

(No Model.)

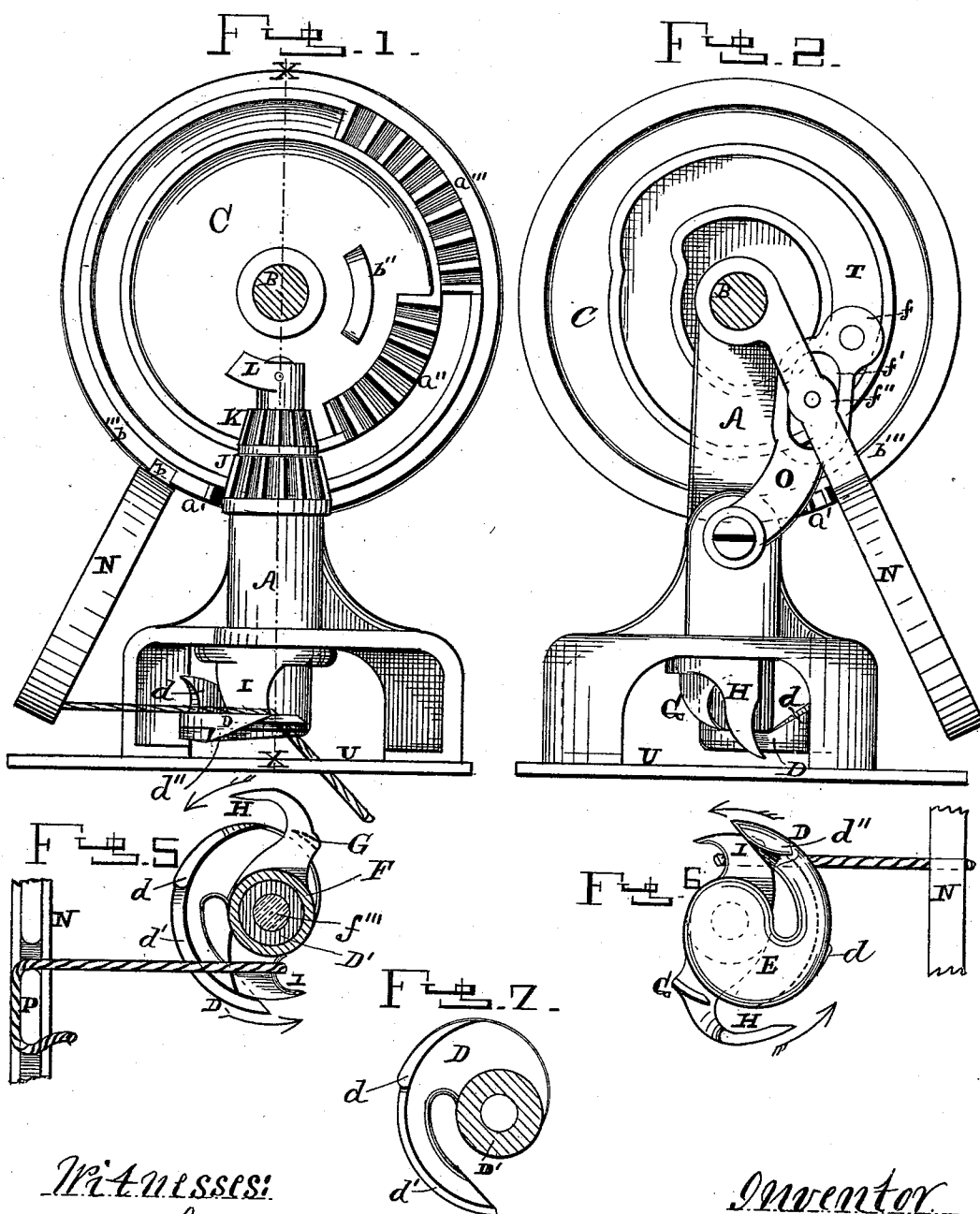
3 Sheets—Sheet 1.

M. A. KELLER.

KNOT TYING MECHANISM FOR GRAIN BINDERS.

No. 536,698.

Patented Apr. 2, 1895.

Witness:

A P Keller

W. C. Keller.

Inventor

M. A. Keller.

(No Model.)

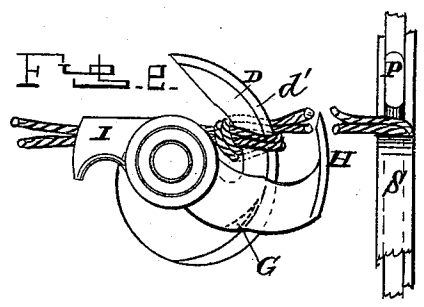
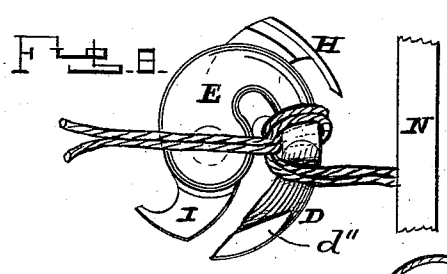
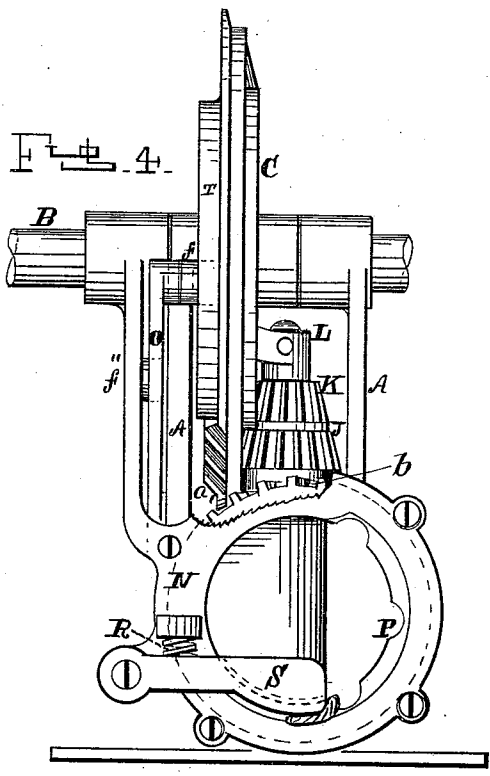
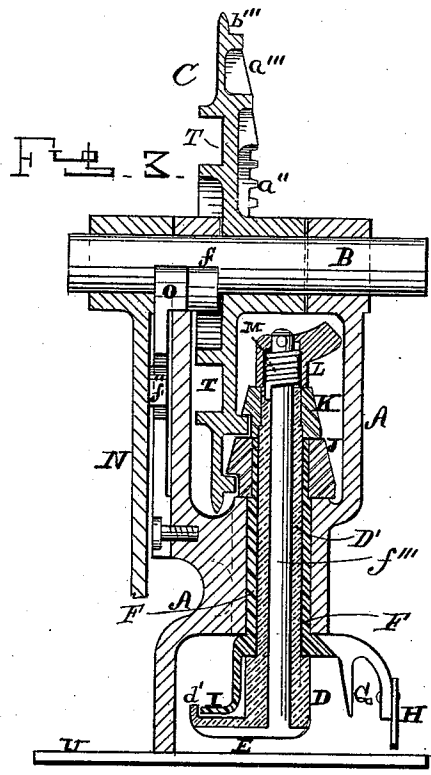
3 Sheets—Sheet 2.

M. A. KELLER.

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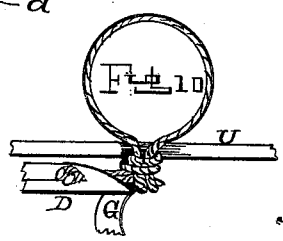
Patented Apr. 2, 1895.



Witnesses:

A. P. Keller

M. A. Keller



Inventor

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UNITED STATES PATENT OFFICE.

MOSES A. KELLER, OF BATAVIA, NEW YORK.

KNOT-TYING MECHANISM FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 536,698, dated April 2, 1895.

Application filed November 18, 1886. Serial No. 219,246. (No model.)

To all whom it may concern:

Be it known that I, MOSES A. KELLER, a citizen of the United States, residing at Batavia, in the county of Genesee and State of New York, have invented a new and useful Improvement in Knot-Tying Mechanism for Grain-Binders, of which the following is a specification.

My invention relates to improvements in knot-tying mechanism, in which a hook knoter and the disengaging mechanism are journaled together in a single bearing, and a knife for severing the cord also carried around the knotting hook, and it further consists of a cord supporting hook that also revolves with the disengaging mechanism, and it consists further in various other points, that will be pointed out in the specification and claims.

The object of my improvements are to simplify the knotting mechanism for grain binders, and to make them absolutely sure; in binding every bundle. I accomplish these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a right hand side elevation. Fig. 2 is a left hand side elevation. Fig. 3 is a vertical sectional view, taken through the line X X Fig. 1. Fig. 4 is a rear side elevation, and Figs. 5 to 10, are detail views. Fig. 11, represents a right hand side elevation of the knoter with the binding needle in position during the knotting operation. Fig. 12, is a detail view of the knoter operating wheel, and cord clamping ring showing the former in gear with the latter at the time the ring is rotated, which operation is also shown in Fig. 11, giving a side view of the cogs of wheel C, and Fig. 13, is a full plan of the looping hook with the cord looped just prior to the opening of the clamping jaw, and represents the position of the hook and cord in Fig. 11.

Similar letters refer to similar parts throughout the specification, in which—

A, is the main knoter frame in which are journaled the main knoter operating shaft B, and the knotting hook D, and the sleeve F. Affixed to the upper ends of the shaft of said knotting hook and of the sleeve are segmental pinions J, and K. A segmental bevel wheel C, is secured upon the shaft B, which at the proper time causes the pinions J and K, to revolve. Upon the under side of the

knotting hook, and affixed to a shaft f''' is a clamping jaw E, and a spring M, at the upper end of said shaft f''' and connected to the knoter shaft or pinion K, holds the clamping jaw closed. An arm L, is also affixed to the shaft f''' at its upper end which operates in conjunction with the stop b'' on the face of the bevel wheel C, and causes the clamping jaw E, to open, at the proper time as will appear farther on.

The sleeve F, that is journaled in the frame A, is provided at its lower end next to the knotting hook, with a cord supporting hook I, and the disengaging hook G, and also with a knife H, for severing the binding cord.

The knotting hook has upon its upper side a projecting flange d' that is concentric with the shaft of the hook, and the disengaging hook G, and supporting hook I, move along the inside of said flange. The point of the disengaging hook is thus enabled to get under the cord to strip it off the hook at the proper time. The knife H, revolves around on the outside of the knotting hook, and at the proper time severs the binding cord, which enables the disengaging hook G, to strip the loop off the knotting hook. Rigidly formed upon the flange d' , is a horn or projection d . When the knotting hook D, is set in motion said horn will engage the cord that rests upon the hook I, and cause the cord to be lifted off said hook I, and carried around with the knotting hook D, and cause the cord to pass over the jaw E, to form the loop as seen in Fig. 8. It also prevents the cord from being pushed back upon the knotting hook when passing under the point of the disengaging hook G, to enable the latter to get behind the cord to strip the same off the hook D.

Journaled upon the main shaft B, is a swinging frame N, to which is fitted the notched cord holding ring P. A grooved clamping shoe S, is pivoted to said swinging frame, and a spring R, serves to hold the shoe in contact with the notched ring. Upon the outside periphery of the notched ring, are cogs b , which gear with the flange b''' , that is on the periphery of the bevel wheel C, and the spiral cogs A' , on said wheel cause the ring P, to move one notch to each revolution of the wheel C, and the flange b''' locks the ring in its normal position, as the cogs pass out of

gear. A lever O, journaled to the main frame, and provided with a roller *f*, that moves in the cam groove T, of the wheel C, and connected to the swinging frame N, by a roller *f'* on the frame moving in the slot *f'* in the lever causes the frame N, to yield up the cord at the proper time during the tying operation.

In Figs. 1, 2, 5, 6, and 7 the knotter is represented in its normal position with one end of the cord in position on the hook and holder. When the binding needle carries the cord around the bundle it places the other end of the band right by the cord shown in the drawings. When the cord has thus been placed in position, the pinion K, is set in motion by the cogs *a''* of the wheel C. This sets in motion the knotting hook D, and gives it one complete revolution, no more, no less. This forms the loop of the knot, in the manner shown in Fig. 8. Simultaneously with this action of the knotting hook, the frame N, was caused to yield up the cord by the action of the cam on the back side of the wheel C, through the lever mechanism before described. It will be seen in Fig. 8, that the clamping jaw E, is open, and the cord has dropped between the open jaws. The opening of the jaw E, was caused by the arm L, coming in collision with the stop *b''* on the face of wheel C. The cam T on the back side of the wheel C, now moves the frame N, back from the knotting hook, and thereby positively draws the cord up between the clamping jaws of the knotting hook, and at the same time the cogs *a'''* have engaged with the pinion J. This has put in motion the knife H and disengaging hook, G, but before the knife has arrived at the cord, the cam L, has passed off the stop *b''* and the spring M, caused the jaw E, to close on the cord. The knife now severs the cord, between the knotting hook, and the clamping mechanism of frame N, in the manner shown in Fig. 9, and the loop is disengaged from the knotting hook by the hook G, in the manner shown in Fig. 10. This completes the knot on the band around the bundle, and the bundle is free to pass out of the binding mechanism, and the cord is again placed in position on the supporting hook I, as represented in Fig. 1.

The operation of the knotter in forming and completing the knot proper, and independent of the cord holding mechanism is as follows: The normal position of the knotter proper is represented in Figs. 1, 2, 5, and 7, with the cord on hook I, and passing over the point of the looping hook D, as represented in Figs. 1 and 5. When the binding needle W begins to rise to bring the cord around the bundle and having placed it on the hook I, and into the clamping mechanism the two strands of the cord are in the position shown in Figs. 8, 9, and 11. Simultaneously with the starting of the needle the knotter operating wheel C, also commences its rotation in the direction of the arrow see Fig. 11, and the moment the cord has been placed on the knotting hook as above

stated the wheel C, has advanced far enough to bring the cogs *a''* up to the pinion K, and as the wheel C, continues to rotate the cogs *a''* set in motion the looping hook D, in the direction of the arrow. The hook D, passes around the cord and the horn *d* on the flange *d'* of hook D, engages the cord and takes it off the supporting hook I, and throws it over the heel of the hook D, as represented in Figs. 11 and 13. When the hook D, has arrived where it stands in Figs. 11 and 13, the arm L that controls the clamping jaw E, is arrested by the cam or stop *b''*, that is on the face of the wheel C, and as the hook D, moves on, it opens away from the jaw E and the cord that is between the knotter and holding mechanism slips into the open space on the knotting hook D. By this time the cam *b''* has passed the arm L, and the spring M closed the jaw E on the cord and clamped it against the hook *d''* just a little before the hook D completes its revolution and in the meantime the pinion J, that is on the sleeve F, has also been put in motion and the disengaging hooks G, and knife H and hook I, that are in the sleeve F, have advanced sufficiently by the time the cord was clamped by the jaw E, so that the knife H, immediately cuts the cord as represented in Fig. 9 and the hook G strips the loop off the beak or hook D, and the bound bundle is free to pass out. The hook I, will come around to take up its normal position to receive the cord before the needle has receded too far. The cams *c* and *c'* on the face of the wheel C, lock the knotter pinions in their normal position when out of gear with the segments of said wheel. The wheel C, makes but one revolution to each tying operation.

Having thus fully described my invention, what I desire to secure by Letters Patent is—

1. In a knot tying mechanism for grain binders, the combination with the knotter frame and knotter operating shaft of the rotary knotter journaled in said frame, the cord holder frame journaled concentric with the knotter operating shaft, the supplemental lever for operating said cord holder frame journaled to the knotter frame, and the segmental gear and cam wheel upon the knotter operating shaft for operating both the knotter, and cord holder frame.

2. The combination with the knotter frame and knotter operating shaft, of the cord holding mechanism journaled concentric with said shaft, the supplemental lever journaled to the frame, means connecting it with the cord holding mechanism, and the knotter operating wheel affixed upon said shaft and provided with segmental gear and cam connecting it with the cord holder and supplemental lever to positively rotate said holder, and swing it back and forth, as and for the purpose described.

3. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary disengaging hook journaled upon the same

axis as the knotting hook, and the segmental gear wheel for operating both knotter and disengaging hook, substantially as described.

4. In combination with the knotter frame, 5 and the knotter operating shaft journaled in said frame, of the rotary knotter, and rotary disengaging hook and knife journaled in a common bearing in said frame, and the knotter operating wheel affixed to said shaft and 10 provided upon the same side with two segmental bevel gears, and delay rims to engage the pinions of the knotter, disengaging hook and knife and rotate them in the same direction and alternately one complete revolution, 15 to each tying operation, no more no less, substantially as and for the purpose specified.

5. The intermittently rotating cord holding ring, journaled in a swinging frame that is journaled concentric with the axis of the 20 knotter operating wheel, spiral gear and delay rim upon the circumference of said knotter operating wheel engaging with the cogs of said cord holding ring and operating it positively and periodically as described, and 25 a cam on the back side of said knotter operating wheel, means connecting it with the swinging frame of said cord holder ring, all as and for the purpose described.

6. The combination of the rotary knotting 30 hook D, provided with the projecting flange d' , the stop d , with the rotary stripping hook G, and cord supporting hook I, journaled concentric about the axis of the knotting hook, and adapted to rotate in the same direction 35 as the knotting hook.

7. The combination with the knotter frame and knotter operating shaft, of the knotting-hook journaled in said frame, the cord clamping jaw of the knotting-hook secured to a 40 spindle journaled in the knotter spindle, and a stop arm and closing spring on the upper end of the spindle, the rotary knife and rotary stripping hook journaled about the same axis as the knotting-hook, and the single segmental gear and cam wheel giving motion to 45 all of said parts, substantially as described.

8. The combination with the knotter frame and knotter operating shaft, of the rotary knotter and clamping jaw journaled in said 50 frame in a common bearing, a spring connecting the clamping jaw with the knotting hook, and the segmental gear and cam wheel adapted to give the knotting hook one complete revolution, no more no less, and a temporary pause to the clamping jaw against the 55 resistance of the spring while the knotting hook continues to rotate, and to release the clamping jaw as the knotting hook comes to rest, as and for the purpose set forth.

9. The combination with the knotter frame 60 and knotter operating shaft, of the rotary knotting-hook journaled in said frame, the rotary cord holding ring journaled in a swinging frame journaled about the operating 65 shaft, the supplemental lever for operating said swinging frame pivoted to the knotter frame, and the single segmental gear and cam

wheel for rotating directly and positively both the knotting-hook and cord holding ring, and to swing the cord holder frame, all in the 70 manner substantially as shown and described.

10. The combination with the knotter frame and knotter operating shaft, of the intermittently rotating cord holding ring, journaled in a swinging frame journaled about said op- 75 erating shaft, the supplemental lever for operating the swinging frame pivoted to said knotter frame, the rotary knotting-hook, the rotary knife and rotary disengaging or stripping hook journaled in said frame upon a 80 common axis, and the single segmental gear and cam wheel, adapted to operate all of said parts, in the manner substantially as shown and described.

11. The rotary knotting hook D, affixed to 85 a hollow shaft and having said hook made concentric with the shaft, a flange d' and projecting horn d , formed upon the hook on the same side as its shaft, and a hook d'' , on the opposite side; and the vibrating clamping 90 jaw E, operating in conjunction with the hook d'' , the rotary disengaging hook and knife journaled upon said knotter shaft and operating in unison with the flange d' , and knotter hook D, all substantially as shown for the 95 purpose specified.

12. The combination with the knotter frame and knotter operating shaft, of the rotary knotting-hook journaled in said frame said 100 hook having upon its under side the vibrating clamping jaw secured to a spindle journaled in the knotter spindle and a stop arm and a spring at the other end of the spindle as said jaw to open and close the jaw; the 105 disengaging or stripping-hook, the knife and the cord supporting hook all secured to a common sleeve; journaled about the axis of the said knotting hook on the opposite side as the clamping jaw, segmental toothed pinions 110 upon said sleeve and knotting-hook spindle, and the single segmental gear and cam wheel, adapted to engage directly said pinions and stop arm and operate positively all of said parts, in the manner substantially as shown 115 and described.

13. The combination with the knotter operating wheel, of the annular cord holding ring having cord receiving notches upon its inside 120 edge and operating in conjunction with a clamping shoe, the spiral teeth upon the periphery of said ring and adapted to be engaged by the teeth upon the periphery of the knotter operating wheel and rotated intermittently, as and for the purpose set forth.

14. The combination of the knotter oper- 125 ating shaft, and swinging cord holder frame journaled about the shaft, of the intermittently rotating cord clamping ring journaled in said frame, and the knotter operating wheel provided upon its periphery with spiral 130 teeth, to engage the spiral teeth upon the periphery of the ring and rotate said ring positively and periodically as described, and a cam in said wheel, means connecting it with

the swinging frame, to cause said frame to swing to and from the knotting hook positively, as and for the purpose set forth.

15. A knotting mechanism for grain binders composed of the following elements, a hollow shaft D', having the knotting hook D, at one end and its operating pinion K on the other end, a vibrating shaft f''' journaled into said hollow shaft, and having the cord clamping jaw E, at one end, and its closing spring M, and operating arm L, at the other end, a sleeve F, provided with a cord supporting hook I, disengaging hook G, and a knife H, at one end, and its operating pinion at the other end, and a single wheel upon the main knotter operating shaft provided with radial projecting racks adapted to engage and rotate said pinions periodically as described, and a cam b''' on the face of said wheel for arresting the arm L, to open said clamping jaw against the resistance of the spring M, all combined and arranged for operation, substantially as shown and described.

16. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary disengaging hook and rotary cord supporting hook journaled upon the same axis as the knotter, and the segmental gear wheel for operating both knotter and the hooks, substantially as described.

17. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the cord supporting hook journaled upon the knotter spindle, and mechanism on the knotter operating shaft for operating both knotter and supporting hook.

18. The combination with the knotter frame, and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary knife journaled concentric about the knotter spindle and adapted to revolve around on the outside of the knotting hook to sever the cord at the proper time, the stripping hook adapted to revolve about on the inside of the hook, simultaneously with the knife, and means for operating all of said parts periodically and in the same direction from the knotter operating shaft, as and for the purpose set forth.

19. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary knife, rotary disengaging and rotary supporting hooks journaled upon the same axis as the knotter, and the segmental gear wheel for rotating all of said parts in the same direction and periodically, as described.

20. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary knife, and rotary disengaging hook journaled upon the same axis as the knotter, said knife being adapted to revolve around the outside of the knotting hook, and the disengaging

hook upon the inside, and pinions for revolving said knotter, knife and disengaging hook in combination with the segmental gear on the main knotter operating shaft.

21. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, and the cord supporting hook journaled upon the knotter spindle and gears upon said knotter operating shaft for rotating both the knotter and supporting hook one complete revolution, as set forth.

22. The combination of the knotter frame and knotter operating shaft, of the rotary knotting hook journaled in said frame and adapted to make one complete revolution no more nor less, the rotating cord supporting hook journaled about the spindle of the knotting-hook, and the single segmental gear wheel affixed to said operating shaft, means connecting it with the spindle of the knotting-hook and cord supporting-hook and rotate both the knotting-hook and cord supporting hook, positively and periodically in the same direction one complete revolution each, substantially as and for the purpose specified.

23. In combination with the knotting-hook formed concentric with its driving spindle, and having the projecting flange upon its outside edge, and a cord stop, of the rotating cord supporting hook and the disengaging or stripping-hook journaled concentric about the spindle of the knotting-hook, and operating in conjunction with the said flange, said cord supporting and stripping hooks being adapted to rotate in the same direction as the knotting-hook after said knotting hook has completed its revolution, and strip the knot from the knotting-hook.

24. In combination with the rotary knotting hook, of the vibrating clamping jaw, journaled into the spindle of the knotting-hook, the rotating cord supporting-hook the rotating stripping-hook and the rotating knife affixed to a sleeve journaled about the spindle of the knotting hook, and means to rotate all of said parts in the same direction and periodically, as described.

25. The combination of the rotary knotting hook, the rotary knife adapted to revolve around on the outside of the knotting hook, and the disengaging hook adapted to revolve around on the inside of said hook, and disengage the knotted band from the knotting hook while the latter remains stationary.

26. The combination with the rotary knotter, the rotary cord supporting hook and rotary knife, and cord clamping jaw journaled concentric with the knotting hook, and means for rotating all of said parts, as and for the purpose set forth.

27. The combination of the rotary knotting hook having the cord supporting flange upon its outer edge, the cord severing knife adapted to revolve around on the outside of said knotting hook, and the cord supporting and dis-

engaging hooks, adapted to revolve around on the inside of the flange of said knotting hook, for the purpose specified.

28. The combination with the rotary knotting hook, the rotary knife and rotary supporting hook journaled concentric with the knotting hook, and means for rotating all said parts in the same direction and periodically, as set forth.

29. In combination with the rotary knotting-hook having the projecting flange d' , the cord stop d , with the vibrating clamping jaw E, of the rotating cord supporting hook, rotating stripping hook, and rotating knife journaled concentric with the spindle of the knotting hook, means for rotating all of said parts simultaneously in the same direction as the knotting-hook after the said knotting-hook has completed its revolution.

30. The combination with the knotter frame and knotter operating shaft, of the rotatory knotter journaled in said frame, the rotary knife, rotary disengaging and rotary supporting hooks journaled concentric with the knotting hook, the cord clamping mechanism mounted in a swinging frame journaled concentric with the knotter operating shaft and a single knotter operating wheel giving motion to all of said parts, and periodically, as set forth.

31. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary supporting, and rotary disengaging hooks, journaled concentric with the knotting hook, the cord clamping mechanism mounted in a swinging frame journaled concentric with the knotter operating shaft, and the single knot-

ter operating wheel for operating all of said parts and periodically as set forth.

32. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary knife and rotary disengaging hook journaled concentric with the knotting hook, the cord clamping mechanism mounted in a swinging frame journaled concentric with the knotter operating shaft, and the single knotter operating wheel for operating all of said parts, and periodically as set forth.

33. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary knife and rotary supporting hook journaled concentric with the knotting hook, the cord clamping mechanism mounted in a swinging frame journaled concentric with the knotter operating shaft, and the single knotter operating wheel for operating all of said parts and periodically, as set forth.

34. The combination with the knotter frame and knotter operating shaft, of the rotary knotter journaled in said frame, the rotary cord holding mechanism journaled in a swinging frame journaled concentric with the knotter operating shaft, the supplemental lever for swinging the frame, and the single combined segmental gear and cam wheel, and means connecting it with and rotating both the knotter and cord holder, and swinging the cord holder frame positively, as set forth.

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Witnesses:

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