

N. B. WOOD.

APPARATUS FOR BALING AND BINDING STRAW, &c.

No. 367,489.

Patented Aug. 2, 1887.

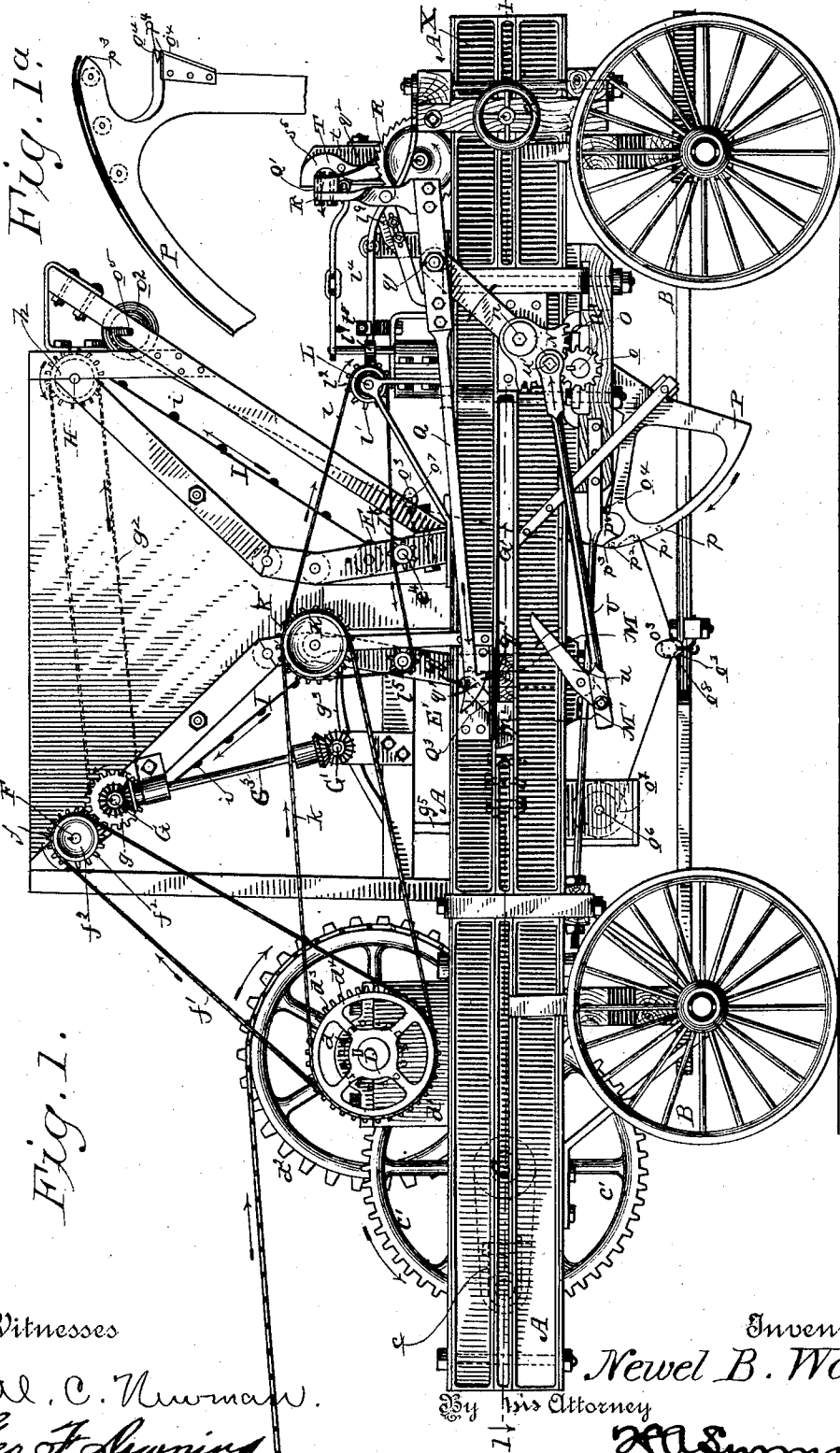


Fig. 1.

Fig. 1.

Witnesses

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Newel B. Wood,

By his Attorney

W. A. Symmes.

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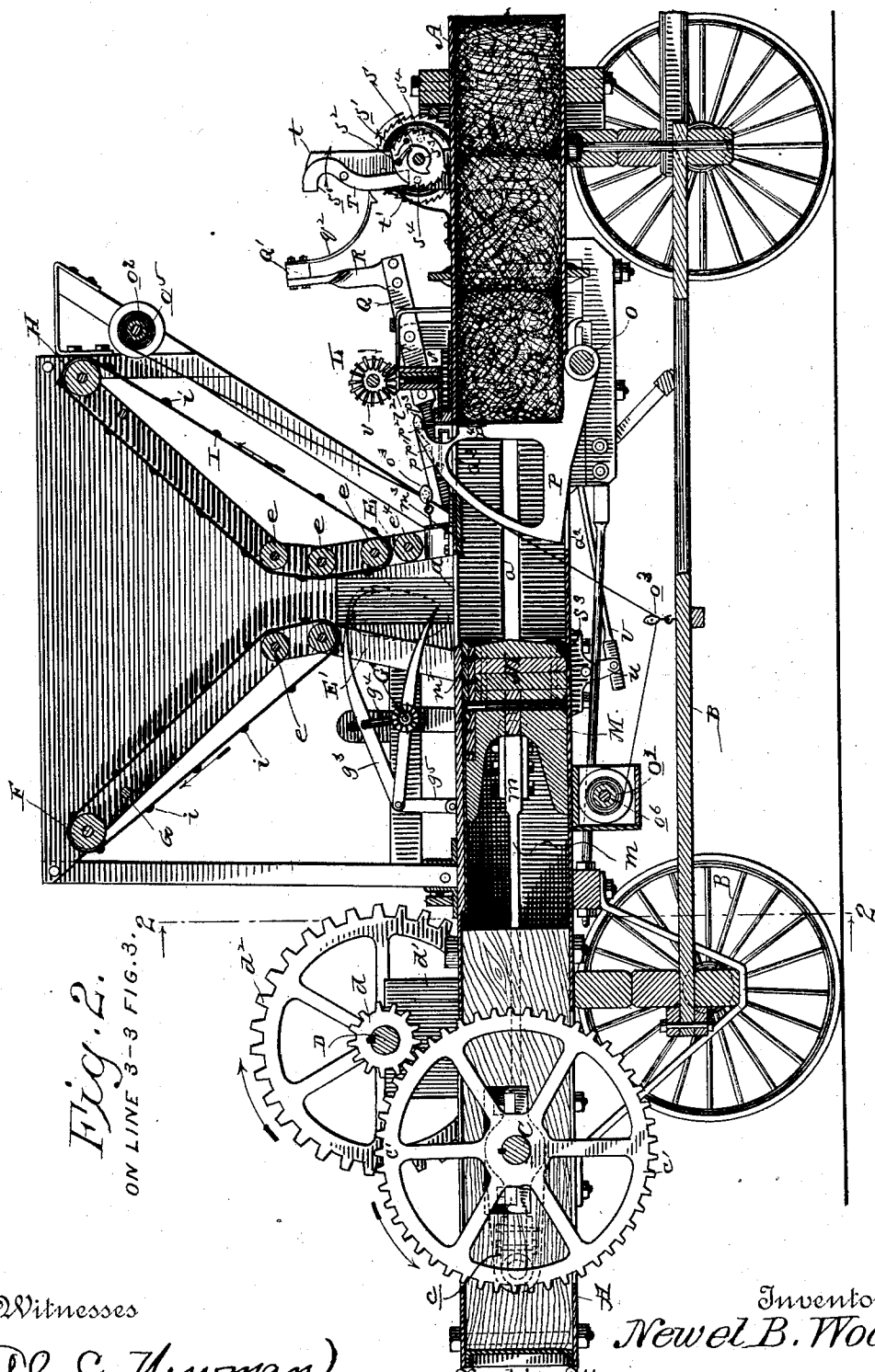


Fig. 2.

ON LINE 3-3 FIG. 3.

Witnesses

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(No Model.)

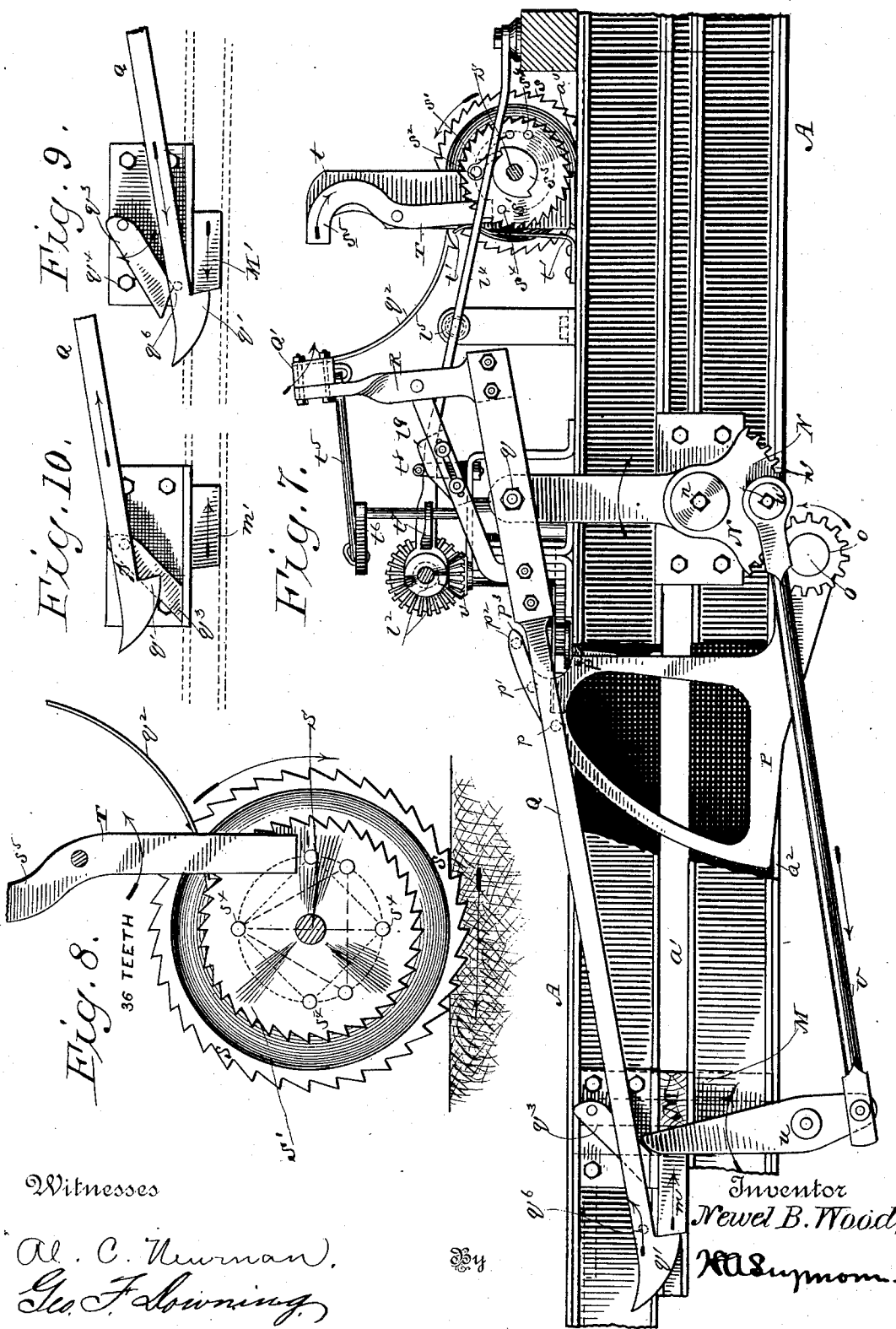
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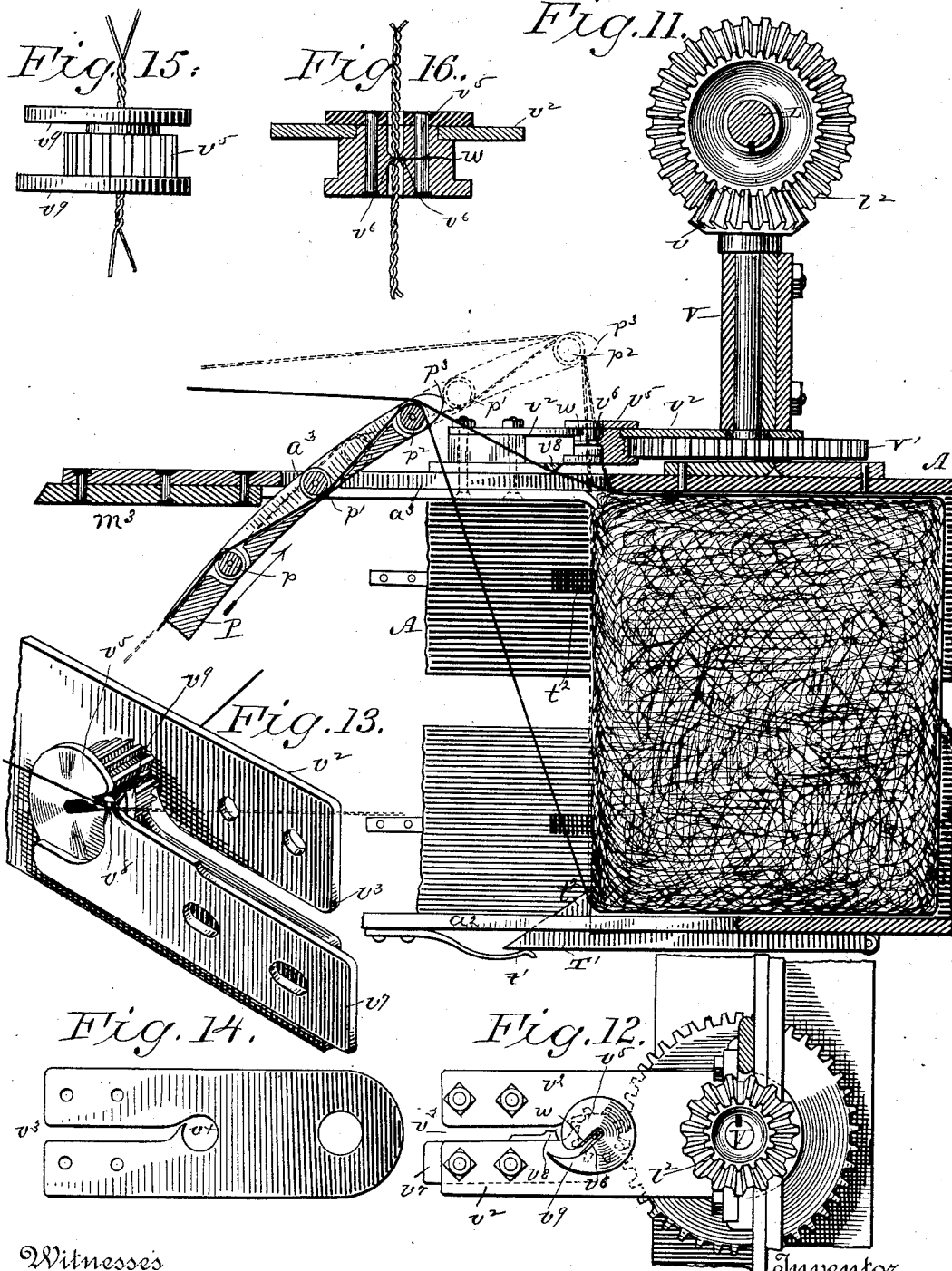


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Witnesses

Al. C. Newman.
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UNITED STATES PATENT OFFICE.

NEWEL B. WOOD, OF WASHINGTON COURT-HOUSE, OHIO, ASSIGNOR OF
ONE-HALF TO LEWIS C. COFFMAN, OF SAME PLACE.

APPARATUS FOR BALING AND BINDING STRAW, &c.

SPECIFICATION forming part of Letters Patent No. 367,489, dated August 2, 1887.

Application filed April 16, 1886. Serial No. 199,151. (No model.)

To all whom it may concern:

Be it known that I, NEWEL B. WOOD, of Washington Court-House, in the county of Fayette and State of Ohio, have invented certain new and useful Improvements in Apparatus for Baling and Binding Straw, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of machines which are designed to compress straw, hay, and similar materials into the form of bales, and to secure the same after such compression by means of cords or wires for preserving the form of the bales.

The objects of my invention are to produce a machine which shall operate continuously in compressing, binding, and delivering the material, and fastening the binders or wires for preserving the forms of the bales; also, to materially increase the capacity of this class of machines, and to render them more durable in construction and certain in operation.

To these ends my invention consists, first, in a peculiar and novel construction and arrangement of devices for conveying the straw or other material from the source of supply to the compression-chamber, as hereinafter described and claimed.

My invention further consists in certain novel means for severing the mass in front of the compression-head from that in the conveyer, whereby all choking of the machine and irregularities in the supply are avoided, as also hereinafter described and claimed.

My invention further consists in a certain peculiar and novel arrangement of connections, whereby the movements of the compressor-head are caused to actuate the devices for laying and fastening the binding wires or cords at suitable intervals, as hereinafter described and claimed.

My invention still further consists in certain peculiar and novel devices for laying the wires or cords around the bales, for fastening such wires or cords, and for severing the wire or cord supply from the fastened wires or cords without disconnecting the supply from the wiring or cording devices or interrupting

the action of the latter, as hereinafter described and claimed.

My invention further consists in the peculiar and novel arrangement of the compression wiring and cording mechanisms, whereby the bale is partially compressed against the resistance of the binding wires or cords, as hereinafter described and claimed.

Finally, my invention consists in certain peculiar and novel details of general construction and arrangement, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine. Fig. 1^a is a detailed view showing wire guides or threading-frames. Fig. 2 is a longitudinal vertical section on line 3 3 of Fig. 3. Fig. 3 is a plan view on line 1 1 of Fig. 1 of lower part of the machine, partly in section. Fig. 4 is an enlarged vertical section on line 2 2 of Fig. 2, showing the angular packers. Fig. 5 is an enlarged plan view of the front portion of the machine. Fig. 6 is a detached view of latch *l*. Fig. 7 is an enlarged side elevation of the forward end of the machine. Fig. 8 is a diagrammatical view of the gage-wheel regulating the size of bale. Fig. 9 is a detached view of hook in engagement with the cross-head. Fig. 10 is a similar view of the hook in position to recover its normal adjustment. Fig. 11 is an enlarged vertical section through the baling, knotting, and threading mechanisms. Fig. 12 is a plan view of the knotting mechanism. Fig. 13 is a view in perspective of the knotter, showing by dotted lines the normal position of the top wire while at rest, and in full lines its position when in the path of the knotter-hooks. Fig. 14 is a detail of supporting-plate for knotter. Fig. 15 is a side elevation of twister. Fig. 16 is a cross-section of same.

In the said drawings, A designates the body of the machine, which is of oblong rectangular form, and which may be mounted upon trucks B or other suitable supporting-gears, as desired.

C designates a crank-shaft, which is mounted

horizontally in the rear end of the box A, and which is also formed with two crank-arms, *c*, *c*, as shown, for a purpose to be hereinafter described. Midway of its length this shaft C carries a gear-wheel, *c'*, the teeth of which mesh with those of a pinion, *d*, upon a power-shaft, D, which is mounted horizontally in standards *d'* upon the body A, as shown. These shafts C D extend transversely of the body A, and the shaft D lies above and beyond the shaft C, as will be seen by reference to the drawings. Upon one end of the shaft D is mounted a sprocket-wheel, *d'*, which receives power from any suitable motor through a belt or chain running over its periphery. Upon the opposite end of this shaft D are mounted sprocket-pulleys *d'*, for a purpose to be hereinafter described.

E E' designate vertical standards, which are arranged at each side of the body A contiguous to its feed-opening *a*, as shown. The standards E E' are bent first upwardly toward each other, and finally outward away from each other, so that the space between these four standards is widest at the top, diminishing downward to a certain distance, then expanding in width downward to the feed-opening *a*. This peculiar form of the standards E E' possesses important functions, as will be seen from the ensuing description. In the upper extremities of the standards E' E' is mounted a horizontal shaft, F, which carries a band or chain wheel, *f*, over which the chain or belt *f'* from pulleys *d'* passes. Shaft F also carries a gear-wheel, *f'*, located at the side of band or chain wheel *f*, the teeth of which mesh with those of an idle gear-wheel, *g*, running upon a shaft, G, which is mounted horizontally in the rear standards, E', below the shaft F. This shaft G also carries a band or chain wheel, *g'*, from which a band or chain, *g'*, runs to a pulley, *h*, upon a shaft, H, which is mounted horizontally in the upper extremities of the front standards, E E. It will thus be seen that the two wheels *f'* *g* revolve toward each other. Mounted on the shafts F H are rollers, which actuate the endless belts I, these belts being of canvas or other suitable material and provided with transverse slats *i*, which, by the motion of the belts, tend to force the straw downward into the feed-opening *a*. A series of similar rollers, *e*, preferably two at the rear and three in front, are journaled in the standards E E' at a lower position, these being adapted to guide the belts I. This feeding action is also assisted by roll *e'*, so that a constant supply of straw is conveyed downward toward the feed-opening *a*. The passage of straw or other material between the belts I is still further aided by a series of obliquely-mounted needles or packers, *g'*, which are mounted upon crank-sections *g'* of the two downwardly-slanting shafts G', operated by the shaft G, so that as the shafts G' revolve the fingers or packers *g'* will alternately enter the straw and draw it downward and apart toward the sides of the compression-

chamber and evenly distribute it therein. Links *g'* are pivoted at one end to frame A, and the opposite ends of said links are pivoted to the lower ends of the packers *g'*, whereby the said links serve to insure the proper action of the packers. This arrangement of packers *g'*, and also of the idler *g* and gear-wheel *f'*, may be duplicated upon this and opposite standards E E', as desired.

Upon the rear standards, E', is mounted a band or chain wheel, K, over which runs a belt or chain, *k*, from the belt or chain pulley *d'*, upon the power-shaft D. A belt, *l*, runs from the periphery of belt or chain wheel K', beneath wheel *l'*, and over wheel *l'*, thence to a loose belt or chain wheel, *l'*, which is mounted upon a horizontal shaft, L, extending partially across the body A. This shaft L carries a suitable number of bevel-gears, *l'*, which serve to transmit power to the knotting mechanism, to be hereinafter described.

Within the body or box A is located the reciprocating traverser M, which is of such size as to fill the interior of said box or body. At its rear face this traverser is suitably coupled to two rods, *m*, by means of a cross-head and straps, which are in turn connected at their rear ends with the cranks *c c* of the shaft C, so that as said shaft revolves it will reciprocate the traverser M longitudinally of the body A, and the rods *m* serve not only to actuate the traverser but also to guide its movement in the body A.

It will be readily seen that the motion of all the above-described parts is continuous, irrespective of the periodical movements of the tying, threading, and other mechanisms yet to be described, these latter parts being automatically thrown in and out of action by the movement of the bales through the press.

Rigidly attached to the traverser M is the cross-head M', projecting through and working in two slots, *a'*, formed longitudinally in the vertical sides of body A. Upon the upper front edge of the traverser M is located a knife, *m'*, which may have either a plain or serrated cutting-edge, and which works in conjunction with a similar knife, *m'*, secured to the front transverse edge of the feed-opening *a*.

If desired, the knife *m'* may be dispensed with, and a series of fingers or guards, *m'*, may be substituted therefor, said guards *m'* serving to convey the straw or other material, and hold it in position while being severed by knife *m'*. By virtue of this arrangement of the knives or guards the forward movements of the cross-head M' are caused to sever that portion of the straw or other material which lies within the body A in front of the cross-head from that which remains in the throat above the feed-opening, and in order to facilitate the action of these knives or guards the cutting-edge of knife *m'* is set obliquely, so as to operate upon the knife *m'* or guards *m'* with a shearing cut. It should also be stated that the depth of the traverser M is such that it closes the feed-opening during its forward movement, in order

to prevent the entrance of any more straw into the body A until the traverser has traveled backward again. The purpose of widening the lower extremity of the feeding-throat will also be perceived at this stage of the description, as it enables the feeding devices to accumulate a supply of straw, while the traverser closes the feed-opening, so that when the cross-head has been drawn backward the accumulated supply of straw will be carried into the body A, and thus no cessation of the feed will occur.

At each side of the body A is mounted a gear segment or quadrant, N, which is pivoted at n to the body. Teeth n' of these quadrants are at the lower extremities of the same, and each set of teeth mesh with those of a gear-pinion, o , mounted rigidly upon a shaft, O, extending transversely beneath the body A. This shaft carries two pinions, o , one at each end, and there are two segments, N, one at each side of the body A. Upon the shaft O are rigidly mounted a series of threading-frames, P, corresponding in number with the wires or cords for binding the bales. Each of these threading-frames is of segmental form and works upward through longitudinal slots a^2 in the bottom of the body and a similar slot, a^3 , in the top of the said body. Three of these threading-frames are generally employed, and the upper and lower slots, a^2 a^3 , correspond in number with said frames. The cords or wires for supplying these frames are supplied from two reels or spools, o' o'' , placed, respectively, below and above the body A, as shown. The wires or cords from spools o' pass over and under tension-sheaves o^3 , thence over and under guiding-sheaves p p' p'' upon the frames P to the tips p^3 of said frames, and said wires pass through the slots a^2 from the tips p^3 , and their ends are fastened to the ends of the wires or cords from the upper spools, o'' . The wire, which is drawn upward around the bale by the threading-frame P, is guided in its direction by sheaves o^3 . The number of reels or spools and tension devices correspond with the number of threading-frames, and said spools are mounted, respectively, upon an upper spool-shaft, o^5 , and a lower spool-shaft, o^6 . From the foregoing description it will be seen that the threading-frames are actuated by oscillations of their shaft O, which is actuated in turn by oscillations of the pivoted segments N.

It will be seen that the threading-frames P serve to take up the rebound of the bales through the middle portion and hold the latter while being bound, while the spring-actuated hooks T prevent the rebound of the straw at the edges of the bale. These hooks are so formed with beveled ends t^2 that the traverser forces them back out of the way as the hay passes, the hooks immediately springing into their normal position by dropping into slots S^3 of the traverser. The oscillations of these segments are produced by two bars, Q, each of which is pivoted at q to the small end of

the corresponding segment. At their rear ends these bars are each formed with a downwardly-extending hook, q' , which, as the bars Q lie outside of the body A, engage at times with the extensions m' of the cross-head or compressor M. This engagement of the hooked bars Q occurs during the backward stroke of the cross-head, and hence it will be seen that the upper parts of segments N will be carried backward and produce a forward movement of the lower parts of said segments. As the results of this movement, the threading-frames P will be raised into the body A, and as the cross-head M' moves forward it will reverse the stroke of the segment N by the cross-head coming into contact with pivoted arm u , which is connected therewith by rod U, and thereby withdrawing the threading-frames P, and the mass of straw will impinge against the joined upper and lower wires which the threading-frames leave in position for the new supply of straw which draws them outward toward the forward or discharged end of body A. Thus the wires are caused to embrace the mass of straw and assist in its compression into the form of a bale. The bars Q extend forward beyond their point of pivotal attachment to the segment N, and at their forward ends said bars are provided with vertical bars R, these being connected at the top by a cross-bar, Q', as shown. A shaft, S, extends horizontally across the body A, and carries two wheels, s , which are toothed or serrated upon their peripheries, and which extend through slots a^5 in the body A. The toothed or serrated peripheries of these wheels extend down into the compression chamber of body A, and are rotated by contact with the forwardly-moving mass of straw therein, so that the shaft S is rotated thereby in the direction indicated by arrows. This shaft S also carries a loosely-mounted ratchet-disk, s' , midway between wheels s , the teeth upon the periphery of which incline toward the front end of the machine. A pawl, s^2 , pivoted upon this disk, engages the teeth of a small disk, s^3 , rigidly secured to the shaft S, the said teeth being inclined oppositely to the teeth-disk s' . The disk s' also carries one or more tripping-pins s^4 , which engage the lower end of a pawl-rod, T, which is pivoted upon an upright arm, t , resting upon the top of the body A. The size of the bale is regulated by the position of these tripping-pins, the number of bales per rotation of the disk s' corresponding with the number of equally-separated tripping-pins located thereon. The rod T is pressed forward at its lower end by a spring, t' , so that its lower end engages with the pins s^4 of the disk s' , and its upper end, which has a hook, s^5 , engages the horizontal bar Q'. It will thus be seen that as the shaft S is rotated by the moving mass of straw the rod T is disengaged from the horizontal bars Q', allowing the hooked ends of rods Q to drop into position to be drawn back by the receding traverser simultaneously with the rotating of the

segments N and threading-frames P, as before described. In so doing the hook q' , which is provided with the inwardly-projecting pin q'' , slides beneath the pivoted incline q^3 , which latter, acting as a gravity-latch, immediately drops on being released by pin q'' . It will then form an incline surface upon which pin q'' will ascend as the traverser M moves forward, releasing the hook q' from the cross-head M', allowing the horizontal bars Q' again to be engaged by the hooked end of the rod T, by which it is held until sufficient hay or straw has been delivered to form another bale, when the bar Q' is automatically released and the operation repeated. The disengagement of bar Q' is owing to the action of the tripping-pins upon disk s' relative to the pawl-rod T, throwing the lower end of the same rearward. As the bar Q' rises and moves backward, its hook q'' , engaging the teeth of wheel s' , accelerates the motion of disk or wheels s' , thereby clearing the path of lower end of rod T, so as to permit said rod T to resume its normal position and allow the upper end of the pawl-rod to move into position to receive the bar Q' by its hooked end s^5 . When the hooked ends of bars Q have ridden up over the inclined guides upon their return movement, which they do as the traverser moves forward, the bar Q' is engaged with the hooked end of pawl-rod T, and the disengagement of the bar Q' and pawl-rod T may be repeated. During the forward movement of the traverser its cross-head extensions m' come in contact with arms u , extending upward from and pivoted at the lower end to arms U, which are in turn pivoted at their forward ends to the segments N at u' and return the said segments to their normal position, throwing the threading-frames B down out of the path of the traverser, as shown in Fig. 1.

The shaft L, before described, is provided at one of its ends with clutches $t^1 t^2$, the engagement or disengagement of which throws the wire-twisting mechanism respectively in or out of motion. The free end of lever t^1 , which oscillates the movable clutch t^2 , is normally held outward, as shown in Fig. 5, by the spiral spring t^3 ; but as the cross-bar Q' moves forward to be engaged by the hooked end of the pivoted pawl-rod T, the link t^4 , which is loosely buckled to the arm t^5 , gives the cam t^6 a turn which forces the free end of lever t^1 , carrying clutch t^2 inward, where it is held by the latch t^7 , which immediately engages it. The clutches $t^1 t^2$ are held in this disengagement until the backward movement of cross-bar Q' takes place, when the latch t^7 is liberated from its engagement with the lever t^1 by the cam-surface t^8 , secured to one of the arms Q, as shown in Fig. 7, sliding beneath its free end, lifting it and allowing the spring t^3 to force the clutches together.

The beveled gears t^9 mesh with similar gears, v , upon vertical shafts V. Loosely mounted upon the lower end of shafts V are the rearwardly-projecting plates v^2 , which are pro-

vided with the peculiar-shaped slots v^3 , clearly shown in Figs. 12, 13, and 14. The said slots serve a double purpose, the outer portion acting as a guide for the binding-wires, while the inner rounded portion, v^4 , carries the twister v^5 . The twister v^5 is provided with teeth on its periphery, which mesh with similar parts on the large wheel V', mounted on the lower end of its vertical driving-shaft V. The twister v^5 is also slotted and provided with the opposite V-shaped ribs v^6 , which are located near enough to each other to prevent more than one wire entering the middle of the twister at a time, and while twisting the sharp-edged w pierces and severs the wires. Beneath the twister v^5 still another guide-plate, v^7 , is located, the same being so constructed, with the projecting finger v^8 , as to hold the upper and lower wires rigidly until the grabbing-hooks v^9 , located above and below the teeth on twister v^5 , which project beyond the periphery of the twister alongside of the slot or opening therein, come in contact with the wires, removing them from the fingers v^8 , whence, owing to the position of threading-frame P, having its points $p^3 p^4$ respectively above and below the middle of the twister v^5 , as shown in Fig. 2, the wires slide one after the other between the ribs v^6 , and become weakened at that point by the rapid rotation of said twister as the wires are being twisted. After the wires have been sufficiently twisted and the surplus wire between the said points $p^3 p^4$ have been taken into the twist, the resistance becomes great enough to sever the wires at the weak point at rib v^6 , thus finishing the tie on the bale just formed and leaving the corresponding wire ends with a duplicate knot for the next bale, as previously described.

The front end of the body A is opened, and near this opened end, at the vertical sides of the body, are located two swinging sections, X, hinged at their rear or inner ends to the body and adjusted inwardly and outward by set-screws x , as shown.

The swinging sections afford additional lateral pressure to the mass of straw and assist the cross-head in compressing the same. Said sections may be set farther inward at the beginning of the operation of the machine and may be drawn outward when the machine has been operated for a short time, so as to decrease the lateral pressure. Each bale is discharged from the machine by one or more bales succeeding it through the compression-chamber.

The straw is first thrown into the hopper, and is carried by the belts I down into the restricted throat of said hopper, at which point it comes within reach of the packers g^2 , which latter force it into the compression-chamber. The movement of the completed bales regulate or control the movements of the threading-frames, and when sufficient straw to form a bale has been packed within the compression-chamber the movement of the outgoing bales trips the mechanism before described and permits the free end

of bars Q to drop into a position to engage the cross-head M. This engagement of the bars Q with the cross-head M elevates the threading-frames P, which latter carry the wire up into a position to be engaged by the twister, which is now operating. This twister twists and severs the wire and at the same time unites the ends of the wires leading from the upper and lower reels, as shown in Fig. 1. On the return movement of the cross-head the latter engages the lever *u*, which, through the intervention of the rods U and segments N, withdraws the threading-frames from the compression-chamber. The rearward movement of the cross-head or compressor opens the lower end of the throat of the hopper or permits the straw therein to be forced into the compression-chamber, where it is acted upon by the compressor until sufficient quantity has been packed therein to form another bale, when the bars Q are again tripped and the binding operation repeated.

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

1. In a straw-baling machine, the combination, with a feeder for automatically conveying the straw to a compressor-chamber, of a follower for compressing the straw into bales of any desired size, binding mechanism for automatically binding the compressed bales while retained within the compression-chamber, and devices connected indirectly with the threading-frames of the binding mechanism and adapted to be engaged by the follower for actuating said frames, substantially as and for the purpose set forth.

2. In a straw-baling machine, the combination of a compression-chamber of suitable dimensions to contain one or more compressed bales of straw of the desired size, straw-feeding mechanism located above the compression-chamber and connected therewith, means for compressing the straw and also to serve as a gate to cut off the supply of straw to the compression-chamber at suitable intervals of time, and devices for automatically binding the compressed bale while within the compression-chamber, substantially as set forth.

3. In a straw-baling machine, the combination, with a compression-chamber, a feeder located above the same for forcing the straw into the compression-chamber, and a follower, of a binding-mechanism for binding one bale and connecting the binding cord or wire for the next succeeding bale.

4. In a straw-baling machine, the combination of feeding mechanism for conveying the straw into the compression-chamber, mechanism for forming straw into bales by compressing, said mechanism operating continuously, and mechanism for binding, fastening, and severing the binders, operating at suitable intervals, said mechanism being actuated from a single power-shaft, forming part of the machine and operating without variation in the speed, substantially as specified.

5. In a straw-baling machine, the combination, with a reciprocating follower, threading-frames or binder-arms, and knotting and severing mechanism, of an oscillating device for actuating the threading-frames or binder-arms, and devices for actuating the knotting and severing devices.

6. In a straw-baling machine, the combination, with a reciprocating follower and an oscillating connection for operating the binding mechanism, of a knoter, a knoter-operating mechanism, a clutch, and a device actuated by the binder-actuating device for operating the clutch, substantially as set forth.

7. In a straw-baling machine, the combination, with a follower and an oscillating threading mechanism, of hooked bars adapted to engage the follower for the purpose of elevating the threading mechanism, substantially as set forth.

8. In a straw-baling machine, the combination, with a compressor-chamber and a follower for compressing the material therein, of a hopper located above the compression-chamber, a feeding mechanism constructed and arranged substantially as set forth and operating to accumulate the material during the closure of the feed-opening to the compressing-chamber, and means for spreading the material equally therein, substantially as set forth.

9. In a straw-baling machine, the combination, with a compression-chamber and a follower, of the binding and severing mechanism arranged substantially as described, whereby the binding cords or wires are severed without disconnecting said cords or wires from the threading-frames, and mechanism, substantially as described, interposed between the plunger and binding and severing mechanism, whereby the movements of the latter are controlled by the movements of the former, substantially as set forth.

10. The combination, with the body A, having the feed-openings *a*, of the standards E E', carrying the straw-conveying devices, said standards E E' being bent substantially as described, so as to form a feeding-throat diminishing downward to a certain point and then expanding downwardly to the feed-opening, substantially as described.

11. The combination, with the body A, having feed-openings *a*, the standards E E', the latter being bent, as described, to form the contracted and enlarged feeding-throat, of the follower-head, crank-shaft for operating the same, the power-shaft and the gear-wheels, and belts and belt-wheels for transmitting power from the power-shaft to the crank shaft and also to the feeding devices upon standards E E', substantially as described.

12. The combination, with the body A and its crank-shaft, of the reciprocating cross-head or follower actuated by said shaft, the hooked bars Q, for engaging the said head, and the rotating shaft S, with its wheels *s* extending into a compression-chamber to engage the moving material therein, the pivoted segments N, con-

nected pivotally to bars Q, and the ratchet-wheels, pawls, and pawl-rods for controlling the movement of the bars Q, substantially as set forth.

5 13. The combination, with the reciprocating follower-head, the pivoted gear-segments, the hooked rods Q and pivoted arms U, both of which are set in operation by the compressor-head, the latter actuating said segments, of
10 the oscillating thread or wire carrying frames actuated by said segments, substantially as and for the purpose described.

14. The combination, with the reciprocating compressor-head, the pivoted segments, and
15 the hooked rods Q, for engaging the compressor-heads, and the arms U, actuating the segments, of the shaft L, carrying clutches t' t'' , the levers t' , and knotting or fastening mechanism operated by gearing from shaft L during
20 the engagement of the clutches, substantially as set forth.

15. The combination, with the reciprocating compressing-head, the oscillating gear-segments, the hooked bars Q, connected with said
25 segments and engaging with the compressing-heads, of the threading-frames provided with the thread or wire guiding devices, the frames being geared to the oscillating segments and actuated thereby, the shaft L, having the beveled
30 gear and clutches and clutch-levers actuated by the segments, the shafts V, carrying gear-wheel v' and the wire-fastening devices v'' , v' , v'' , and v' , the spring-actuated lever t' , for operating the clutches, and a cam and
35 latch for controlling them, as and for the purpose set forth.

16. The cord or wire carrying frame P, of quadrant shape, provided with the threading-tip p^3 and having guides o^4 , and the pulleys p^1 ,
40 p^2 , and p^3 , arranged to carry the binding cord or wire into contact with the moving bale, substantially as described.

17. The combination, with the quadrant-shaped threading-frame constructed substantially
45 as described, of the upper and lower reels or spools for supplying the said frame, substantially as set forth.

18. The wire-twisting device consisting of guide-plates, grabbing-hook, and ribs for regulating
50 the position of wires therein and the operating mechanism, substantially as set forth.

19. The combination, with the reciprocating follower-head carrying knife m^2 on its upper edge, stationary knife m^3 , the shaft S, carrying
55 wheels s , ratchet-wheel s' , having pawl s^2 and pins s^4 , ratchet-wheel s^3 , and hook q^2 , for actuating wheel s' , of the pawl-rod T, pivoted upon rod t , the spring t' , for controlling the action of said pawl-rod, and the pivoted hooked rods
60 Q, engaging the compressor-head and connected together at their front ends by a cross-rod, Q', for engaging pawl-rod T, substantially as described.

20. A wire-twister provided with a receptacle
65 for wires and a combined twisting and sever-

ing edge, v^6 , as and for the purpose set forth, substantially as described.

21. A wire-twisting device consisting of guide-plates v^2 v^7 , a twister having receptacles
70 for wires, provided with a combined twisting and severing edge and a grabbing-hook, as and for the purpose set forth.

22. A thread-carrying frame, P, provided with forked guides for cords or wires and
75 guide-plates, in combination with a twister having a recess or opening for the wires, and a grabbing-hook, substantially as set forth.

23. A loosely-mounted toothed wheel, s , carrying pawls s^2 , and tripping-pins s^4 , mounted
80 on said wheel s' , in combination with spring-hook q^2 , mounted on oscillating cross bar Q', as and for the purpose described.

24. A wire-twister and thread-carrying frame actuated automatically at suitable intervals,
85 regulated by tripping mechanism, in combination with hook Q, engaging cross-head M, substantially as described.

25. In a straw-baling machine, the combination, with a compression-chamber, a follower,
90 thread or wire carrying frames, and knotting mechanism, of devices actuated by the follower for operating the thread or wire carrying frames, and devices for holding said actuating
95 devices out of contact with the follower.

26. In a straw-baling machine, the combination, with a compression-chamber, a follower,
95 thread or wire carrying frames, and knotting mechanism, of devices actuated by the follower for actuating the thread or wire carrying frames, and devices for holding said actuating
100 devices out of contact with the follower and for automatically releasing said devices when the necessary amount of hay has been packed within the compression-chamber, substantially
105 as set forth.

27. The combination, with a follower, thread or wire carrying frames, and a hooked bar connected indirectly with the thread or wire carrying frames and adapted to engage the
110 follower, of devices for holding the hooked bars out of the line of travel of the follower, and devices actuated by the movement of the baled straw for releasing the hooked bars from the holding devices, substantially as set forth.

28. The combination, with a follower, of
115 thread or wire carrying frames, and hooked bars connected indirectly with the thread-carrying frames and adapted to be engaged by the follower.

29. The combination, with a follower, thread
120 or wire carrying frames, and hooked bars connected indirectly with the thread or wire carrying frames and adapted to be engaged by the follower, of the pawl T, for holding the hooked bars out of the line of travel of the follower,
125 and devices for disengaging the pawl and bars, substantially as set forth.

30. The combination, with a follower, thread or wire carrying frames, and hooked bars actuated by the follower for raising and lowering
130

the thread or wire carrying frames, of devices
for holding the hooked bars out of the line of
travel of the follower, a toothed or serrated
wheel projecting into the press-box and
5 adapted to be rotated by the movement of the
material therein, and devices connecting the
pawl and serrated wheels, substantially as set
forth.

In testimony whereof I have signed this speci-
fication in the presence of two subscribing wit- 10
nesses.

NEWEL B. WOOD.

Witnesses:

C. S. DRURY,
J. E. JONES.