(No Model.) 2 Sheets—Sheet 1.

J. MILLER, Dec'd.

L. and R. A. MILLER, Administrators.

GRAIN BINDER.

No. 429,046. Patented May 27, 1890.

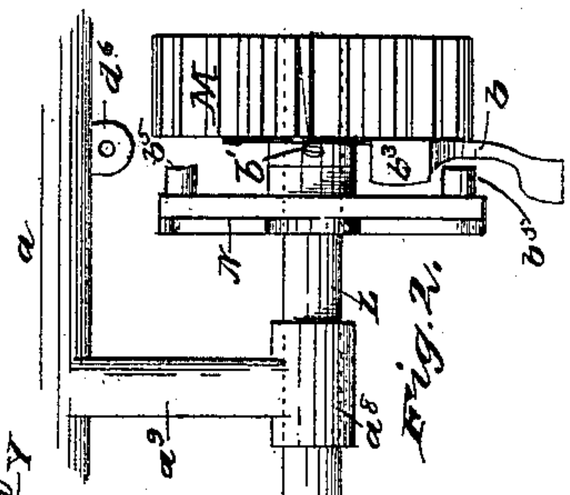

Fig. 2.

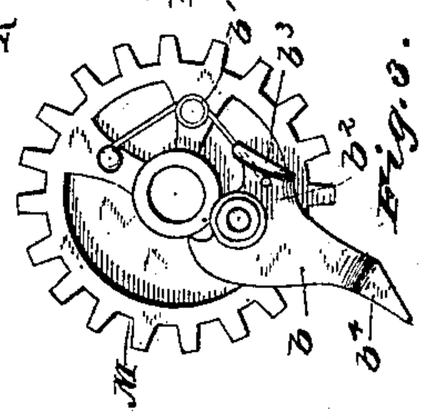

Fig. 3.

Fig. 1.

Fig. 4.

Fig. 5.

Witnesses

Ed. G. Lowe

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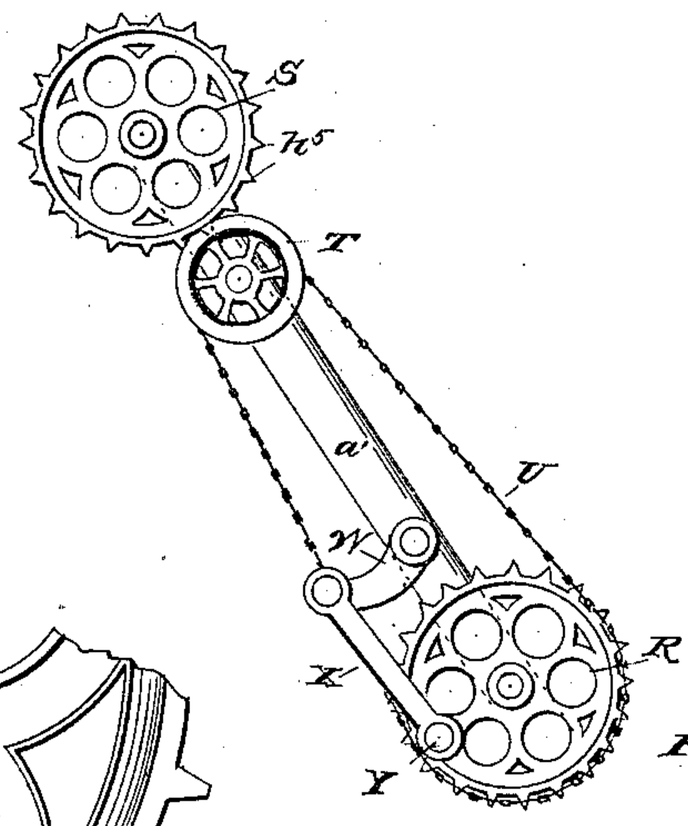

Fig. 6.

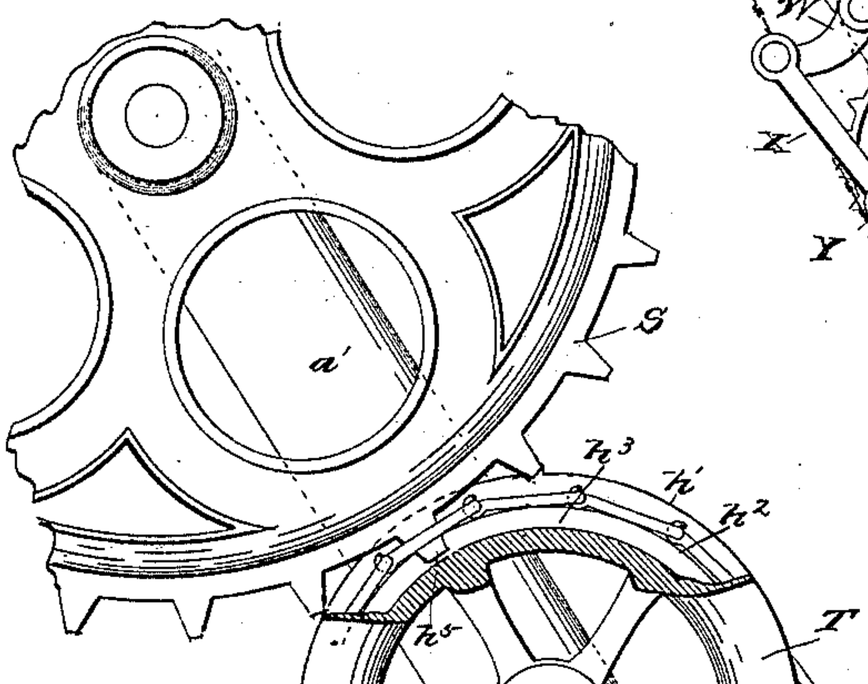

Fig. 7.

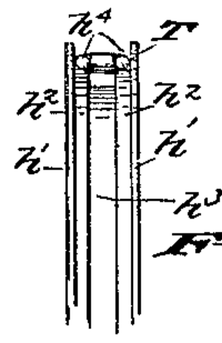

Fig. 9.

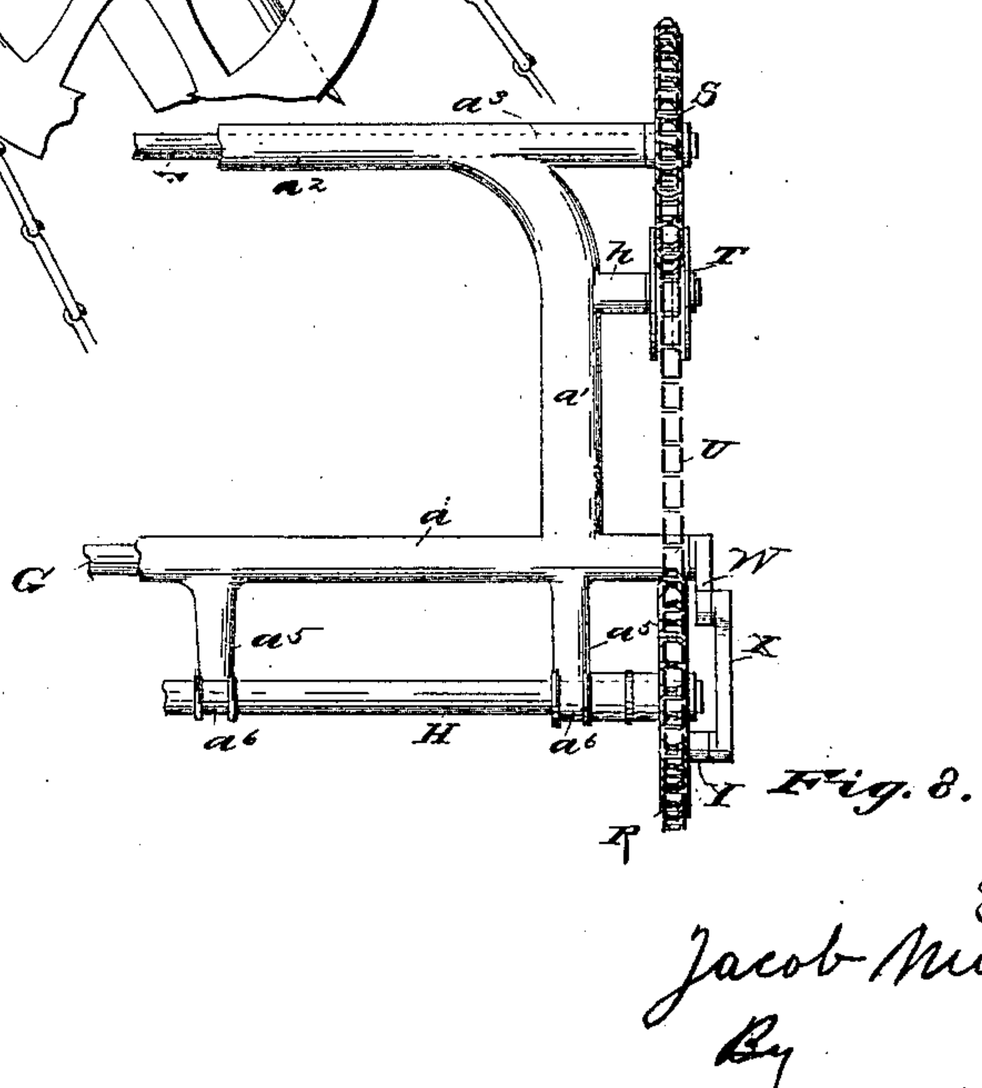

Fig. 8.

Witnesses

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UNITED STATES PATENT OFFICE.

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GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 429,046, dated May 27, 1890.

Application filed June 21, 1889. Serial No. 315,058. (No model.)

To all whom it may concern:

Be it known that I, JACOB MILLER, a citizen of the United States, and a resident of Canton, county of Stark, State of Ohio, have invented a new and useful Improvement 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.

My invention relates to improvements in grain-binders, the object of which is to simplify and reduce bulk and cost of the machinery employed to operate the binder mechanism without impairing its efficiency.

With these ends in view my invention consists in certain features of construction and combination of parts, as will be hereinafter described, and set forth in the claims.

Figure 1 in the accompanying drawings is a view in perspective illustrating my invention; Fig. 2, a view of a fragment of the binder-frame and inner end of packer-shaft, showing the journal-support for the shaft and relative position of the driving-arm, pawl, and pinion; Fig. 3, a side view of pinion and pawl. Fig. 4 is a similar view showing the internal gear-wheel, pinion, pawl, driving-arm, and trip. Fig. 5 is a perspective of the back portion of the gear-wheel, showing the cam, roller, and a portion of the arm by which the compressor is actuated; Fig. 6, an end view of binder-frame, showing parts in relative position; Fig. 7, an enlarged view of the upper end portion of binder-frame, a fragment of sprocket-wheel, and idler, a portion of the latter cut away to show the chain; Fig. 8, a front elevation of binder-frame, sprocket-wheel, idler, cranks, connecting-link, and chain; and Fig. 9 is a view of a fragment of the idler, showing the central groove and the shoulders upon which the chain is carried.

As my invention is applicable to many of the harvesters now in use and relates particularly to the means provided and hereinafter described for intermittingly actuating the binder, I shall proceed with the description, referring only to the harvester parts in conjunction thereto.

The parts A, B, and C are respectively the lower, upper, and cross pieces of the binder-supporting frame. The lower tubular arm *a* of the binder-frame D is secured in the trusses E E′, the upper ends of which are loosely secured on the frame-piece B, the lower ends being pivotally supported on the upper ends of links having a pivotal connection with the sill A.

The binder-frame D is composed of a lower horizontal pipe portion, as *a*, a vertical portion, as *a*′, and an upper horizontal portion, as a^2, having an outwardly-projected portion, as a^3, forming a journal-box for the support of the binder-shaft F. The lower horizontal portion *a* is of pipe form, and in it are provided journal-bearings for the needle-shaft G. It is also provided with hangers a^5, having journal-boxes a^6, in which is supported the binder-actuating shaft H. On the inner end of the shaft H is mounted a wheel, as K, said wheel having on its face a series of inwardly-projected teeth a^7.

L represents the packer-shaft, which is located below and inside of the shaft G′. Its rear end may be supported in a journal-box secured to the harvester-frame in any of the well-known ways, the inner or front end supported in a journal-box, as a^8, provided at the lower portion of a hanger a^9, projected downwardly from the lower horizontal portion *a* of the frame D, as shown in Fig. 2. On the front end of said shaft L is loosely secured a pinion M, having pivotally secured thereto a pawl *b*, which is actuated by a spring *b*′. Said pawl is provided with a short arm b^2, on the end of which is an outwardly-projected lug b^3. There is also provided a long arm portion, as b^4.

A driving-arm N is mounted on a shaft L between the loose pinion M and the journal-box a^8. At the ends of said arm on the face next the pinion are provided pins b^5 to engage the lug b^3 of the pawl *b* when said lug has been thrown in the track of the pin b^5 by the energy of spring *b*′. By this engagement of the driving-arm pin with the pawl the pinion is rotated with shaft L, and as the teeth of the pinion M engage the teeth of the wheel K the wheel and shaft H will be rotated in the same direction as shaft L. There is also provided integral with the lower horizontal portion *a* of the frame D laterally and inwardly projected lugs b^6, in which is se-

cured a shaft b^7, upon which the trip O and dog b^8 are supported, under the binding-receptacle and preferably near the plane of the needle. On the shaft b^7 are secured the compressor-supporting arm b^9 and actuating-arm d, upon which there is provided a roller d', that engages a cam d^2 on the wheel K, and about diametrically opposite the lugs b^7 lugs d^3 are provided, in which a pin d^4 is secured, about which the packer-links d^5 have pivoted connection. The outer end of the pin d^4 is secured to the truss E, by which the rear portion of the binder-frame is supported.

The front portion of the binder-frame is supported by the truss E′, secured to the horizontal portion a and to the harvester-frame C.

The packers P may be of the usual form now in use, and may be operated in any of the well-known ways. The needle Q, which may be of the well-known forms, is secured on shaft G. On the lower portion a of the binder-frame is provided a lug d^6, forming a seat for a spring d^8, through which a bolt d^9 is passed, the rear end of which is pivotally secured to the dog b^8. A compressor-arm d^{10} is supported as shown in Fig. 1.

On the front end of the binder-actuating shaft H a sprocket-wheel R is mounted, and on the front end of the binder-shaft F a similar sprocket-wheel S is mounted, substantially as shown.

That the shafts H and F may be rotated in opposite directions, an idler T is loosely mounted on a pin h, projected from the vertical portion a' of the binder-frame. The said idler T is provided with annular side flanges h', shoulders h^2, and a central groove h^3. A sprocket-chain U is placed about the wheel R and the idler T, as shown in Figs. 1, 7, and 8, the side bars h^4 of the chain-links resting on the shoulders h^2, the central open portion of the link to pass over and above the groove h^3. The sprockets h^5 of the sprocket-wheel S are passed through the links into the groove h^3, the idler simply holding the chain in engagement with the wheel S, and in no sense to act as a driver. By placing the chain about the wheel R and the idler, then placing the idler in position, and passing its supporting-pin through the hub into the frame D the chain can be fitted tightly about the wheel and idler, dispensing with the use of a tightener.

On the front end of the needle-shaft H there is mounted a crank W, that is connected by a link X to a crank-pin Y on the sprocket-wheel R, by which arrangement at each revolution of the wheel R the needle-shaft G will be rocked a distance to raise and lower the needle.

In the operation the shaft L is continuously rotated and the cut grain is packed by the packer P against the compressor-arm b^9 and on the trip O to a certain density, regulated by the energy of the spring d^7. The trip, yielding to the pressure of the grain, will rock on the shaft b^7, whereby the dog b^8 is drawn from the pawl b^4. The spring b', attached to the pinion M and in engagement with said pawl, will throw the pawl out, as shown in Fig. 3. The lug b^3 will then engage the pins b^5 on the driving-arm N, which engagement will carry the pinion M with the packer-shaft L. The teeth of the pinion, engaging the teeth a^7 of the wheel K, will rotate said wheel and shaft H and wheel R one full revolution, which, by its chain engagement with wheel S, will rotate the binder-shaft one revolution, and by the link-connection of the wheel R with the crank W the needle-shaft will be rocked to raise and lower the needle, at which instant the bundle will be discharged, the trip O resume its former position, the dog b^8, engaging the pawl b^4, pressing the lug b^3 in toward the driving-shaft L, thereby disengaging the driving-pins b^5, by which the rotary movement of the shaft H and binder F will be arrested.

To secure compactness of parts, I place my clutch under the binding-receptacle nearly in the same plane as the needle, and to prevent the straw which falls through the slots in the binder-table through which the needle and packers work, clogging the gears, I employ an internal gear-wheel upon the binder-actuating shaft, which meshes with and shields the pinion upon the packer-shaft, thereby preventing the clogging of the teeth. By the employment of this gearing it will be noticed that the packer-shaft and binder-actuating shaft rotate in the same direction, and as it is desirable that the binder-shaft rotate in an opposite direction to the binder-actuating-shaft I employ the sprocket-chain and idler, which are connected with sprocket-wheels at the ends of the shafts in the manner hereinbefore stated.

Having thus fully described the nature and object of my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with a packer-shaft having a pinion loosely mounted on one end thereof, a pawl pivotally secured to said pinion, a driving-arm N, secured to said shaft, carrying pins diametrically opposite to engage said pawl, an internal gear-wheel K, binder-actuating shaft H, sprocket-wheel R, chain U, idler T, sprocket-wheel S, and binder-shaft F, and the trip o and trip-arm b^8, located directly under the binding-receptacle and nearly in the same plane of the needle, whereby the shafts H and F may be intermittingly rotated in opposite directions, substantially as described, and for the purpose set forth.

2. The combination, with the binder-actuating shaft H, of the binder-shaft F, sprockets R and S, mounted thereon, idler T intermediate said sprockets, chain U about the sprocket R, and the idler, said chain to engage the inner portion of the sprocket S, and the needle-shaft G, having a linked connection with the wheel R, whereby the shafts H and F

may rotate in opposite directions and the shaft G rock in its journals to raise and lower the needle, substantially as described, and for the purpose set forth.

3. In combination, the binder-frame D, having a lower horizontal pipe portion a, shaft G, journaled therein, hangers a^5 and a^9, shaft H, journaled therein, vertical portion a', outwardly-projected pin h, upper horizontal pipe portion a^2, shaft F, journaled therein, sprockets R and S, and idler T, having a central groove h^3, chain-supporting shoulders h^2, flange h', chain U, crank W, and link X, substantially as described, and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 25th day of May, A. D. 1889.

JACOB MILLER.

Witnesses:
W. K. MILLER,
CHAS. R. MILLER.