(Model.) 2 Sheets—Sheet 1.

R. BROWN.

KNOTTING MECHANISM FOR HARVESTERS.

No. 379,886. Patented Mar. 20, 1888.

Fig. 1.

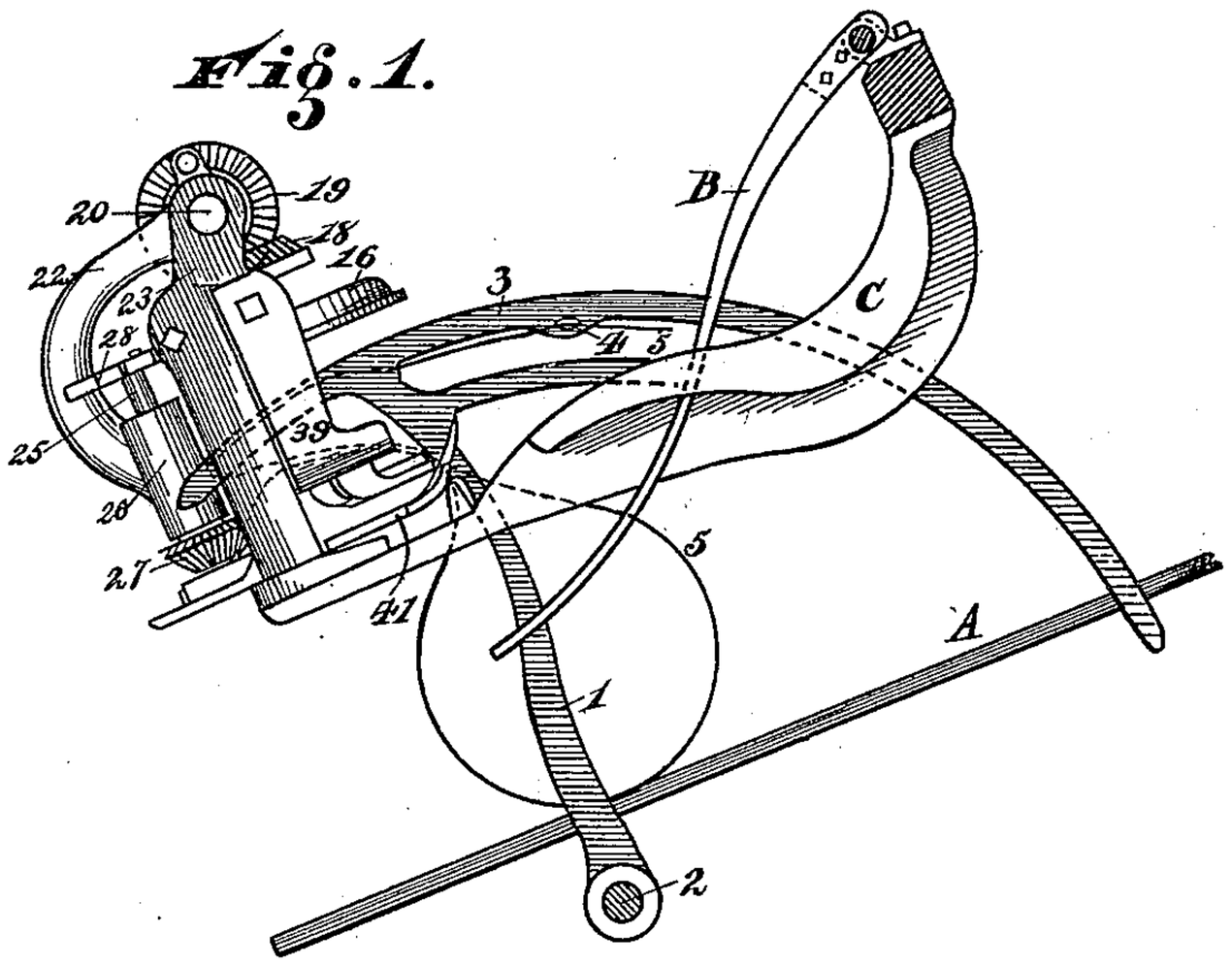


Fig. 2.

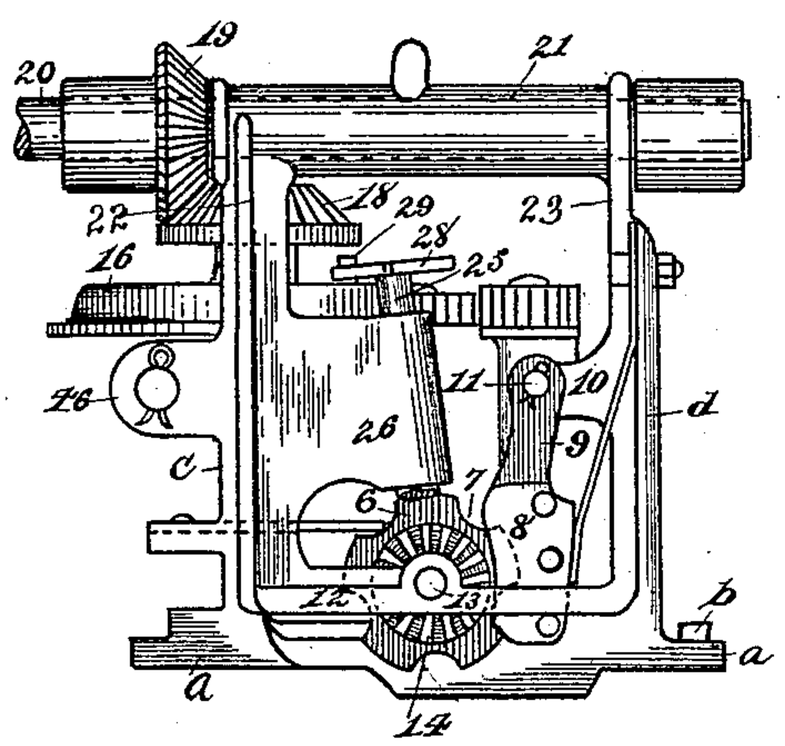
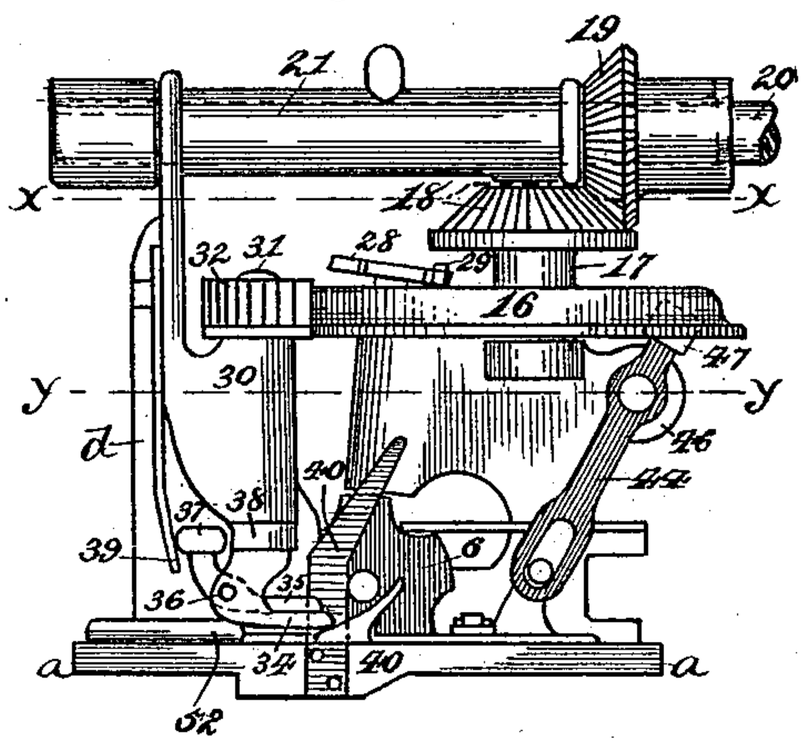


Fig. 3.



Attest.

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(Model.) 2 Sheets—Sheet 2.

R. BROWN.

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Fig. 4.

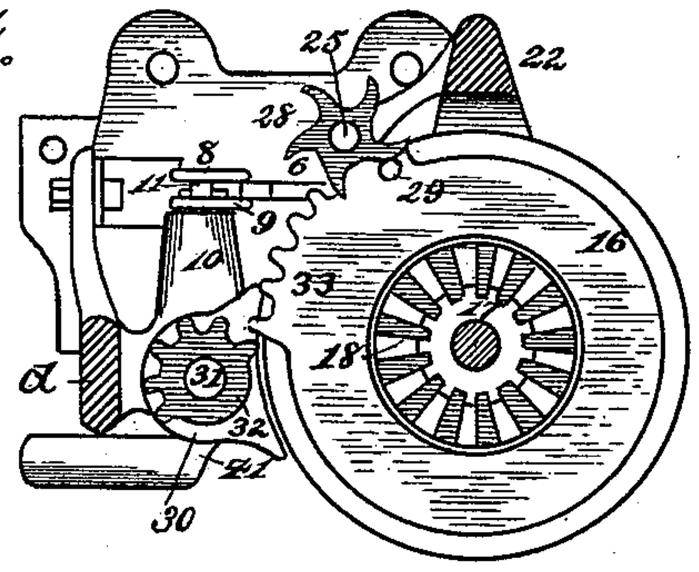


Fig. 5.

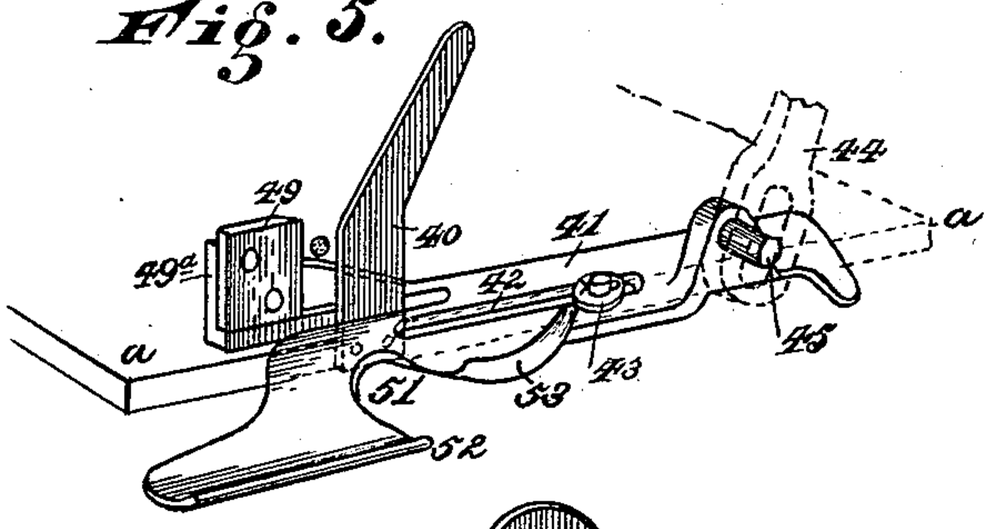


Fig. 6.

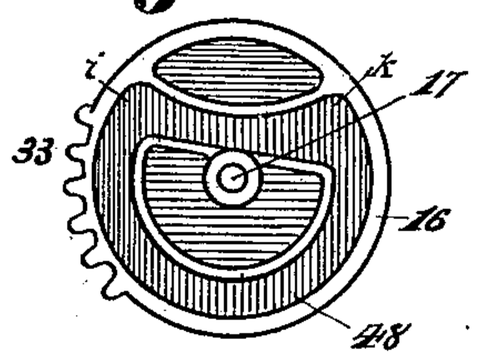


Fig. 7.

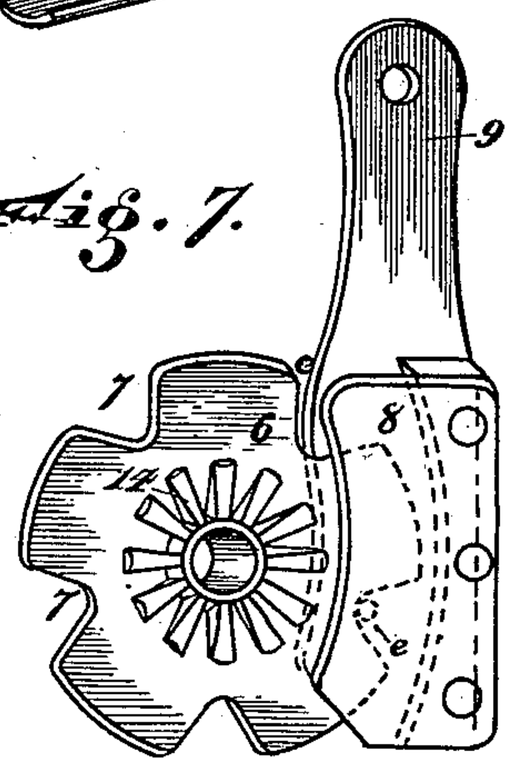
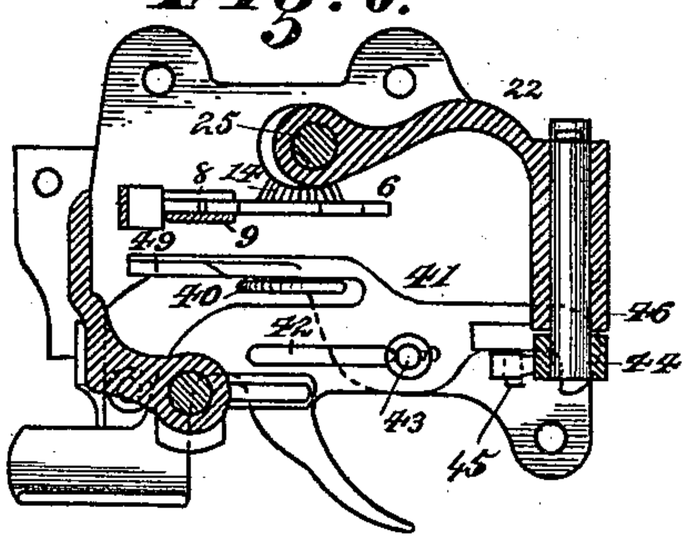


Fig. 8.



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UNITED STATES PATENT OFFICE.

ROBERT BROWN, OF MIAMISBURG, OHIO, ASSIGNOR TO HOOVER & GAMBLE, OF SAME PLACE.

KNOTTING MECHANISM FOR HARVESTERS.

SPECIFICATION forming part of Letters Patent No. 379,886, dated March 20, 1888.

Application filed November 4, 1886. Serial No. 218,002. (Model.)

To all whom it may concern:

Be it known that I, ROBERT BROWN, a resident of Miamisburg, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Knotting Mechanism for Harvesters, of which the following is a specification.

My invention relates to knotting mechanism for harvesters. It is shown as adapted to the Appleby type of binders; but any binder employing a needle-arm for placing the end of the thread in a twine-carrying disk may be used with this invention.

One of the objects of the invention is to dispense with the cord-tucking mechanism.

Another object is to avoid the use of a plunger-bolt or pawl-and-ratchet mechanism for operating the cord-carrying disk.

Another object is to employ a reciprocating knife-carrier operated simultaneously with the stripper.

Another object is to obtain a stationary shear-post, in combination with a reciprocating knife for cutting the twine.

Another object of the invention is to simplify the construction of the parts and to provide a single wheel for giving motion at the proper time to the cord-carrying disk, the revolving knotting-bill, and the knife and stripper, by means of fewer parts, which are at once more durable, simpler in operation, and much less liable to get out of order.

Another object of my invention is to mount the wheel and all the operative parts within the knotter-frame, so that the frame can be attached and detached without disturbing the setting mechanism.

In the use of knotting devices hitherto employed the twine-holder and twine-carrying disk have been a considerable distance away from the knotting-bill, and the knife had no support in cutting the twine between these two points. Owing to the sagging of the twine or the difference in tautness, a variation occurred in the time in which the twine was cut. Sometimes, the twine being cut too late, the ejecting of the bundle would pull out the knot; sometimes being cut too soon, before the string is pulled to complete the knot. By employing a stationary cutting-post to operate in conjunction with the knife in holding the twine these difficulties are avoided, as this post assists in holding the twine, and prevents danger of losing the knot by pulling the twine through before the knot is completed. By avoiding the use of a twine-tucker and having the needle-arm to place the twine directly in notches, with the proper mechanism for moving the notched twine-carrier disk, a positive presentation of the twine to the knotting mechanism is accomplished, and serious difficulties hitherto experienced by the use of the twine-tucker wholly avoided, all of which will be fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is an end elevation of my improvement, showing its proper relation to the table, needle-arm, and knotting devices. Fig. 2 is an outside elevation of the knotting-frame carrying the knotting devices. Fig. 3 is a reverse or inside elevation of the same. Fig. 4 is a sectional plan on line *x x*, Fig. 3. Fig. 5 is a detail view of the cutting mechanism. Fig. 6 is a bottom plan view, on a smaller scale, of the knotter-driving wheel. Fig. 7 is an outside elevation of the twine-holder and carrying-disk. Fig. 8 is a section on line *y y*, Fig. 3.

A, Fig. 1, represents the decking on which the gavel rests when the cord is being tied around to form the bundle.

B represents the tripping-finger.

C represents the breast-plate, supported above the table in the usual manner, upon which the knotting mechanism is mounted.

1 and 3 represent the needle-arm; 2, the shaft operating the same; 4, the eye in the needle-arm through which the cord passes; 5, the cord; 6, the cord-carrying disk, provided with the ordinary notches, 7, by which the cord is carried between the jaws of the cord-holder 8; 9, the shank of the cord-holder.

a represents the base of the cord-holding frame, which is attached by bolts *b* to the breast-plate C.

c represents one of the side posts of the knotter-frame.

d represents the opposite side post. The base *a* and the sides *c d* are preferably cast of

one piece, with projections and lugs for supporting the operative parts of the entire knotting devices.

Shank 9 of the cord-holder is secured to lug 10, projecting from the frame, by bolt 11. The cord-disk 6 is journaled upon an elevated frame-piece, 12, by stud 13, upon which stud is also journaled the bevel-pinion 14, which is rigidly connected to the cord-disk 6.

The several parts of the knotting mechanism are operated by the knotter-driving wheel 16, which is journaled horizontally within the frame *c d* on shaft 17. It is provided with a bevel-gear, 18, rigidly connected thereto, which meshes with the bevel 19, keyed upon knotter-driving shaft 20, which is journaled in the usual manner on the main frame of the machine. From this shaft is hung the knotter mechanism by means of the arms 22 and 23 of the sleeve 21, said arms forming part of the side posts, *c* and *d*.

25 represents a shaft journaled in the frame-piece 26, projecting from the end post, *c*, as shown in Fig. 2, on the lower end of which shaft is keyed a bevel-pinion, 27, for driving the cord-carrying disk.

28 represents a gear or armed wheel journaled on the top of shaft 25, having arms or teeth projecting radially outward and extending over the knotter-driving wheel 16.

29 represents a pin or lug projecting up from said transmitter 16, so as to impart an intermittent motion to the cord-carrying disk 6 by a positive engagement of the toothed wheel 28 with the pin or lug on the main driving-disk. The knotting-bill is likewise driven intermittently by the knotter-driving wheel 16 in the following manner:

30 represents a sleeve projecting inwardly from the side post, *c*, through which passes a shaft, 31.

32 represents a mutilated spur-gear rigidly connected to shaft 31, the teeth of which engage with the spurs of segment 33, provided on the periphery of the main driver 16. On the bottom of shaft 31 are shown the knotting-jaws 34 35, the latter being pivoted at point 36 to the shank of jaw 34.

37 represents a friction-wheel, which is operated by a cam, 38, projecting from the shaft 31, above the knotter-bill, to close the bills or jaws and clasp the twine at the desired point. The guard 39 closes the bill to pull one of the cords through the loop wound over the two jaws in the ordinary manner.

The knife mechanism is constructed in the following manner:

40 represents a stationary post rigidly secured to the base of the frame *a*, as shown in Fig. 3. The top of this post is inclined forward, so as to guide the cord down to its base and hold it to the action of the cutter.

41 represents a reciprocating plate mounted on the base *a*, provided with the slot 42, through which passes a bolt, 43, projecting up through from the base of the frame to act as a guide and hold plate 41 in lateral position. This plate 41 is driven by a crank-arm, 44, which is pivoted and rigidly connected upon a center, 45, that journals in a boss, 46, projecting from the side piece, *c*. The upper end of the crank-shaft 44 is provided with a friction-roller, 47, that engages in a cam-groove, 48, formed in the under face of the knotter-driving wheel 16, as shown in Fig. 6. The shape of this cam-groove is such that it will give a quick reciprocating motion to the plate 41 at the desired point of the revolution of the knotter-driving wheel 16 and draw the cutting-knife 49, which is attached to one of the arms 49^a of plate 41, across the face of the stationary cutting-guard 40 and sever the ends of the cord by the shearing action of the reciprocating knife against the stationary guard. Thus the intermittent motions of the knotting devices—to wit, the cord-carrying disk 6, the knotting-jaws 34 35, and the knife or cutter 49—are intermittently driven at the proper time by the knotter-driving wheel 16.

51 represents a notch cut in plate 41, in which the cord is placed by the needle-arm.

52 represents the stripper which pulls the cord off the knotter-bill, and 53 a curved finger for guiding the cord into the notch 51.

The operation of the device is as follows: The needle-arm 3 carries the cord 5 forward and places it in the notch of the disk, as shown in section, Fig. 7, which is adjusted so as to move forward the instant the cord has been placed in the notch. This carries the string or cord down between the jaws of the cord-holder, the needle-arm being retracted at the proper time. As soon as the cord-carrying disk has commenced to move by the action of the pin 29 against one of the teeth 28, the front tooth of the segment of teeth 33 has started to revolve the mutilated gear 32, thereby setting the knotting-jaws in operation. The pin or lug 29 has carried the needle-disk a sufficient distance to bring the cord 5 into the position shown at *e*, Fig. 7, by the time that the pin or lug 29 has passed out of engagement with one of the teeth 28, when the knotting-disk is held in that position by the elasticity of the jaws of the twine-holder until the next operation of tying a knot. The segment of teeth 33 carries around the knotting-jaws, which perform the operation of tying the knot by means of the opening, closing, and pulling of the jaws. The cam-groove 48 of the main driver 16 is provided, so that as soon as the knotting-jaws have pulled one of the strands over the loop and drawn the knot taut the cam-groove 48 has traveled from point *i* to point *k* through the curved portion, during which portion of the travel the knife is stationary; but in passing from point *k* to point *i* through the straight portion of the groove the plate 41 is reciprocated forward and backward, bringing the cutter 49 past the guard 40 and severing the twine, coming back into position for a second operation. It will be observed that these operations are all performed by devices arranged within the skeleton frame *c d*, to which they

are severally attached, the frame being a unit and the parts all connected to it; and the main driving mechanism, consisting of the knotter-driving shaft 20 and the knotter-driving wheel 16, likewise being journaled to said frame, the adjustments are very positive, and are not liable to get out of adjustment because of the rigidity of construction, and the whole is attached to the breast-plate C without disturbing the adjustment or the tying operation of the several individual parts of the knotting mechanism.

I claim—

1. In a knotting mechanism, the combination, with the knotter-driving wheel 16, journaled horizontally within the frame *c d* and having a pin, 29, a segment of gear-teeth, 33, and the cam-race 48, of the cord-carrying disk, the knotting-jaws, and the reciprocating knife-plate having the stripper 52, said knotter-driving wheel receiving motion from the main driving-shaft, substantially as described.

2. In combination with the frame *c d* and horizontal sleeve 21, inclosing the knotter mechanism, the knotter-driving wheel 16, journaled horizontally within the frame *c d*, having its shaft arranged in the sleeve, said wheel being provided with a segment of gear-teeth, a pin and a cam-race, the knotting-jaws, cord-disk mechanism, and reciprocating knife-plate, substantially as described.

3. In combination with the skeleton frame, the main driving-shaft 20, and the sleeve 21, within which said driving-shaft is arranged, the bevel-gears, the knotter-driving wheel 16, journaled horizontally within said frame *c d*, and having a segment of gear-teeth, 33, pin 29, and cam-race 48, and the knotting devices, substantially as described.

4. In combination with the skeleton frame having sleeve 21, within which frame the knotting mechanism is inclosed, the knotter-driving shaft 20, arranged in said sleeve, the knotter-driving wheel 16, journaled horizontally within the inclosing-frame, having segment of gear-teeth 33, pin 29, and cam-race 48, the bevel-gears, and the knotter-driving wheel, substantially as described.

In testimony whereof I have hereunto set my hand.

ROBERT BROWN.

Witnesses:

LEWIS H. ZEHRING,

JOHN W. HIPPLE.