(Model.)

3 Sheets—Sheet 1.

M. G. HUBBARD.

GRAIN BINDER.

No. 257,333. Patented May 2, 1882.

Fig. 1.

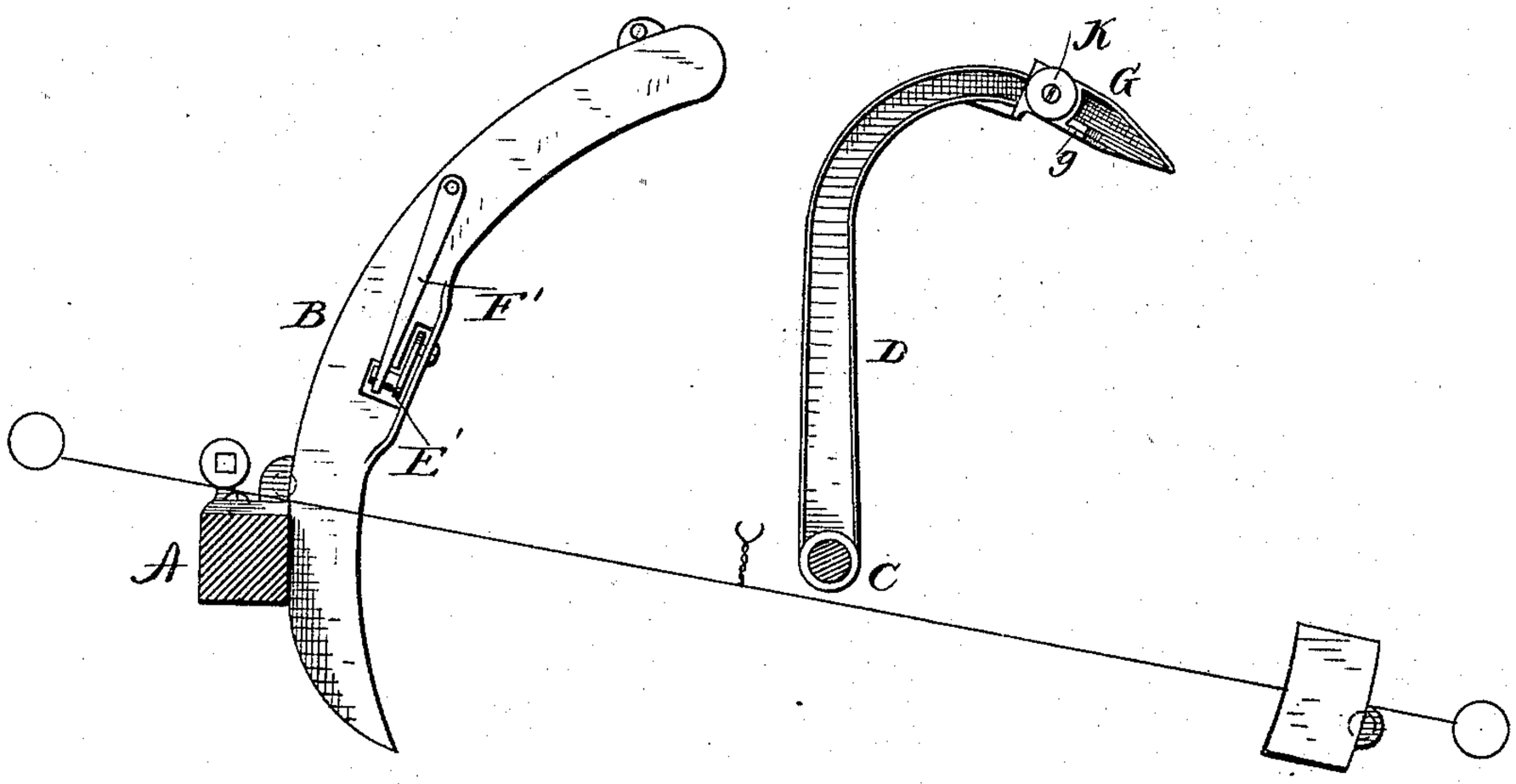
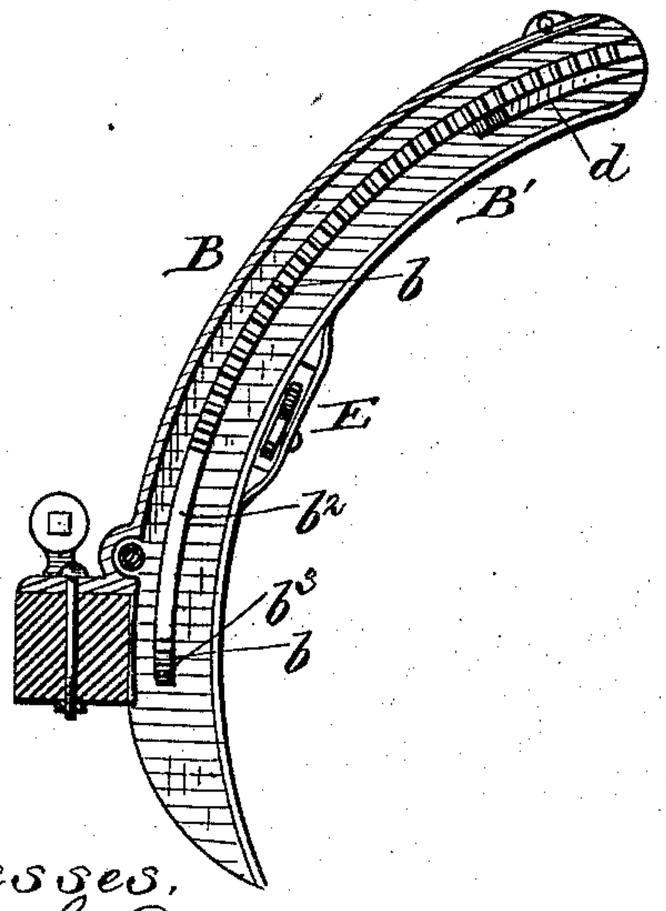


Fig. 2.



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(Model.)

3 Sheets—Sheet 2.

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GRAIN BINDER.

No. 257,333. Patented May 2, 1882.

Fig. 3.

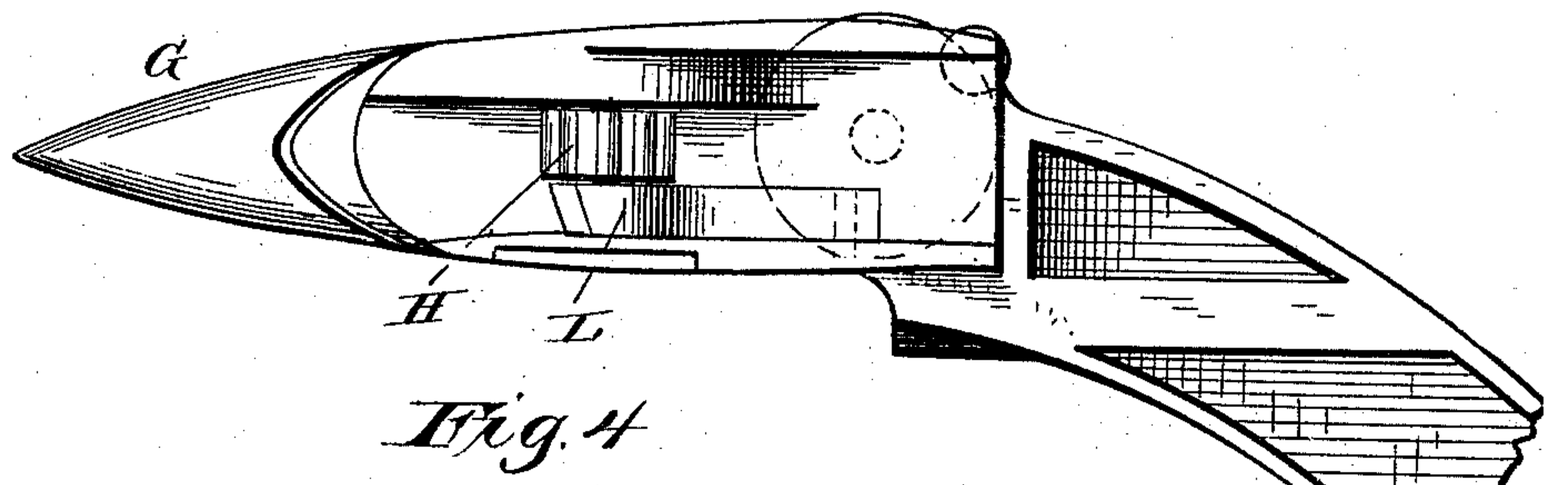


Fig. 4

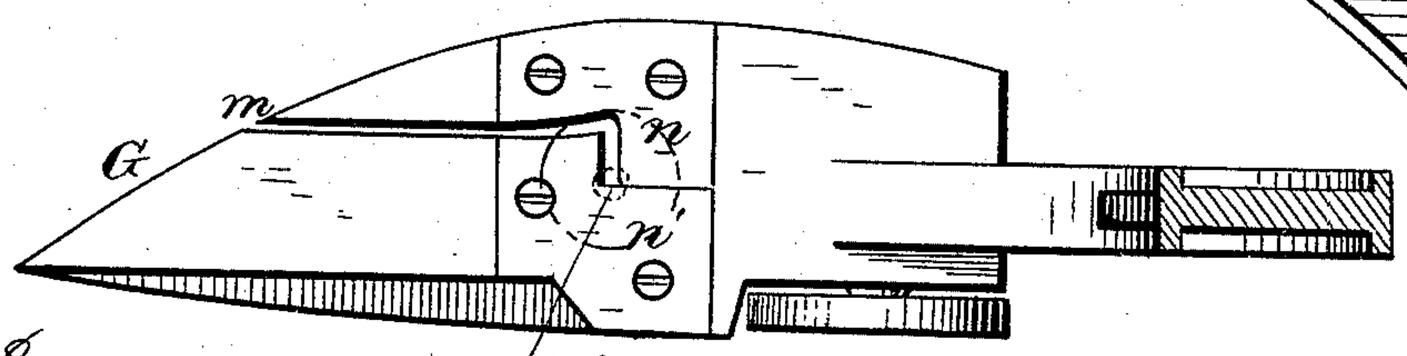
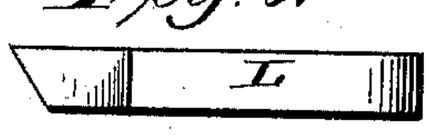


Fig. 8.



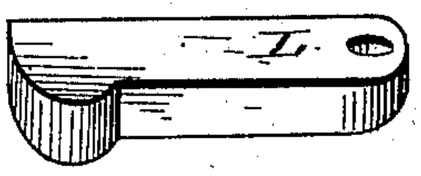
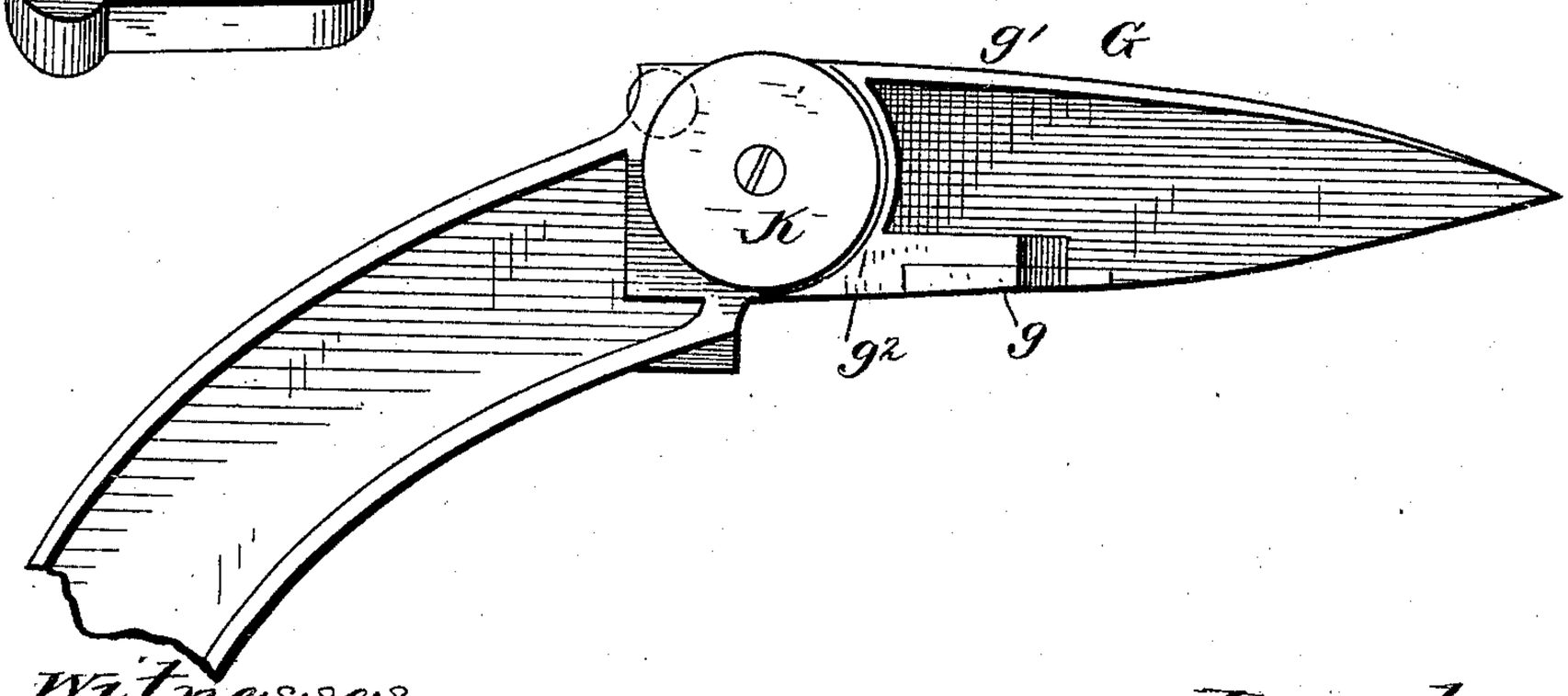


Fig. 5



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3 Sheets—Sheet 3.

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GRAIN BINDER.

No. 257,333. Patented May 2, 1882.

Fig. 6

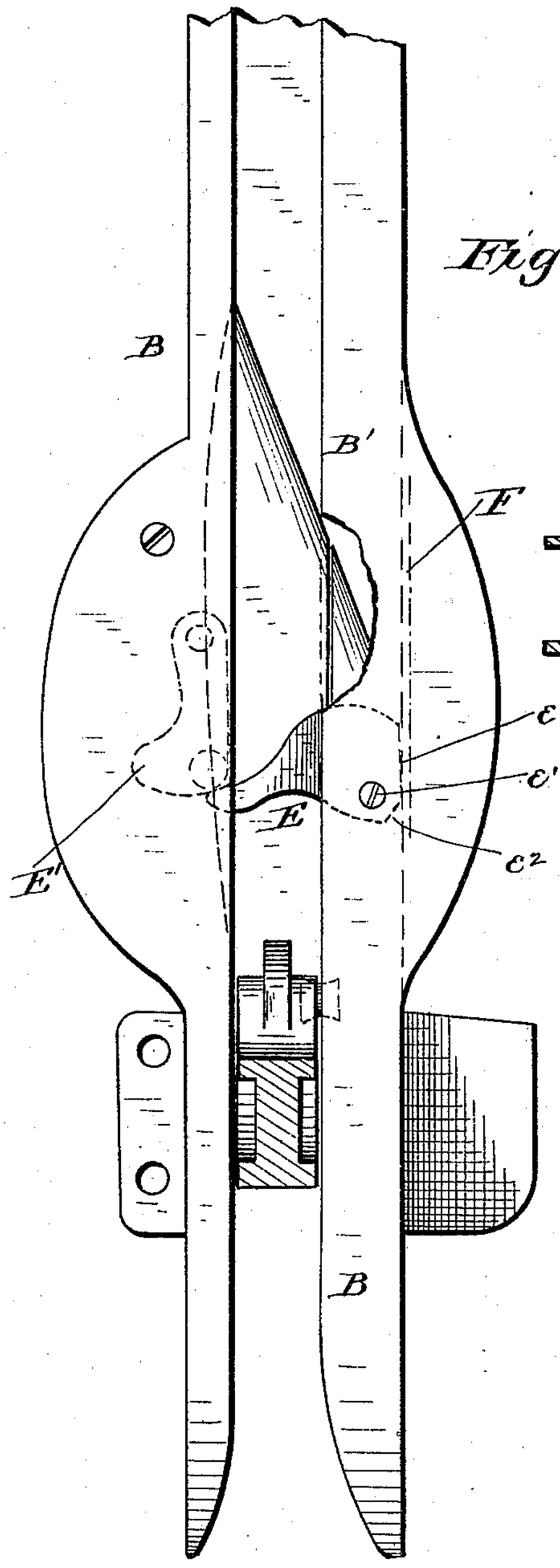


Fig. 7

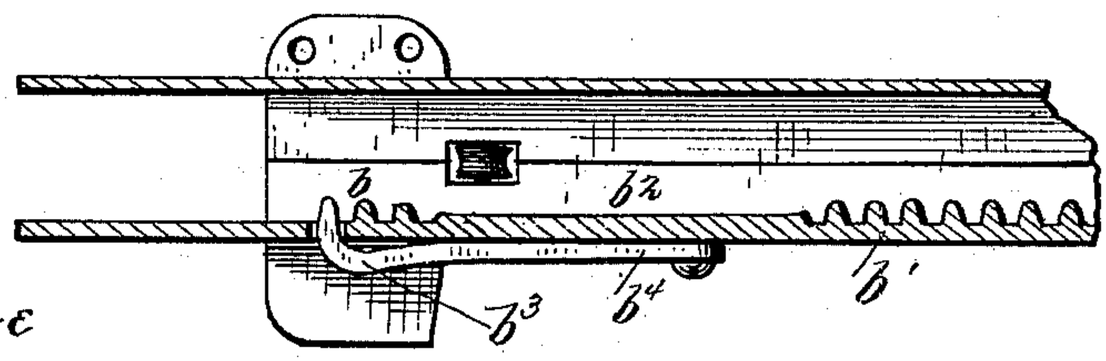


Fig. 9

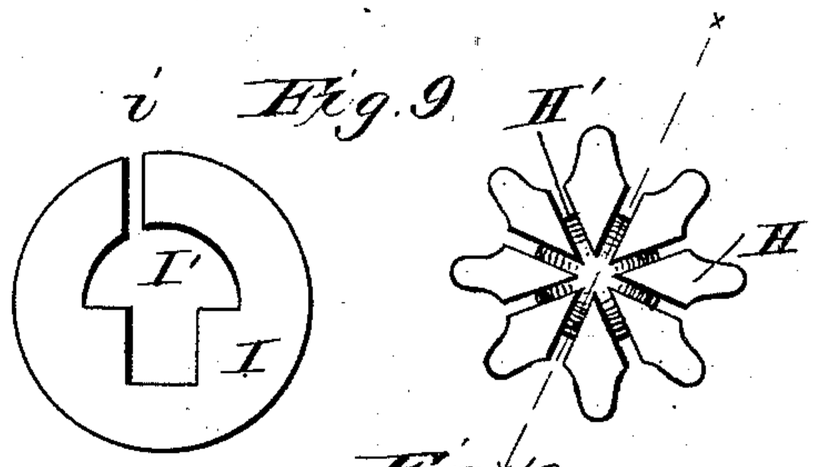
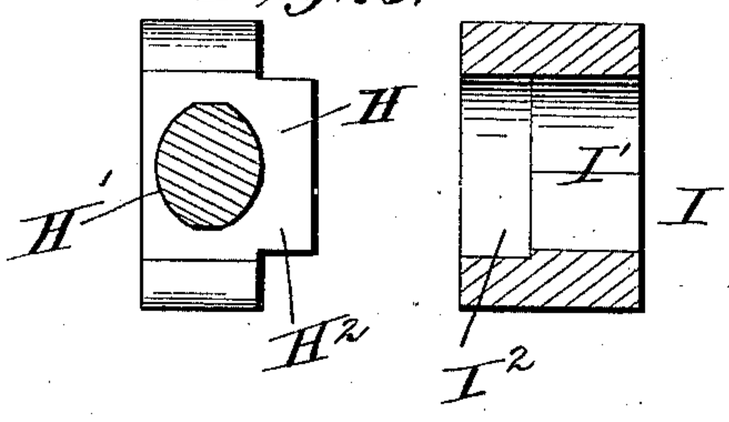


Fig. 10.



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UNITED STATES PATENT OFFICE.

MOSES G. HUBBARD, OF NORRISTOWN, PENNSYLVANIA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 257,333, dated May 2, 1882.

Application filed May 2, 1881. (Model.)

To all whom it may concern:

Be it known that I, MOSES G. HUBBARD, of Norristown, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Grain-Binders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents in side elevation the binder-arm and rack-standard in proper working relation. Fig. 2 shows the rack-standard in section to show the construction of the rack. Fig. 3 represents the binder-arm head enlarged, showing the side adjacent to the rack and carrying the twister-pinion. Fig. 4 is an inner face view of the same, and Fig. 5 is a side view taken from the opposite side to Fig. 3. Fig. 6 represents an inner face view of the rack-standard, showing also the binder-head passing through it. Fig. 7 is a section through the rack-standard at right angles to Fig. 2, showing the construction of the rack and the relation of the wire-guiding sheave thereto. Fig. 8 shows the knife or band-cutter in elevation and in perspective, and Figs. 9 and 10 are plan and sectional views of the twister-pinion and its cap and bearing-piece.

The present invention relates to an improvement in the binder-arm head and rack-standard described in joint application filed by myself, M. G. Hubbard, Jr., and George Heavner, whereby the construction of said parts is greatly simplified and their operation improved; and it consists, first, in forming the slot in the binder-head on one side of the center of the twister-pinion, or in a tangential relation to the journal of said pinion, whereby it is brought nearer to the rack actuating the pinion and more space is given to the point of the head for taking the wire, and in providing the rack-segment with a flange on the rack side overhanging the slot in the binder-head for facilitating the movement of the wire into the retaining-notch in said head, as hereinafter explained.

It further consists in a novel manner of forming the retaining-notch in the binder-head and in the arrangement of the same relatively to the pinion, whereby the wire is effectually retained without the aid of a movable jaw or equivalent retaining device.

It further consists in providing the binder-head with a guiding friction-wheel and with flanges or a shield protecting said wheel for preventing straw or other material from winding on the hub or journal thereof, and also for keeping the side of the wheel from coming in contact with the side of the standard or segment.

It further consists in a novel arrangement in the rack-standard of the latch for holding the wire in position for the head to take it the second time—that is, after it has seized the wire and passed it around the bundle, as hereinafter explained.

The improvements referred to are represented in the position they would occupy applied to the gleaner and binder described in a former application, and will be described as if applied to such machine; but it will be apparent that their application need not be confined to such machine, as they may be used on other constructions of machine for binding grain.

In the drawings, A represents the sill or frame-bar of the machine; B, the rack standard or segment secured thereto; C, the shaft carrying the binder-arm, and D said arm, said parts being arranged substantially as in the former application referred to, and differing therefrom only in the details hereinafter described. In the application referred to the rack for operating the twister-pinion was made continuous from end to end, whereas in the present construction it is composed of two parts or sections, $b\,b'$, with an intervening bridge or plane surface, b^2, (see Figs. 2 and 7,) the first or short section, b, having a number of teeth sufficient to give the twister, after it has taken the first wire, a half-revolution to bring it into position to take the second wire into the slot on the opposite side of the pinion. The bridge or plane surface b^2 then comes into action, and rising just high enough to catch the tooth on the pinion succeeding that last acted upon by the short rack b causes it and said last-named tooth to slide over the bridge, stopping the rotation of the pinion until the second wire has been caught by the pinion on its opposite side, as stated, when, the pinion having reached the second long section, b', of the rack, it is rotated thereby for twisting the wire forming the ends of the band and for reuniting the ends of the wires from the two spools.

Difficulty has been experienced in making

the pinion engage properly with the rack, from the fact that the teeth of the latter frequently approach the rack endwise, striking the first tooth of the latter heavily, often breaking the same and destroying the rack or the pinion. This difficulty is obviated by making the first tooth, b^3, so that it can yield slightly to the blow by forming it upon the end of a flat spring, b^4, secured to the rack-standard. The spring is shown secured to the outer face of the standard with the tooth b^3 passing through a slot or perforation; but it may be otherwise arranged so long as the tooth is adapted to yield and so insure the proper engagement of the pinion with the rack. The cam for actuating the knife in the binder-head for cutting the band after the ends are twisted is also located on the rack side of the standard near the end of the rack, (shown at *d*, Fig. 2,) and the wire is cut off on this side—an arrangement which in practice is found to materially reduce the amount of power required for cutting and the frictional resistance to the passage of the binder-head as compared with locating said cam or cutting off the wire on the side opposite the rack.

The latch E for holding the second wire in position to be grasped by the binder-head and forcing it into the twister-pinion and retaining-notch in said head is also pivoted in the rack side of the standard or segment B, as shown in Fig. 6. The pivoted end of this latch is expanded in width, and is provided with a flat surface at *e*, which rests in contact with a flat spring, F. (Shown in dotted lines, Fig. 6.) The pivot *e'* is near the lower face of the latch and the flattened heel end *e* rises mainly above said pivot, the arrangement being such as to offer considerable resistance to the upward movement of the latch from the position shown in Fig. 6, and to facilitate its downward movement for permitting the return of the wire after the passage of the binder-head. To further insure the holding of the wire, as above explained, a second latch or locking device, E', is pivoted on the side of the segment opposite the rack (see Fig. 1 in dotted lines, Fig. 6) and overhangs the swinging end or point of latch E, held in place by a spring, F', resting on a pin on said latch, as shown in Fig. 1. By this arrangement the latch E is locked in position until the second wire has properly entered the retaining-notch and twister-pinion in the binder-head, when a cam-ledge, *g*, on the binder-head comes in contact with the swinging end of latch E' and crowds it out, releasing the latch E and allowing it to rise to permit the passage of the wire with the binder-head. To facilitate the downward movement of latch E in permitting the return of the wire to its position below said latch the heel end of said latch is cut away or has an inwardly-inclined surface at e^2, extending from the flattened heel end *e* at a point at or near the horizontal plane of the pivot *e'* to the lower face of the latch, as shown in dotted lines Fig. 6.

The rack standard or segment B has a flange, B', formed on its inner face on the rack side, overhanging the rack, and also the slot in the binder-head, as shown in Fig. 6, where said flange is broken away in part to show the relation of the slot in the binder-head thereto.

The binder-head G, forming the end of the arm D, above referred to, is represented in Figs. 3, 4, and 5, and the twister-pinion and the plug or cap covering the same in Figs. 9 and 10. The head has a socket formed in it, opening on its outer face for the reception of the pinion H, which rests on the bottom wall of said socket, and the plug I is then inserted for retaining the pinion in place. The form of the pinion employed is shown in Fig. 9, where radial slots are formed between the teeth at their base, extending within the central longitudinal perforation, I', through the plug I, and the bottom walls of these slots are rounded, giving to the core or hub of the pinion from which the teeth project a spherical or elliptical form, as shown at H'. By this construction the pinion is adapted not only to take the wire between any two of its teeth, but said wire is carried in beyond the journal-surface of said pinion, and the rounded face of the retaining-slots not only enables the twisting to be done in closer proximity to the ends of the pinion, but effectually obviates the cutting or breaking of the wire upon the sharp angles at the ends of the pinion-slots as heretofore constructed. The hub or journal H^2 is formed upon one side of the pinion, as shown, and has its bearing in the plug or cap I at I^2; or, if preferred, an annular flange may be formed on the plug around the central perforation, and the end of the pinion may be recessed to surround said flange, and so have its bearing thereon, the first-named construction being, however, preferred. The side of the head opposite the rack in the rack-standard is recessed to receive a guiding and friction wheel, K, journaled therein, the flanges *g* and *g'* at the sides or edges and the connecting-web or curved flange g^2, which covers the forward face of the wheel and forms a shield therefor, rising high enough to protect the wheel and keep it from coming in contact with the adjacent side wall of the rack-segment. These flanges also prevent the straw, through which the head or needle necessarily passes, from wrapping itself on the axis of the wheel, and the latter insures the smooth, easy movement of the head through the rack-segment. The knife or band-cutter L, (see Fig. 3 and detail view, Fig. 8,) instead of working on the outer face of the pinion and between it and its bearing plug or cap, as in the pending application referred to, is located on the inner side of said pinion, and is actuated by means of the cam-ledge *d* on the rack side of segment B, as above explained. This cam is so arranged as to act on the knife, forcing it inward near the completion of the twisting movement of the pinion sufficiently far to cause the rotating

pinion to bring first one wire on one side thereof against the knife and to cut the same, and then, by the continued rotation of the pinion, to bring the other wire on the opposite side against the cutter and to cut the same. By this arrangement the wires are cut singly instead of both together, as heretofore, and the resistance is thereby reduced over what would be required for cutting both wires together or at the same instant.

The slot in the head through which the wires are passed into the twister-pinion is shown at *m*, Fig. 4. It is made to incline or curve inward toward the rack side of the segment B, and at its inner end has a retaining-slot, *m'*, formed at right angles to the main or entering slot *m*, as shown. This retaining-slot *m'* may be formed, like *m*, in the head itself; but by preference it is formed over a socket or perforation therein by means of and between two shouldered plates, *n n'*, secured to the inner face of the head, as shown. These plates are shouldered, so that when brought together in the relation shown the angular retaining-slot is formed between them. The curving or inclining of the slot *m* inward toward the rack side of the head, in connection with the overhanging flange or ledge B' on the rack-standard, produces lateral tension on the wire passing through said slot sufficient to force it laterally into the retaining-slot *m'* the instant it reaches the latter, and as a consequence the wire is forced from the end of the entering-slot *m*, (where it is tangential to the hub or journal of the twister-pinion, as shown by the slot *i* in the plug or cap I, Fig. 9, and which forms a part of the slot *m*) in toward the center of the pinion and within the circle of its bearing-surface when the retaining.slot prevents displacement of the wires and holds them up to the action of the twisting-pinion. By this construction the necessity for a moving jaw for permitting the passage of the wire into the pinion and for holding the same therein is obviated.

Parts of the machine not particularly described herein or in the application before referred to may be constructed and arranged in any usual or preferred manner.

Having now described my invention, I claim—

1. The binder-head, having the slot formed therein in tangential relation to the journal of the twister-pinion, or thereabout, in combination with the overhanging ledge or flange on the rack-segment.

2. The binder-head, provided with the entering-slot, terminating in the retaining-slot at right angles, or nearly so, thereto, in combination with the flange on the rack-segment overhanging the entering-slot, substantially as described.

3. The removable shouldered plates, forming the retaining slot or notch in the binder-head, substantially as described.

4. The binder-head, provided with the guiding-wheel, in combination with the flanges or ribs forming a shield thereto and holding it out of frictional contact with the side wall of the rack-segment, substantially as described.

5. The pivoted retaining-latch E, having the flattened heel end *e*, and the inclined face e^2, terminating in the lower face of said latch, in combination with the spring F, arranged and operating substantially as described.

6. The pendent locking-latch E', provided with the pin or spur, in combination with the flat retaining-spring, arranged and operating substantially as described.

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