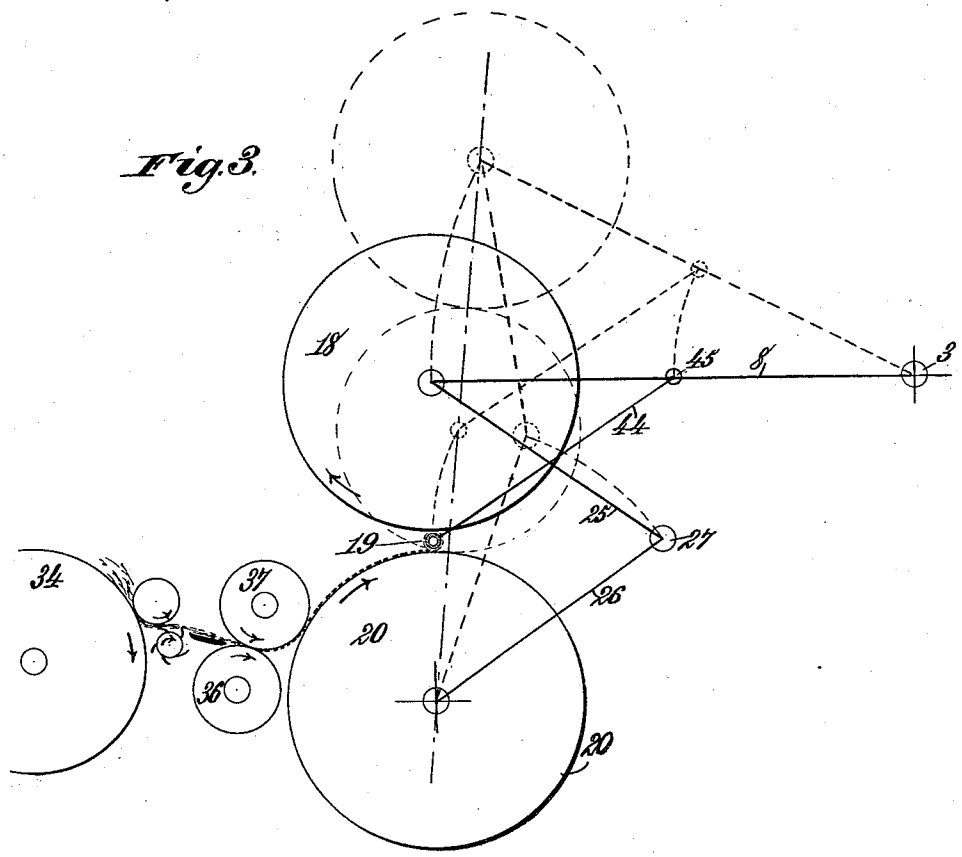


Fig. 4.

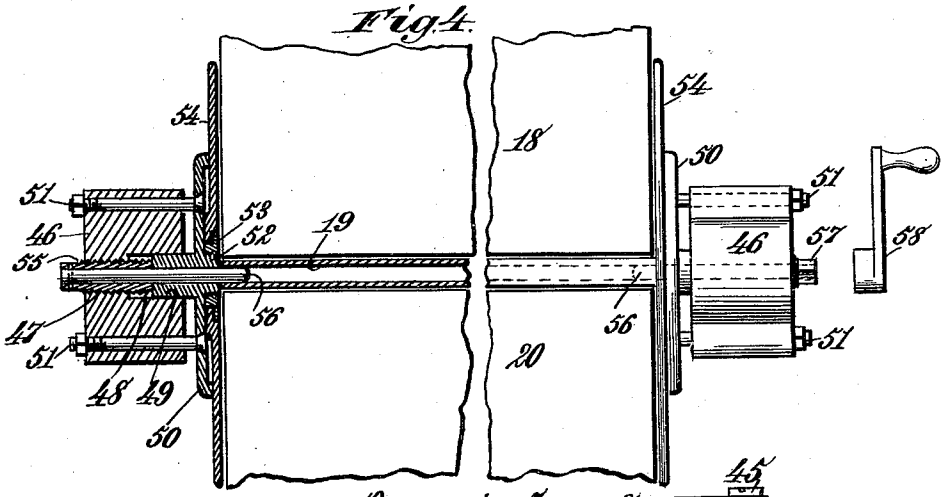
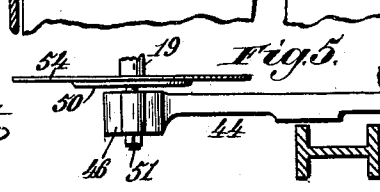


Fig. 5.



Witnesses.
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(No Model.) 5 Sheets—Sheet 4.

H. E. SMITH & B. A. DARE.

COTTON BALING MACHINE.

No. 529,968. Patented Nov. 27, 1894.

Fig. 6.

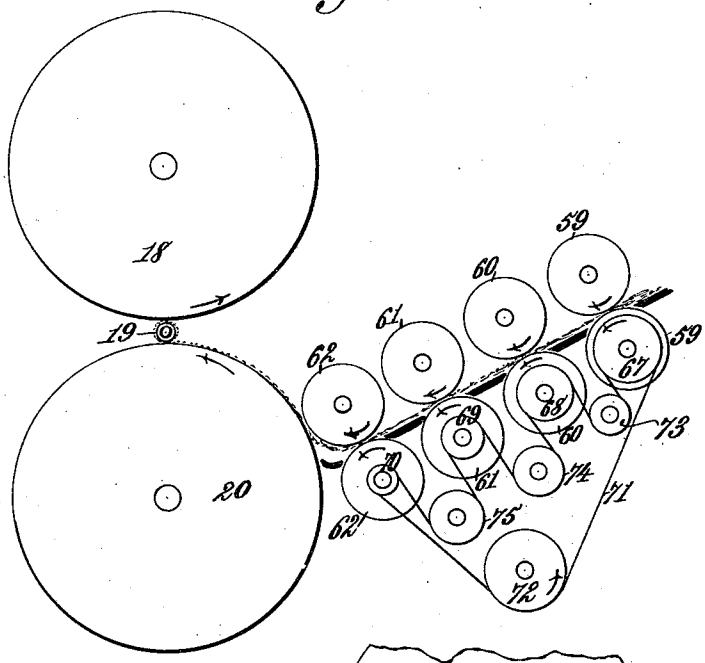
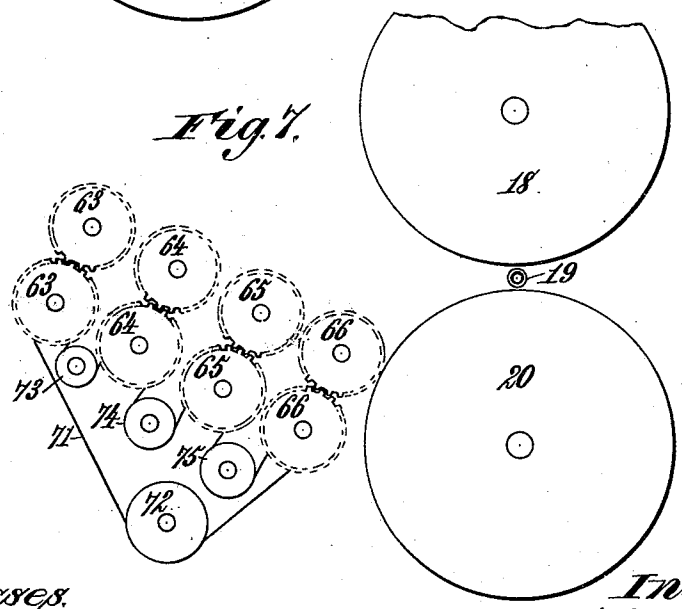


Fig. 7.



Witnesses.
Robert Burnett
G. W. Rea.

Inventors.
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By James L. Norris Atty.

(No Model.) 5 Sheets—Sheet 5.

H. E. SMITH & B. A. DARE.

COTTON BALING MACHINE.

No. 529,968. Patented Nov. 27, 1894.

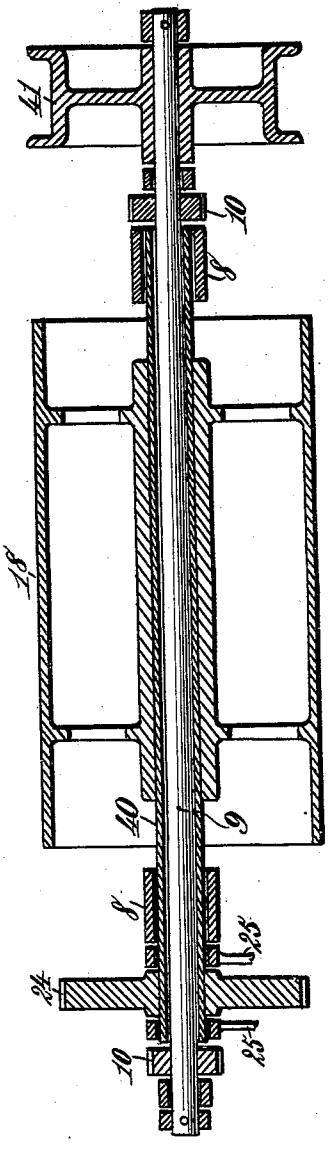

Fig. 8.

Witnesses.
Robt. Everett,
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By James L. Norris.
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UNITED STATES PATENT OFFICE.

HAMILTON E. SMITH, OF NEW YORK, N. Y., AND BENJAMIN A. DARE, OF JERSEY CITY, NEW JERSEY, ASSIGNORS TO THE BESSONETTE COTTON COMPRESS MANUFACTURING COMPANY, OF WACO, TEXAS.

COTTON-BALING MACHINE.

SPECIFICATION forming part of Letters Patent No. 529,968, dated November 27, 1894.

Application filed February 17, 1894. Serial No. 500,557. (No model.)

To all whom it may concern:

Be it known that we, HAMILTON E. SMITH, residing at New York, in the county of New York and State of New York, and BENJAMIN A. DARE, residing at Jersey City, in the county of Hudson and State of New Jersey, citizens of the United States, have invented new and useful Improvements in Cotton-Baling Machines, of which the following is a specification.

This invention relates to that type of cotton baling machines wherein cotton batting from the condenser is convoluted or wound on a core between a rotary or moving bale support, and a vertically movable compressor-roller or cylinder for the purpose of forming cylindrical bales.

The objects of the present invention are to provide new and improved means for compressing and feeding the cotton batting to the rotary or moving bale support; to provide means whereby the cotton batting is stretched and compressed to the least possible thickness in transit to the core on which the cotton is convoluted or wound; to provide novel means for carrying the core and maintaining its axis or center coincident with a right line drawn through the centers or axes of the bale support and compressor roller, for rendering machines of this type more effective in operation; to provide novel, simple and efficient means for raising and lowering the compressor roller and utilizing the effective force of a suspended weight or weights in adding compressing power to the compressor roller; to improve the rack and pinion mechanism used to move the compressor roller vertically, whereby each rack can accommodate itself to the movement of the said roller in the arc of a circle; to provide a pivoted swinging core carrier or support with new and improved means for pressing the ends of the cotton roll and producing accurate and nicely finished bales; and to provide novel means for rapidly and conveniently releasing the finished bale, so that it can be removed from the machine.

To accomplish all these objects, the invention consists in the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of the improved cotton baling machine. Fig. 2 is an end elevation, looking in the direction of the arrow, Fig. 1. Fig. 3 is a view showing the rotary bale support, the compressor-roller, and the core in section, and indicating the positions assumed by the core and compressor-roller in the formation of a bale. Fig. 4 is a detail sectional elevation showing portions of the rotary bale support, compressor-roller, and the devices for holding and releasing the core. Fig. 5 is a detail sectional plan view, showing a portion of the main frame, a portion of one of the swinging arms which carry the compressor-roller and one of the radiating links which carry the core. Fig. 6 is a detail side elevation, showing a modification of the invention, wherein stretching and compressing rollers are employed to act upon the cotton batting in transit to the rotary bale-support and core. Fig. 7 is a similar view, looking at the opposite side from that shown in Fig. 6; and Fig. 8 is a detail sectional view on the line *x*—*x*, Fig. 1, to illustrate the manner of mounting the compressor-roller on its supporting spindle.

In the accompanying drawings illustrating the invention, the numeral 1 indicates a stationary main frame, which, as here shown, is provided with an elevated portion 2, in which is arranged a horizontal shaft 3 carrying a worm-wheel 4, and a cable winding drum 5. The worm-wheel 4 engages a worm-shaft 6 having a suitable handle, such as a crank 7, for turning it, and thereby rotating the drum and worm-wheel. The shaft 3 constitutes the support for a swinging frame which is composed of arms 8 mounted at one end on the shaft, and provided at its opposite end with a spindle 9, on the ends of which are mounted pinions, as at 10, which engage rack-bars 12 pivoted at their lower ends to the main frame 1 through the medium of studs or other pivots 13. The toothed portions 14 of the bars 12 are curved or formed in the arcs of circles, and the bars are provided with laterally projecting guide-flanges 15 with which engage rotary-guides or rollers 16 mounted in a

yoke 17 carried by the spindle 9, or secured to the arms 8 in such manner that when the arms 8 are raised or lowered, the guides or rollers 16 maintain the rack-bars in engagement with the pinions, and the rack-bars can accommodate themselves to the movements of the bars 8 in the arcs of circles struck from the center of the shaft 3.

The compressor-roller 18 of the baling-machine is secured to a sleeve 40 mounted on the spindle 9, and is adapted to rest upon the core 19, Figs. 3 and 4, on which the cotton or material to be baled is convoluted or wound. The core is adapted to bear against a rotary or movable bale-support 20 composed of a strong cylinder, which may or may not be hollow, and is preferably composed of metal.

The bale-support is mounted on a horizontal shaft 21, to which is rigidly secured a gear-wheel 22, meshing into a power-transmitting gear-wheel 23, which in turn meshes into a gear-wheel 24 on the sleeve 40. The power-transmitting gear-wheel 23 is carried by two pairs of links 25 and 26, pivoted together at one end by a shaft 27 which supports the gear-wheel 23, and having their opposite ends mounted, respectively, on the sleeve 40 and shaft 21. The gear-wheel 22 engages a pinion 28^a on one end of a counter shaft 29, which, at the opposite end, is provided with a pinion 28 and a gear-wheel 30, the latter meshing with a pinion 31 on a drive-shaft 32 having a pulley 33, or other suitable means by which power can be applied to the drive-shaft for rapidly rotating it and transmitting motion to the rotary bale-support 20 and the sleeve 40, whereby the bale-support and the compressor-roller are rotated in unison.

The cotton to be formed into cylindrical bales is delivered from the ordinary condenser—indicated by the numeral 34—to a feed-board or plate 35, from which it is taken by a pair of compressing and feed rollers 36 and 37, Fig. 3. The roller 37 is adapted to bear directly against the periphery of the rotary bale-support 20; but the roller 36 is mounted at some little distance from the periphery of the bale-support, and is adapted to bear against the periphery of the roller 37. The shaft of the roller 37 is provided with a gear 38, meshing into a gear 39 on the shaft of the roller 36, which latter engages the pinion 28, whereby the rollers 36 and 37 are caused to rotate in unison. By this arrangement of parts the cotton or cotton batting is powerfully compressed in between the rollers 36 and 37, and is further compressed by the roller 37 directly upon the rotary bale-support 20, so that the cotton or cotton batting is delivered to the core 19 in the best condition for producing a perfectly compressed bale.

The peculiar arrangement of the roller 37 causes it to perform two functions: first, it aids in compressing the cotton or cotton batting prior to the latter reaching the rotary bale-support, and, subsequently, it presses the cotton or cotton batting directly upon the rotary bale support.

The roller 37 is preferably mounted in spring-pressed boxes with set screws arranged to vary the tension of the springs, as will be understood by reference to Fig. 1.

The spindle 9 is provided at one end with a rigidly attached drum 41, around which a cable 42 is passed, preferably in several courses. This cable may be composed of a rope or chain, and at one end it is connected with the cable-winding drum 5; while its opposite end extends downward and is secured to a weight 43.

We have only indicated a weight at one side of the machine but if desired another weight may be applied at the opposite side of the machine to exert a downward force on the spindle 9, for the purpose of adding to the compressing power of the compressor-roller.

The compressor-roller may be raised by turning the crank 7 in the proper direction, thereby winding up the cable on the winding-drum 5 which turns the drum 41 and rotates the spindle 9 and pinions 10, so that the latter are caused to ride vertically on the toothed portion 14 of the rack-bars 12. By this means the compressor-roller can be raised for the purpose of releasing the finished bale and enabling the latter to be removed from the machine. As the drum 41 is turned by winding the cable 42 on the winding-drum 5, the end portion of the cable carrying the weight 43 is wound upon the drum 41, and the weight is thereby elevated. By turning the crank 7 in the opposite direction the parts may be restored to their normal position, as indicated in Fig. 1.

As the cotton or cotton batting is convoluted or wound on the core 19, the cotton is pressed between the compressor-roller and the rotary bale-support, and as the diameter of the bale increases the compressor-roller will be raised upwardly, and as it rises, the pinions 10 will turn in engagement with the rack-bars.

The core 19 may be in the form of a tube, as shown in Fig. 4, and it is adapted to be carried or supported by a radiating frame composed of links 44 pivoted at one end to the bars 8, as at 45, and provided at their opposite ends with boxings or hub-like portions 46, each of which are bored out and provided with a screw-threaded socket 47, and a cylindrical portion 48 of a greater diameter than the screw socket. The cylindrical portion or bore 48 is adapted to receive the cylindrical hub 49 of a plate 50, which is connected with the boxing or hub-like portion 46 through the medium of bolts 51, in such manner that the plate 50 can be adjusted with respect to the boxing or hub-like portion 46, in which adjustment the hub 49 telescopes in the cylindrical bore 48. The plates 50 are each provided with a screw-threaded bearing 52, on which is screwed a ring 53, which consti-

tutes a bearing for a disk 54 of such diameter that it will overlap the end portions of the rotary bale-support 20 and compressor-roller 18, as shown in Fig. 4. The disk 54 is adapted to turn on the ring 53, and therefore the disk 54 can rotate independent of the said ring and of the plate 50. The screw-threaded socket 47 is provided with a screw-shaft 55 having secured thereto, or otherwise provided with a core-engaging spindle 56 which extends through a central opening in the plate 50, and is adapted to enter, or otherwise engage with one end of the core 19. The screw-shafts 55 are each provided at their outer ends with an angular portion 57 to receive a crank, as at 58, by which to turn the screw-shafts and cause the spindles 56 to engage or disengage the core. By turning the screw-shafts 55 in the proper direction, the spindles 56 will be withdrawn from the core, and the disks 40 and plates 50 can recede from the ends of the finished bale, so that the latter can be rolled, or otherwise moved out of the machine. If the screw-shafts be turned in the proper direction, the spindles 56 will be caused to enter or engage with the core 19, and at the same time the screw-shafts are caused to bear against the hubs 49, and thus move the plates 50 inward to exert more or less pressure on the disks 54, by which means the pressure against the ends of the bale which is being formed can be regulated as conditions may require. By making the disks 54 susceptible of rotating on the rings 53, these disks will be properly turned at the proper speed by the cotton as it is winding into a roll; and, since the disks overlap the ends of the bale-support and compressor-roller, they serve as guides to uniformly build up the ends of the cotton roll and render it possible to produce accurate and nicely finished bales which present a smooth and desirable appearance.

We have illustrated and described core-engaging and releasing devices, and disks at each end of the core; but we do not confine ourselves to this duplicate arrangement of the devices, as, under certain circumstances, the bale could be released by simply withdrawing a single spindle 56 from one end of the core, and then moving the bale and its core out of engagement from a spindle or support at the opposite end of the core.

Where the core is in the form of a tube, as shown in Fig. 4, it is permitted to remain in the cotton bale, but the core may be constructed in such manner that it can be removed from the cotton bale if desired.

In practical operation the cotton batting is delivered from the condenser to the feed-board and passes between the compressing and feeding rollers to the rotary bale-support on which it is firmly compressed by the upper compressing and feeding cylinder. The rotation of the bale-support carries the cotton batting between the guide-disks to the core which winds the cotton into a roll under the compressing action of the compressor-roller. As the diameter of the cotton roll increases, the guide-disks even up the ends thereof and the compressor-roller is raised, so that the pinions move in engagement with the rack-bars and rotate the spindle, thus winding the cable in such direction as to raise the weight. When a cylindrical bale of the desired size is formed, the winding-drum is rotated by turning the worm-shaft to wind the cable on the winding-drum and rotate the drum on the spindle, whereby the pinions are caused to further ride upward on the rack-bars, and the compressor-roller is lifted from the bale to relieve the latter and enable it to be rolled or removed from the machine when the core-holding spindles are retracted to disengage the core and relieve the pressure of the guide-disks on the ends of the bale.

The radiating frame or links 44 for carrying or holding the core are carried upward as the frame 8 rises, and, since the frame 44 radiates from said frame 8, and is pivoted thereto, the center or axis of the core will always be maintained coincident with a right line drawn through the centers or axes of the compressor-roller and rotary bale-support, whereby we render machines of this type more effective in operation and secure the best results by more perfect compression of the cotton on the core.

As shown in Fig. 5, the radiating links 44 are arranged inside the main frame, and adapted to bear against the latter, so that any tendency of these links to spread apart or move outward is resisted by said main frame.

In the modification, Figs. 6 and 7, we provide mechanism for stretching and compressing the cotton in transit to the rotary bale-support and core. This mechanism is composed of several pairs of rollers 59, 60, 61, and 62, the rollers 62 being the same as and arranged in the same relation to each other and to the rotary bale support as the rollers 36 and 37, hereinbefore explained, and each pair of rollers is geared together at one end by gear-wheels 63, 64, 65, and 66; while at the opposite end the shafts of the lower series of rollers are provided with pulleys 67, 68, 69, and 70, around which passes an endless belt 71, driven by a drive-wheel or pulley 72, and supported at points between the lower series of rollers through the medium of guide-pulleys 73, 74, and 75. The pulleys 67 to 70, inclusive, decrease in diameter from the lower roller 59 to the lower roller 62, in such manner that the pairs of rollers are caused to rotate at different speed. The rollers 59 rotate slowest, while the rollers 62 rotate the fastest, whereby the cotton batting passing between the several pairs of rollers is stretched and compressed, for the purpose of reducing it to the least possible thickness. By this means a greater quantity of cotton can be formed into a cylindrical bale of a given size, which is very important and advantageous in this type of cotton baling machines.

We have illustrated and described the several pairs of rollers composing the stretching and compressing mechanism driven by an endless belt and pulleys of varying diameter; but we do not confine ourselves to this particular means for rotating the several pairs of rollers at different speed. The gist of the invention in this respect resides in the pairs of rollers rotating at different speed for the purpose of stretching and compressing the cotton or cotton batting. It is well known that cotton is difficult to retain in a compressed condition, owing to the large quantity of air contained in the cotton filaments and throughout the mass, which air cannot by ordinary means be expelled. We have discovered, however, that by the successive action of rollers which gradually increase in their speed of rotation and operate to stretch the cotton in addition to compressing it, the air is expelled, and the cotton batting, which is ordinarily of considerable thickness, is reduced to the least possible thickness, and is so delivered to the bale-support and core that a greater quantity of cotton can be formed into a bale without increasing the dimensions of the latter.

We have illustrated and described the compressor roller secured to a sleeve which is mounted on the spindle 9, so that the sleeve carries the gear-wheel 24, while the spindle carries the pinions 10. We do not, however, confine ourselves to this specific construction for supporting the compressor-roller.

A machine constructed according to our invention secures perfect compression of the cotton and the formation of bales which contain a greater amount of cotton to the cubic inch than bales heretofore produced by winding or convoluting cotton batting on a core.

The machine herein described and shown is particularly designed for winding cotton into cylindrical bales; but is useful for winding other material into bales or packages.

Having thus described our invention, what we claim is—

1. In an organized machine for winding cotton into a cylindrical bale, the combination with a rising and falling compressor-roller, a core, and a rotary bale-support, of compressing and feeding rollers, the upper one of which is arranged to compress the cotton directly upon the periphery of the bale-support, and the other arranged to press the cotton against the said upper roller, substantially as described.

2. In a machine for winding cotton into bales, the combination with a compressor-roller, a core, and a rotary bale-support, of upper and lower compressing rollers, the upper one of which is arranged to press the cotton directly upon the bale-support, and the other to press the cotton against said upper roller, and upper and lower sets of rollers rotating at different speed for stretching and compressing the cotton between said upper and lower sets of rollers in transit to said compressing rollers, substantially as described.

3. In a machine for winding cotton into bales, the combination with a bale-support, and a core, of a swinging frame, a compressor-roller carried by said frame, and a core carrying frame or support pivoted to and radiating from said swinging frame, substantially as described.

4. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a rising and falling compressor-roller, of a pivoted swinging frame carrying the compressor-roller, radiating links pivotally connected with the swinging frame and provided with means for engaging the core, and mechanism for raising the swinging frame in a vertical plane, substantially as described.

5. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of a pivoted swinging frame carrying the compressor-roller, means for raising and lowering the frame in a vertical plane, and radiating links pivoted to the swinging frame, and provided with adjustable core-engaging spindles for holding or releasing the core, substantially as described.

6. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of a spindle having pinions, pivoted rack-bars with which the pinions engage, a vertically movable frame carrying the spindle, and devices for holding the rack-bars in engagement with the pinions, substantially as described.

7. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of a pivoted swinging core carrying frame having a boxing or hub-like portion provided with a screw-socket, a screw-shaft engaging the screw-socket and having a spindle adapted to engage and disengage the core, and means for operating the screw-shaft to move the spindle into or out of engagement with the core, substantially as described.

8. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of pivoted links having boxings or hub-like portions provided with screw-sockets, screw-shafts engaging the screw-sockets and having spindles for engaging and disengaging the core, pressure plates carried by the boxings or hub-like portions of the links, and guide disks or plates for evening up the ends of the cotton-bale, substantially as described.

9. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of pivoted links having boxings or hub-like portions provided with screw-sockets, screw-shafts engaging the screw-threaded sockets and having spindles for engaging and disengaging the core, pressure plates adjustably connected with the box-

ings or hub-like portions of the links, and guide disks mounted on the said pressure plates and arranged to even up the ends of the cotton bale, substantially as described.

10. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of pivoted rack-bars, a swinging frame having a spindle provided with pinions engaging the rack-bars, guides for holding the rack-bars in engagement with the pinions, a cable-drum mounted on the spindle, a cable winding drum, and a cable wound in courses upon the drum of the spindle, and having one end connected with the said winding-drum, and the opposite end provided with a suspended weight, substantially as described.

11. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor roller, of a pivoted swinging frame having a spindle provided with pinions and on which the compressor-roller is mounted, rack-bars engaging the pinions, a cable-drum mounted on the spindle, a shaft carrying a worm-wheel and cable winding-drum, a worm for rotating the worm-wheel, and a cable extending around the drum on the spindle and having one end secured to said winding-drum and the other end provided with a suspended weight, substantially as described.

12. In a machine for winding cotton into bales, the combination with a bale-support, a core, and a compressor-roller, of a swinging frame having a spindle provided with pinions and on which the compressor-roller is mounted, pivoted rack-bars engaging the pinions, guide rollers which hold the rack-bars in gear with the pinions, radiating links pivoted to the swinging frame and provided with devices for engaging and disengaging the core, and mechanism for raising and lowering the said swinging frame in a vertical plane, substantially as described.

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

HAMILTON E. SMITH. [L. S.]
BENJAMIN A. DARE. [L. S.]

Witnesses:
ALBERT H. NORRIS,
GEO. W. REA.