(No Model.) 3 Sheets—Sheet 1.

G. W. WHITTINGTON.

KNOTTER FOR BINDERS.

No. 503,634. Patented Aug. 22, 1893.

Fig 1

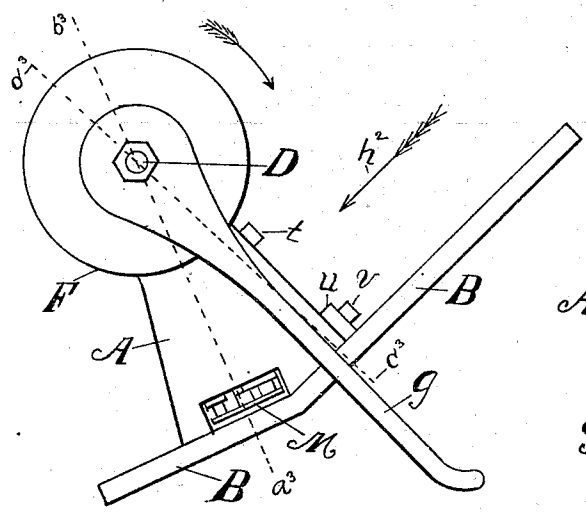


Fig 2

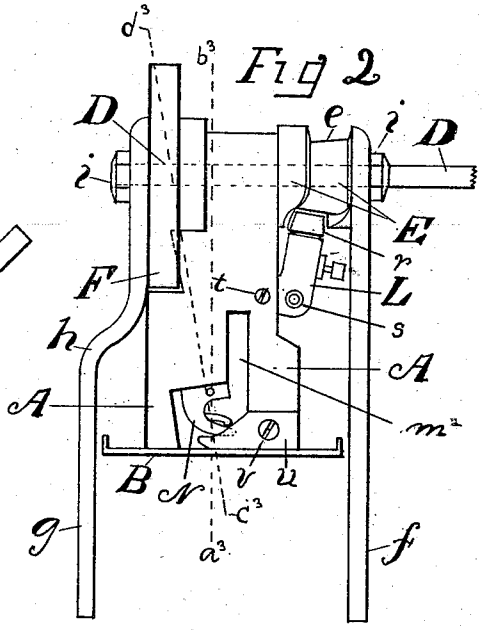


Fig. 4

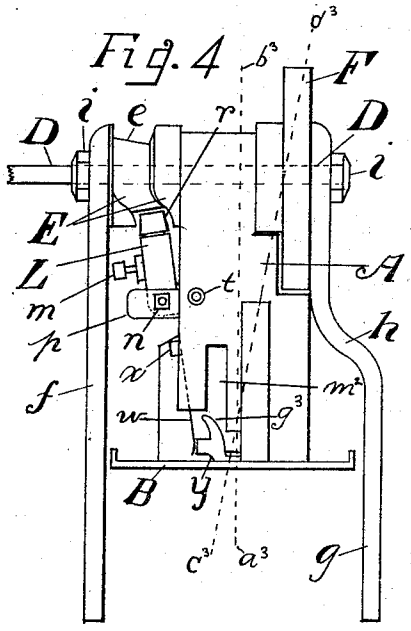
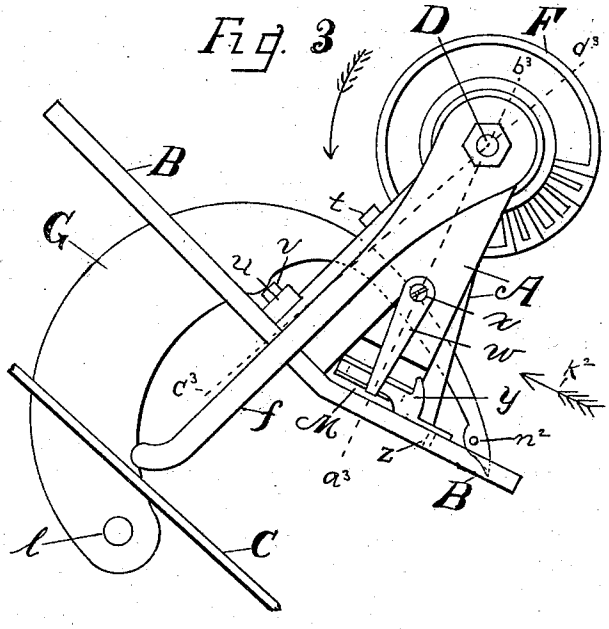


Fig. 3



Witnesses
Charles C. Rice
J. E. VanCamp.

Inventor
George W. Whittington
per Wm F. Sharpe
Atty

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Fig. 5

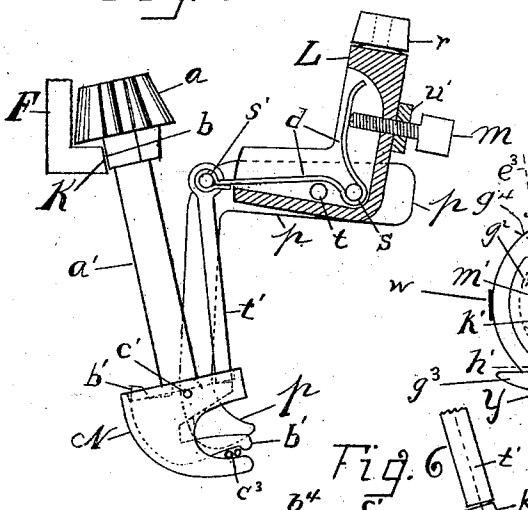


Fig. 8

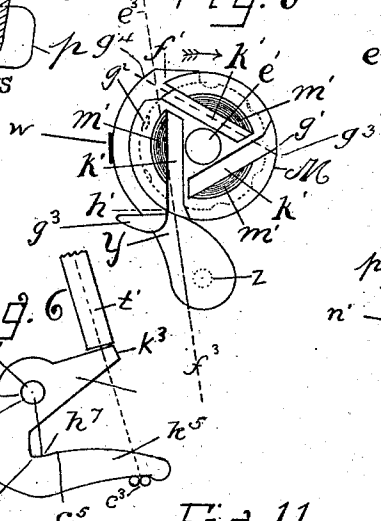


Fig. 7

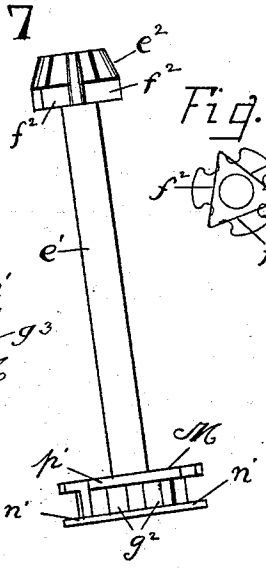


Fig. 9

Fig. 6

Fig. 10

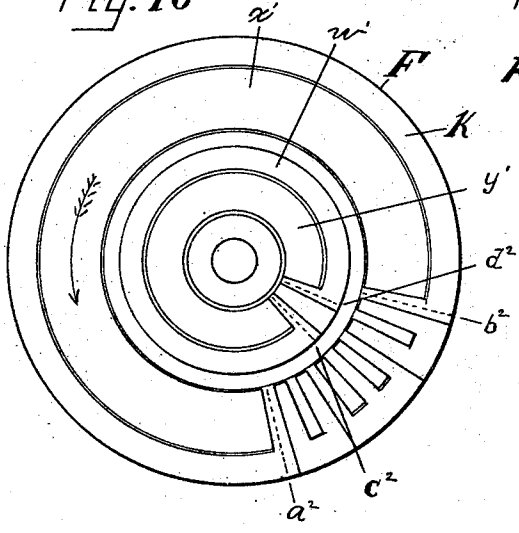


Fig. 11

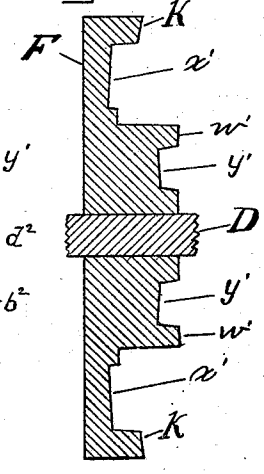
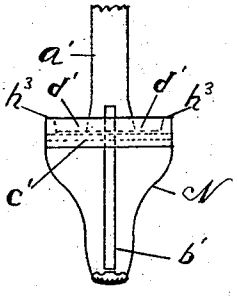


Fig. 12



Witnesses
Charles C. Rice
J. E. Van Camp.

Inventor
George W. Whittington
per Wm F. Shaipe
atty.

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Fig. 13

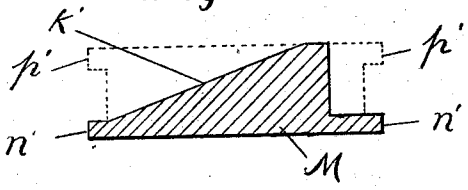


Fig 14

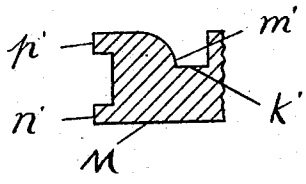


Fig. 15

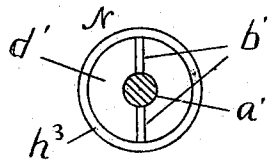


Fig. 16

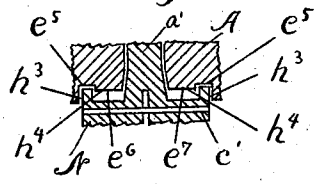


Fig. 17

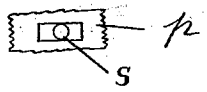
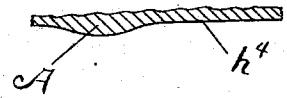


Fig. 18



Witnesses
Charles L. Rice
Ed Van Camp.

Inventor.
George W. Whittington
per. William F. Sharpe
atty.

UNITED STATES PATENT OFFICE.

GEORGE W. WHITTINGTON, OF NEWMARKET, INDIANA.

KNOTTER FOR BINDERS.

SPECIFICATION forming part of Letters Patent No. 503,634, dated August 22, 1893.

Application filed August 22, 1892. Serial No. 443,730. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WHITTINGTON, a citizen of the United States, residing at Newmarket, in the county of Montgomery and State of Indiana, have invented a new and useful Knotter for Twine-Binders, of which the following is a specification.

My invention relates to that class of self-binder harvesters known as twine-binders which have now nearly superseded wire binders and my new and improved knotter is adapted to be applied to any of the twine-binders now in general use.

My entire knotter, including the supporting block thereof, is made of metal, and is illustrated by Figures 1 to 18 inclusive, of which, Figs. 1. to 4. inclusive are views of the complete knotter.

Fig. 1. is a front elevation and, Fig. 2. is the view obtained by looking at the knotter in the direction indicated by the arrow h^2 in Fig. 1. Fig. 3. is a rear elevation thereof. Fig. 4. is the view obtained by looking at the knotter in the direction shown by the arrow k^2 in Fig. 3. Figs. 5. to 18. inclusive are detail drawings of the principal parts of my knotter and are drawn on a scale twice as large as the scale of Figs. 1. to 4. inclusive, excepting that Figs. 6—13 and 14. are drawn to a scale four times that of Figs. 1 to 4 inclusive. Fig. 5. shows the knotter hook, knife, knife arm, plunger and certain other parts hereinafter mentioned. Fig. 6. shows the actual size of the parts which it represents. Fig. 7. is a side view of the revolving twine holder and shaft, with cog wheel by which it is operated. Fig. 8. is a top view of the revolving twine holder and tension device. Fig. 9. is a view of the under side of cog wheel e^2. Figs. 10 and 11. are face view and cross section respectively of the wheel F. Fig. 12. is a front or face view of the knotter hook with bill hook inserted therein. Fig. 13 is a cross section of the twine holder M taken on the line g^3—g^4 of Fig. 8. Fig. 14 is a cross section of a portion of the twine holder taken parallel to its axis midway of the length of the groove k' and at right angles thereto. Fig. 15 is a plan of the upper end of the knotter hook N. Fig. 16 is a cross section of the upper end of the knotter hook N. and of the lower adjacent part of the supporting block A. Fig. 17 shows the enlarged opening in the knife arm p through which the pin s passes. Fig. 18 shows by its lower edge the profile in a circular line on the lower edge of block A concentric with axis of the shaft a', two points of the circle being e^6 and e^7 Fig. 16.

The cast block A and the base plate B, secured thereto by bolts, constitute the supporting frame work of the machine.

The block A and base plate B are pierced with all necessary slits and openings to enable the various parts of the machine to properly perform their respective functions.

D. is the driving shaft which operates the knotter and revolves in the direction indicated by the curved arrows shown in Figs. 1, 3, and 10; although I take the precaution to so construct the several parts of my knotter that the said driving shaft may be revolved in the opposite direction without injury to the machine.

In common with a number of other knotters the shaft D is adapted to start automatically and make one complete revolution from time to time as the bundles accumulate of proper size to be bound by the knotter.

The shaft D revolves freely in a circular aperture passing horizontally through the upper part of block A, and in revolving causes the cam-wheel E, wheel F, and delivering arms f and g to revolve with it, the whole being confined between the taps "i," and rigidly fixed to the driving shaft D. As may be seen from Figs. 10 and 11 there is a large and a small annular groove, x' and y' respectively cut into the face of the wheel F. There is a section of cogs in the larger annular groove comprised between the radii a^2 and b^2 standing up from the bottom of the said groove and adapted to gear with a small cog wheel "a" (see Fig. 5) causing it to make one revolution while engaged with the above described section of cogs. In like manner there are two cogs c^2 and d^2 standing up from the bottom of the smaller annular groove y' and adapted to engage with a small cog wheel e^2 (see Fig. 7.) and impart to it one third of a revolution at each engagement with said cogs c^2 and d^2. I make such reciprocal adaptations of the small cog wheels "a" and "e^2" and the larger wheel F, to each other, by means of gliding surfaces "b" and f^2 on the smaller cog wheels

and the annular beveled rims k and w' of the wheel F, that after the cog wheel e^2 has made one third of a revolution and the cog wheel "a" has made a complete revolution by its engagement with the section of cogs between the radii a^2 and b^2, that the small cog wheels a and e^2 are then held stationary while the wheel F completes its own revolution. Moreover, the two sections of cogs on the face of the wheel F are so adjusted that the one third of a revolution made by the cog wheel e^2 is made wholly within the time of beginning and ending of the complete revolution made by the cog wheel "a."

The cam-wheel E has a cam groove "e" in its periphery adapted to impart to the "knife arm" L one complete vibration about the pivotal axis "t" at each revolution of the cam-wheel E.

f and g are delivering arms which pitch the tied bundles out from under the knotter upon the ground, immediately after being tied. The arm g has a curved part "h" to enable the arm to clear the base plate B.

The foregoing completes the description of the driving shaft D and the parts attached thereto.

e' (see Fig. 7) is a shaft adapted to revolve in a reciprocal aperture in the supporting casting A. to which shaft is rigidly fixed the cog wheel e^2 at its upper end and the circular twine holder M at its lower end. The under side of the cog wheel e^3 is cast in the shape of an equilateral triangle whose faces, f^2 are adapted to glide against the face of the annular rim w' of the large wheel F.

M is a circular revolving twine holder revolving with the shaft e'. The twine holder has a grooved periphery comprised between the flanges p' and n'. The bottom of this groove is indented in a number of places as at g^2. In the upper side of the cord holder M are three grooves k' so arranged that their outer sides prolonged form an equilateral triangle whose vertices are at the points f' g' h' in the circumference of the flange or rim p'. The bottom of each of these grooves is an inclined plane which begins at the upper surface of the flange or rim n' (see Fig. 7) and from thence inclines upward and intersects the upper surface of the twine holder M near to the side of one of the other grooves (see Figs. 8 and 13.) These grooves cut entirely through the upper flange or rim p' and open with an enlarged opening at the circumference of the rim p'. The outer edges of the grooves k', at m', are rounded off so as to prevent cutting the twine which is brought up over the twine holder by the eye n^2 of the needle G, and lodged in the particular groove which is then in position to receive the twine. The twine is brought across the groove in the direction indicated by the dotted line $e^3 f^3$ in Fig. 8 and in the direction e^3 to f^3. Immediately after each sheaf is tied a new one of these grooves is brought into position by the shaft e' being turned one third of a revolution as herein before mentioned, and in the direction indicated by the curved arrow in Fig. 8. The twine when brought into the position e^3 f^3 is brought down against the upper surface of the rim n' of the twine holder M. The tension Y is so constructed that its enlarged end comes just below the level of the twine on the line $e^3 f^3$.

g^3 is a curved horn-like projection of the tension Y to assist in guiding the twine on the line of $e^3 f^3$ into position. At z is a lug or projection of the tension Y which fits into a reciprocal circular aperture in the base plate B and which serves as a pivot. The tension Y has its concave face made to the same radius as the bottom of the groove in the periphery of the twine holder M and is adapted to completely fill said reciprocal groove, there being just play enough to permit the twine holder to revolve freely.

w is a steel spring secured to the supporting casting A and pressing against the convex side of the tension Y.

x is a common screw with head adapted to be tightened with a wrench and secure the spring w firmly in place.

When the twine holder M revolves in the direction indicated by the curved arrow, the twine laid upon the line e^3 f^3 is pressed by the rear vertical face of the groove k against the concave face of the tension Y and carried around in the grooved periphery of the twine holder M, the twine being carried around all the more firmly on account of the indentures g^2.

As has been stated heretofore, the knotter hook, knife, knife arm, and plunger are represented in Figs. 5, 6 and 12, as well as certain other parts which are described below.

a', is a shaft adapted to revolve in a reciprocal aperture in the cast block A.

a, is a small cog wheel fixed to the shaft a', adapted to gear with the outer section of cogs on the face of the wheel F, which causes it to make one complete revolution. It is then held stationary during the remainder of the time occupied by the wheel F in completing its revolution, by means of the cog wheel "a" having, on its under side, a gliding surface b, adapted to glide against the reciprocating raised surface of the annular rim k.

N is the knotter hook, which is circular in plan, and rigidly fixed to the shaft a' with the plane of its circular cross section at right angles to the axis of shaft a' passing through the center of the circular plan of the knotter hook N. There is an annular groove d' in the upper face of the knotter hook N, concentric with the axis of the shaft a' and encircled by the annular rim h^3 (see Figs. 12, 15 and 16).

b' is the bill-hook fitting into a reciprocal pocket in the knotter hook N and base of shaft a', and adapted to oscillate through a small angle about a pivotal pin c' which pivotal pin is immediately below the bottom of the annular groove d'. The axes of the shaft

a' and the pivotal pin c' intersect each other at right angles. The bill hook b' is so made as to be V shaped having two arms, a lower one k^5 and an upper one k^3 k^4, the pin c' passing through the central portion of the upper arm k^3. The arc c^4 c^5 and the arc b^4 b^6 are struck from a common center h^5, the center of the pin c' with radii h^5 h^7 and h^5 h^6 respectively, the former arc having the shorter radius. When the twine is laid on the arc c^4 c^5 its light pressure being in the direction of the radius of h^5 h^7 does not tend to swing the bill hook out of its proper position but on the other hand holds it in place without special friction at its point of contact with its cam. Moreover any slight saving of friction at this point is a great saving of horse power.

By the above special construction of my bill hook it is enabled to oscillate much more easily against the under side of the twine as the pivot of oscillation c' is so located that the twine is not raised by the oscillation.

The annular rim h^3 is adapted to fit into a reciprocal annular groove e^5 of slight depth in the under side of the cast block A and to revolve freely therein. It will therefore be seen that in my knotter the bill hook b' is almost wholly concealed and protected by the knotter hook N from straws which frequently clog up and prevent the bill hook from performing its functions properly in knotters where the heel of the bill hook projects beyond the back part of the knotter hook N and is provided with a small roller operated by a cam.

The precise form and side view of the bill hook b' are shown of the actual size in Fig. 6.

I impart to the bill hook b' an oscillatory or vibratory motion about the pivotal pin c' by a reciprocal cam annular like gliding surface h^4 concentric with the axis of the shaft a' and on the under side of the cast block A, assisted by a plunger t', adapted to press against the upper side of the arm k^3 of the bill hook b'. These operating devices of the bill hook b' are so adjusted as to co-operate with each other and with the revolving shaft a' so as to open and receive, and close down upon the twine at c^3 and also to release the said twine immediately after each knot is tied.

L is the knife arm adapted to oscillate about a pivotal pin t and operated by a cam-wheel E and having at its upper end a roller "r" so as to reduce to a minimum the friction against the sides of the cam-groove e.

p is the knife pivoted at t and firmly bound to the side of the knife arm L by pin s and tap n having an enlarged opening through which the pin s passes, thus permitting a slight adjustment. (See Fig. 17.)

The inner side of the knife arm L is hollowed out to receive a bent steel spring d passing around and firmly grasping the pin "s," having an adjustable set screw "m" pressing against its rear side; passing through a common female screw u' and through rear wall of the knife arm L said spring passing above the pivotal pin t and having a bifurcated end with the branches coiling around the pivotal pin s' on each side of the flattened upper end of plunger t' and carrying and operating said plunger and regulating its pressure on the bill hook b'. Moreover this plunger being regulated by a spring, permits the bill hook to instantly and automatically adjust itself to any thick portions or knots in the twine at c^3 without undue strain upon the various parts of the machine. The axis of the plunger t' is so adjusted as to pass through the position occupied by twine at c^3 thus securing adequate pressure with as little waste of power as possible.

u is a thread guide (see Fig. 2.) secured by a screw "v."

G is the needle with its axis of oscillation at "l" under the binder platform C and carrying the twine in its eye n^2; the needle passes through the reciprocal opening at "m^2."

In Figs. 1 to 4 inclusive the dotted lines a^3, b^3 and c^3, d^3 show the projected positions respectively of the axes of the shafts a' and e'.

Having now described my invention, I claim—

1. In the knotter of a twine binder the V shaped bill hook b' thereof, adapted to fit into and be protected on sides and rear by the walls of a reciprocal central pocket in the knotter hook N;—pivoted by a pivotal pin c' in the central part of the upper arm k^3;—having a lower arm k^5 adapted to grasp the twine and having a small portion of the upper surface thereof adjacent to the inner angle of the two arms struck to a radius h^5 h^7 concentric with axis of pivotal pin c'; said arc adapted to receive the twine placed thereon by the needle G;—having the rear portion of the said upper arm struck to an arc b^4 b^6 with radius h^5 h^6 concentric with axis of pivotal pin c';—the upper surface of the upper arm k^3 being adapted to receive alternate downward impulses by the plunger t' and a cam surface h^4 on the under side of the supporting casting A all substantially as set forth.

2. In the knotter of a twine binder, the mechanical devices for imparting to the bill hook b' an oscillatory motion through a small angle about its pivotal axis c'; consisting of a plunger t' adapted to press downward upon the outer end of the upper arm k^3 of the bill hook b', operated by the knife arm L through the medium of an adjustable and regulating spring d concealed and protected by a reciprocal opening in the knife arm L; a cam annular like gliding surface concentric with the axis of shaft a' about which axis the bill hook b' is adapted to revolve, said cam gliding surface being adapted to cooperate with plunger t' as the bill hook b' revolves about the axis of shaft a' so as to impart to it one complete oscillation for each revolution about the axis of said shaft a': the compound motion thus produced being so adjusted as to cause the lower arm of the bill hook b' to raise, pass over, and press down upon and firmly grasp

the twine at e^3 and also to release the said twine immediately after each knot has been tied.

3. In the knotter of a twine binder the devices for protecting the bill hook b' thereof while at the same time permitting and cooperating with said bill hook in properly performing its functions; said protecting devices consisting of a specially devised knotter hook N having an annular raised rim h^3 on the upper side thereof concentric with the axis of the shaft a' and revolving with said shaft a': said annular rim h^3 fitting into, and revolving in a reciprocal annular groove in the under side of the supporting block A and consisting further of a central reciprocal pocket in said knotter hook N, adapted to receive the bill hook b' and to protect the same at the sides and rear, all substantially as set forth.

4. In the knotter of a twine binder the revolving circular twine holder M thereof, having three grooves in the upper side arranged in the form of an equilateral triangle about its shaft e'; the bottoms of said grooves being inclined planes beginning at the upper face of the twine holder M and sloping to the lower edge of a peripheral groove in the circumference of the said twine holder M, and adapted to trail the twine around in the peripheral groove in the circumference of the said twine holder M and against the reciprocal concave face of the tension device Y pressed upon by spring w, all substantially as set forth.

5. In the knotter of a twine binder the knife arm L thereof consisting of two branches at right angles to each other, with exposed arm actuated by a cam wheel E on the driving shaft D, causing the other arm thereof, concealed in a reciprocal opening in the supporting cast block A, to oscillate about a pivotal pin t; said knife arm being adapted to actuate a knife p to cut the twine immediately after the tying of the knot by the other parts of the knotter, and said knife arm also actuating a plunger t', through the medium of a governing steel spring d, to press down upon the upper arm k^3 of the bill hook b' in cooperation with other mechanical devices to cause said bill hook b' to oscillate about its pivotal pin c' in performing its functions, all substantially as set forth.

6. In a twine binder the knotter thereof consisting of the combination;—the cast block A, supporting the various working parts of the machine;—the base plate B bolted to the under side of the cast block A;—the driving shaft D revolving in a horizontal aperture in the upper part of the block A;—the principal wheel F rigidly fixed to, and revolving with shaft D, having its face next to supporting block A reciprocally arranged, by an outer and inner section of cogs and gliding surfaces, to operate both a knotter-hook N, and a revolving twine holder M through the medium of shafts a' and e' and cog wheels a and e^2 reciprocally adapted to be actuated by the said principal wheel F;—the knife arm L thereof consisting of two branches at right angles to each other with exposed arm L thereof actuated by a cam-wheel E on the driving shaft D, causing the other arm thereof, concealed in a reciprocal opening in the supporting cast block A, to oscillate about a pivotal pin t, said knife arm actuating a knife p and plunger t' in the manner and for purposes set forth;—a revolving circular twine holder M, having three grooves k' in the upper face thereof arranged in the manner and for purposes as set forth; the bill hook b' thereof adapted to fit into and be protected on its sides and rear by a reciprocal pocket in the knotter hook N while performing its functions;—and the knotter hook N thereof having a reciprocal central protecting pocket adapted to protect the bill hook b' therein placed, while being also adapted to permit it the necessary freedom in performing its functions properly, all substantially as set forth.

GEORGE W. WHITTINGTON.

Witnesses:
CHARLES C. RICE,
J. E. VAN CAMP.