

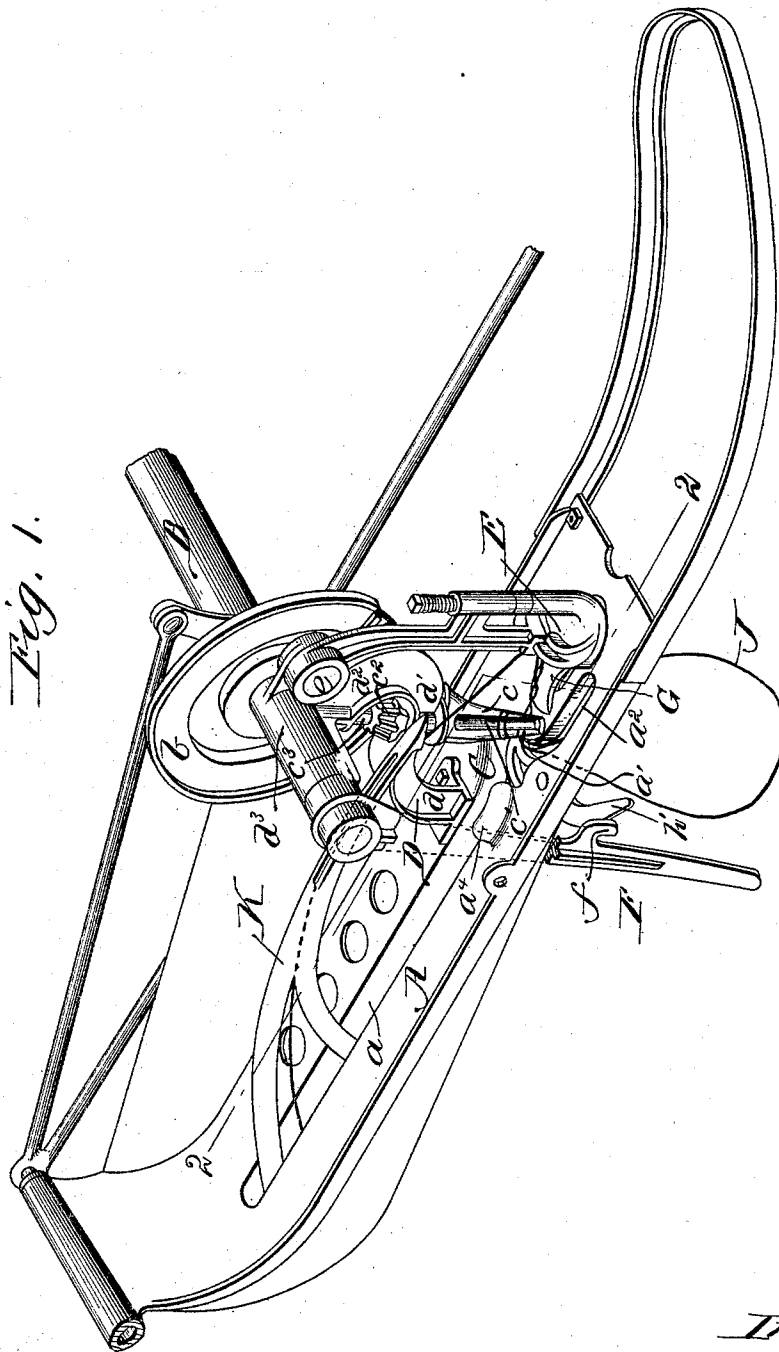
(No Model.)

2 Sheets—Sheet 1.

B. F. STEWART.
GRAIN BINDER.

No. 518,747.

Patented Apr. 24, 1894.



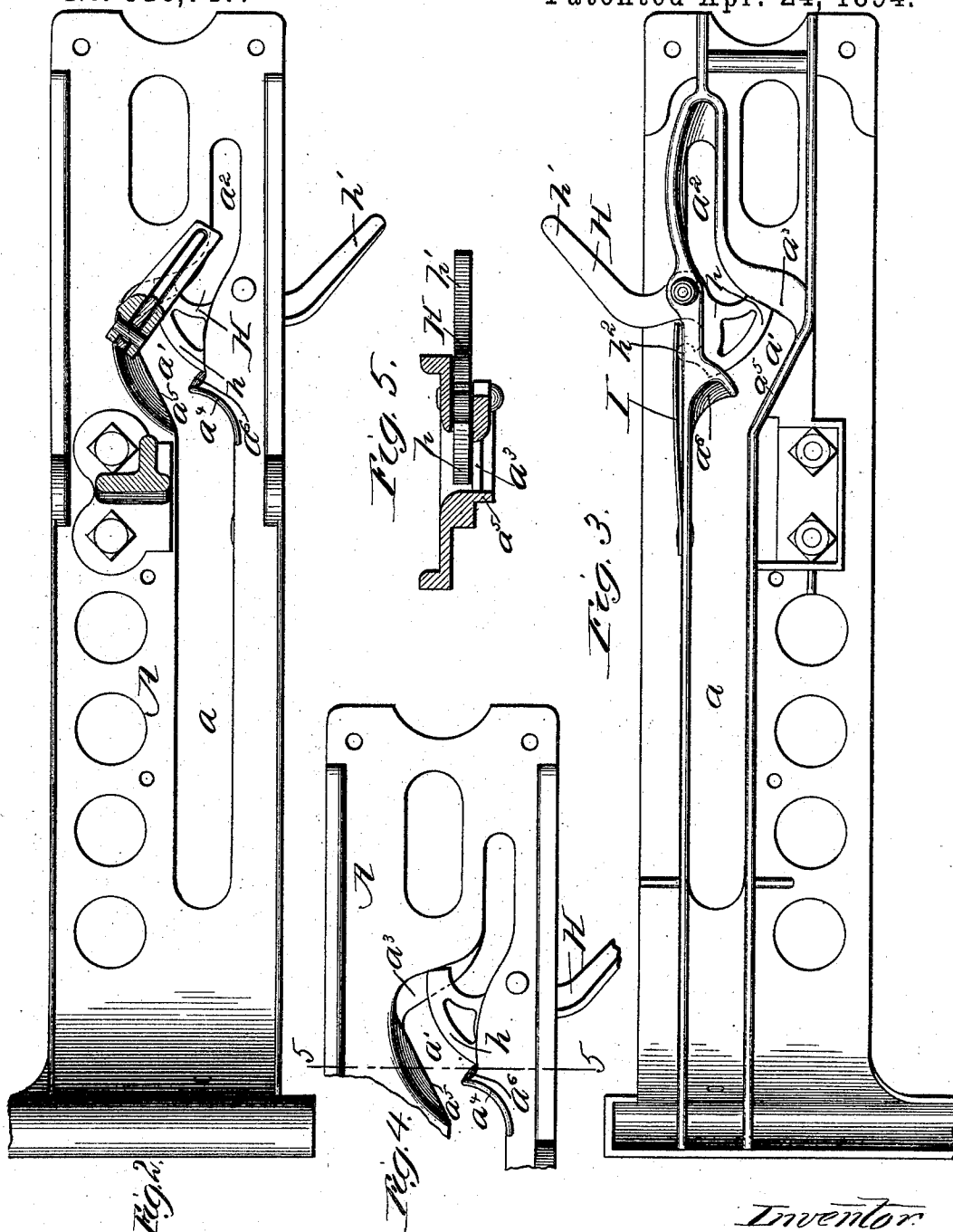
Witnesses
W. C. Corlies
Frederick H. Allen.

Inventor:
Benjamin F. Stewart.
By *Coburn Thacher*
Atty

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UNITED STATES PATENT OFFICE.

BENJAMIN F. STEWART, OF CANTON, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 518,747, dated April 24, 1894.

Application filed December 26, 1891. Serial No. 416,199. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. STEWART, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented a certain new and useful Improvement in Grain-Binders, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of the breast plate, knotting devices and bundle discharger of a grain binder embodying my invention; Fig. 2, a plan section, taken on the line 2, 2, of Fig. 1; Fig. 3, a bottom plan view of the breast plate; Fig. 4, a detail plan view of the breast plate just below the knoter; and Fig. 5, a cross-section of the same, taken on the line 5, 5, of Fig. 4.

My invention relates to certain features of construction in the breast plate and knotting devices, including a movable gate, whereby the twine for binding is guided into the required position for knotting and is there retained by means of the gate alone, until the bundle is bound and the device for discharging the bundle also opens the gate to permit the passage of the twine as required for stripping the knoter.

I will now particularly describe the construction and operation of devices, whereby I have carried out my invention in a practical way and will then point out more definitely in claims the special improvements which I believe to be new and wish to secure by Letters Patent.

In the drawings, A represents the breast plate of a grain binder, which is intended to be suspended above the deck or table on which the grain is received. Above this breast plate is the usual binding-shaft, B, on which is fixed the usual cam and gear-wheel, C, that drives and operates the knotting hook, in the usual way. This knoter is of the ordinary bill-hook type, being provided with a stationary jaw, c, and a pivoted jaw, c', which opens and closes upon the former in tying a knot in a manner that is very well-known and requires no particular description here. The knoter is provided with a pinion, c², by means of which it will be understood the knoter is revolved, as required, by gearing on the wheel b. The knotting-hook is

mounted in a standard, D, which is of peculiar shape, being formed something like the letter S, as seen in Fig. 1. It is fastened by one arm of the S to the breast plate, as seen in said Fig. 1, and is then bent forward or outward over the breast plate some distance and then upward and backward, so that it may be said to be composed of three sections, the lower bend, d, which is fastened to the breast plate, the central portion, d', and the upper return bend, d². The shaft, c³, of the knoter has its upper bearing in the upper arm or bend d² of the standard and its lower bearing in the central section d' thereof, the one being above and the other below the pinion, as seen in Fig. 1. It will be seen then that the attachment of the standard to the breast plate is considerably in rear of the knoter and that by bending the standard forward over the breast plate and mounting the knoter as described there is provided ample free space for the revolution of the latter immediately below the middle bend of the standard. The upper end of the standard also carries a bearing, d³, for the binding-shaft, which bearing may be and is, preferably, cast in one piece therewith. The cord-holder, E, is also fastened to this same standard. It is of the swinging-type and is pivoted by a pin, e, to the upper section of the standard, so as to depend therefrom in front of the knotting hook, as seen in Fig. 1.

The particular construction of the cord holding device is no part of my present invention and, therefore, a special description thereof is not required; it may be of any well-known type.

On the end of the binding-shaft there is mounted a bundle discharging arm, F, which is fastened to the shaft, so as to rotate therewith and is of such length as to reach down below the breast plate in its revolution and so discharge the bound bundle when the cord is severed in the usual well-known way. While the binding-devices are at rest and the bundle is being formed this discharge arm stands out above the breast plate projecting in front of the shaft to which it is attached; its position at the point of discharging the bundle is seen in Fig. 1, in which the cord is shown depending about in the position a bundle would take upon being bound and just as

the tying of the knot has been completed and the knife, G, is about to sever the cord.

The breast plate A is provided, as usual, with a long slot to accommodate the required movement of the binding-arm. This slot is of somewhat peculiar form; the upper or main portion, a , thereof is straight and this straight section extends down to a point a little in front of the shaft of the knotting-hook, when the slot is bent somewhat sharply to the right and then again to the left, thus forming a kind of circular or curved section, a' , after which the slot again extends straight downward a short distance forming a straight lower section, a^2 , which, however, is considerably narrower than the upper section, as seen in Fig. 2 of the drawings, this decrease in the width being occasioned by carrying inward the right hand edge. At the lower portion of the bend a' and on the right side of the slot, a lip or flange, a^3 , projects inward and upward slightly from the under side of the breast plate at this point. At the upper part of the bend, or rather about at the commencement of this bend in the slot, there is a short upright flange, a^4 , rising from the upper side of the plate and on the opposite or left hand side of the slot. This flange is curved inward following the bend in the slot, as seen in Figs. 2 and 4. The bend or curved section a' of the slot is about underneath the knotting hook, though the latter, at rest, lies about diagonally across the lower portion of the bend, as seen in Fig. 2. The main portion of the bend a' of the slot in the breast plate is somewhat wider than the principal section a , which is effected by carrying the bend at the left hand edge of the plate a less distance outward than in the opposite or right hand edge; and the latter edge is preferably beveled around most of the distance at its upper side, as indicated in Fig. 1, and on the under side of the plate there is a corresponding depending flange, a^5 , and on the opposite side of the slot a similar depending flange, a^6 .

In order to hold the binding twine in position to be taken by the knotting hook when the latter is rotated to make the knot and also to permit the passing of the twine into the lower part of the slot for stripping the knotting hook at the discharge of the bundle, I provide a swinging arm or gate, H, which is pivoted to the under side of the breast plate at the left hand of the slot opposite the bend in the latter, as seen in Fig. 2. This gate extends inward across the slot in the breast plate at the lower portion of the bend, but its inner end is constructed with a wing or projection, h , the outer rim of which is curved or circular and projects upward and inward into the bend of the slot when the gate is closed, as seen in Figs. 2, 3 and 4. The extreme inner end of the gate is adapted to fit over the lip or flange a^3 upon which it rests when closed, as shown in Figs. 2 and 4. The outer end of the gate is extended out some distance beyond the side of the breast

plate, so as to bring it into the path of the bundle discharger as the latter is rotated. This projecting arm, h' , of the gate is preferably bent forward slightly to permit the clearance of the discharge arm therefrom during its forward movement. It will be understood that it is necessary to open this gate to let the twine pass below the same in the slot of the breast plate, in order that the loop may be stripped from the knotting hook as the bundle is discharged in the usual way. Obviously to permit this movement it is necessary to open the gate or swing it to one side, so as to leave a free passage through the slot. This is accomplished by the discharge arm F which is arranged to discharge the bundle after it is bound in the usual way. The outer end of the gate being projected across the path of this discharge arm the latter will, of course, strike it as it is revolved and so will swing the gate and open the passage in the breast plate. It will be desirable, however, to open the gate a little in advance of the action of the discharge arm when made straight in the usual form; otherwise the strain upon the binding twine would be increased by the push of the arm upon the bundle and might sometimes be sufficient to break the twine. To obviate this a finger or projection, f , is provided for the discharge arm on the forward edge thereof and arranged so that it will be in line with the projecting arm of the gate at the point of contact and so will strike this arm, as seen in Fig. 1, somewhat in advance of the time when the front edge of the arm itself would make such contact without this projection. Obviously this will open the gate a little sooner than would otherwise be the case and this will relieve the strain upon the twine, thereby obviating all danger of breaking.

At the rear of the circular projection of the pivoted gate there is a short projection or toe, h^2 , as seen in Fig. 3, and the free end of a spring, I, is arranged to rest upon this toe, the other end of the spring being fastened to the breast plate at a little distance away. Obviously the spring will act to throw the gate inward and keep it closed across the slot in the breast plate and the opening of the gate, by the discharge arm as already explained, will be in opposition to this spring, so that as soon as the discharge arm clears the outer end of the gate, the spring will at once close the latter bringing it into the position shown in Fig. 2.

The binding arm K in its usual reciprocal movement required in binding a bundle passes up through the slot in the breast plate and back therefrom after the bundle is bound in the ordinary manner and the twine or binding cord, J, is held in the cord holder, threaded in the binding arm and carried by the movement of the latter in the usual well known manner. The curved projection of the gate, extending out into the slot of the breast plate, is an important feature in the operation of the

device, for the twine will be carried by this curve over near the heel of the knotting hook toward the lower portion of the bend in the slot; this will be seen from the relation of the parts shown in Fig. 2 of the drawings. The strands of the binding cord are thus brought into the required position where they will be surely and properly taken by the knotting hook in its revolution and this is an important point in the successful operation of the devices. The under lip or flange a^3 , over which the end of the gate closes, is another important feature in this device, for it effectually prevents the forcing of the twine past the end of the gate when closed, of which there would be some danger in the operation of the knotter, if there was no protection of this kind, and it also serves, in connection with the gate, to hold the twine up close to the heel of the knotter. This will also be seen from an examination of Fig. 2 of the drawings, in which it will be noticed that this flange extends out beyond the end of the gate and, of course, will operate to hold the twine up close to the heel of the knotter, which is just above, as shown in this figure.

In operation, upon the return or opening movement of the binding arm K, the cord J will be laid across the bill of the knotting hook, as usual, and will be drawn down over the curved rim of the gate toward the lower portion of the bend in the breast plate and thence will drop below the latter to receive the bundle as it is formed against it by packers in the usual way. When the binding arm closes around the formed bundle it brings the second strand of twine down to the bend in the breast plate where it is deflected to the right by the curved flange a^4 onto the curved rim of the gate, by which it is farther deflected toward the lower part of the bend underneath the heel of the knotter, so that when the binding arm is finally closed the two strands will lie side by side in proper position to be taken by the knotting hook which is then revolved and ties the knot, as usual. Upon the return or opening movement of the binding arm the discharge arm has about reached the bound bundle; the gate will then be opened, as already described, thus permitting the strands of cord to pass by it into the slot below, as seen in Fig. 1. The discharge of the bundle by the further movement of the arm F sheds the loop from the knotting hook as is required and at the same time the cord is severed between the knotting hook and the cord holder. With this device I am enabled to dispense entirely with the stationary finger which has usually been employed in this connection for the purpose of holding the cord in proper position. There is always some danger

of the cord accidentally slipping over the end of this finger, if no other device is used in connection therewith, when, of course, the formation of a knot will be prevented. In order to obviate this difficulty I have heretofore used a pivoted gate in connection with the finger, but not of such construction and arrangement as to be operative alone. In this present improvement it will be seen that the gate itself performs the function of the finger heretofore employed and at the same time provides a certain stop which will always prevent the escape of the cord from the position required for the proper operation of the knotter and this is accomplished by one single device.

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

1. In a grain binder, the breast plate A, having an unobstructed irregular shaped slot a , a' , a^2 , and provided with a projecting lip or flange a^3 at the lower end of the curved section, in combination with a revolving knotting hook C arranged above the bend in the slot and a swinging gate H pivoted to the breast plate and provided with a curved wing h adapted to extend into the bend a' in the slot to deflect the twine to the heel of the knotting hook and to fit over the said flange when closed, substantially as described.

2. In a grain binder, the breast plate A, provided with a slot a , a' , a^2 and having a curved upright flange a^4 at the beginning of the bend a' , in combination with the swinging gate H, provided with a curved inwardly projecting wing h on its forward end, and the revolving knotting-hook C, substantially as described.

3. In a grain binder, a slotted breast plate, having a bend a' in the slot, in combination with a revolving knotting-hook C, a swinging gate H, adapted to close the slot in the breast plate underneath the knotting-hook, and the bundle discharge arm adapted to open the gate during its revolution for the discharge of the bundle, substantially as described.

4. In a grain binder, the slotted breast plate A, having the bend a' in the slot, in combination with the revolving knotting head C, the gate H pivoted to the breast plate and provided with the arm h' projecting out at one side thereof, and the discharge arm F provided with a projection f on the front edge thereof and arranged to make contact with the projecting gate arm, substantially as described.

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