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Q. A. SCOTT.

Grain-Binders.

No. 140,083. Patented June 17, 1873.

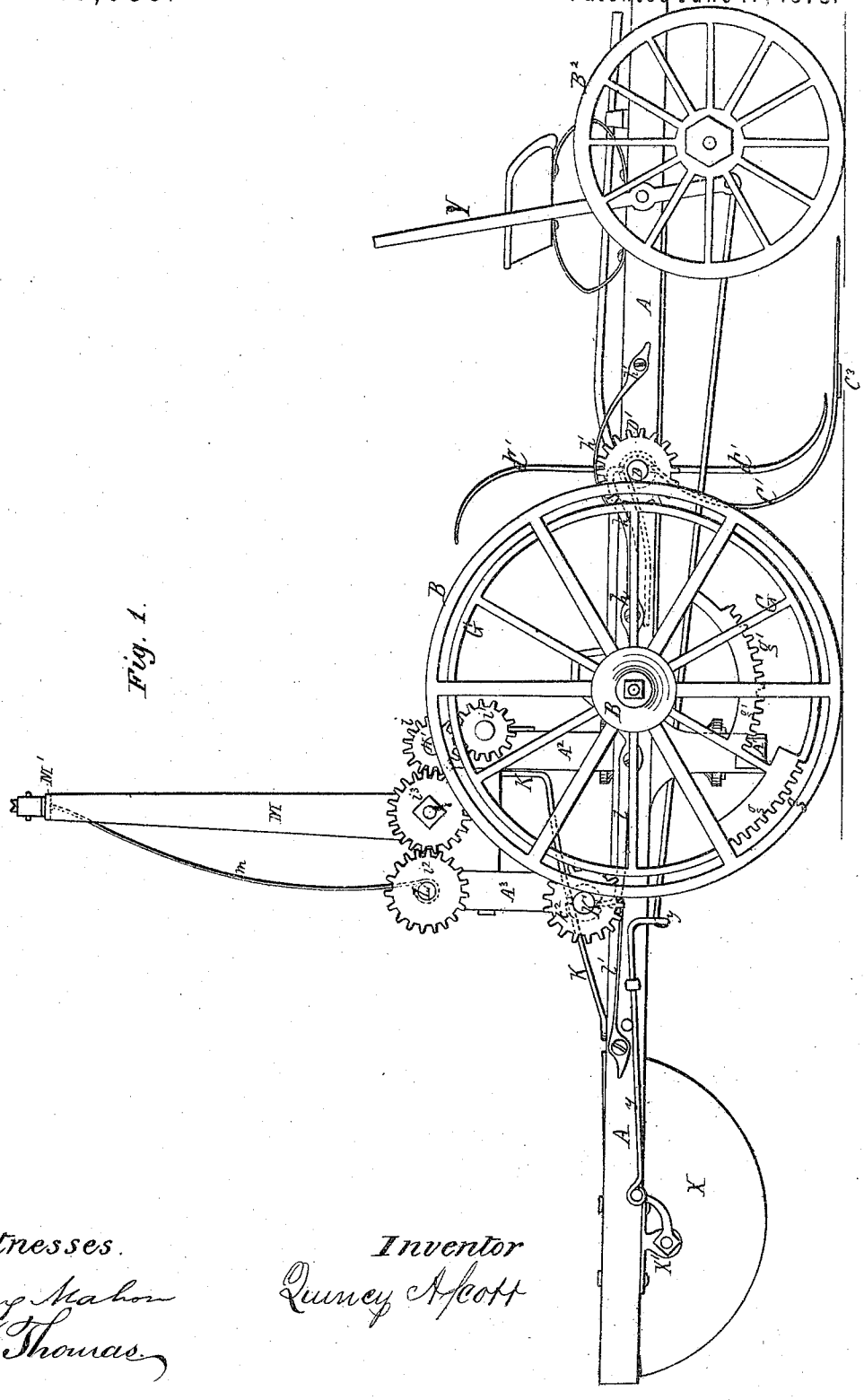

Fig. 1.

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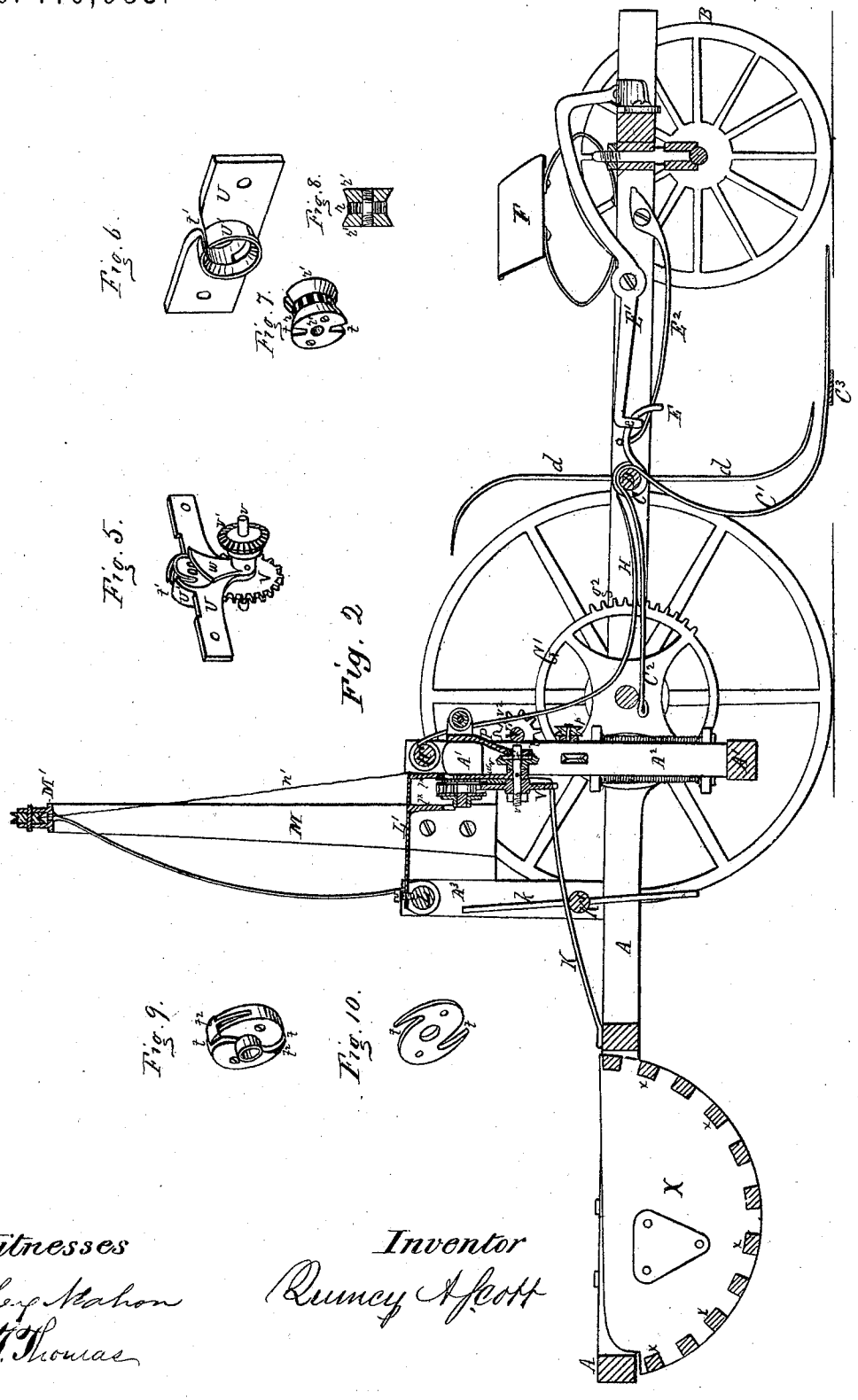

Fig. 2

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

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Fig. 4.

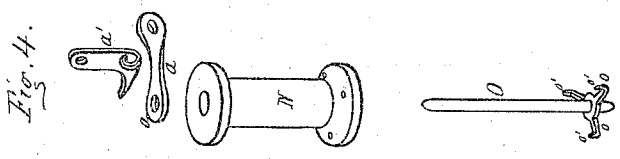
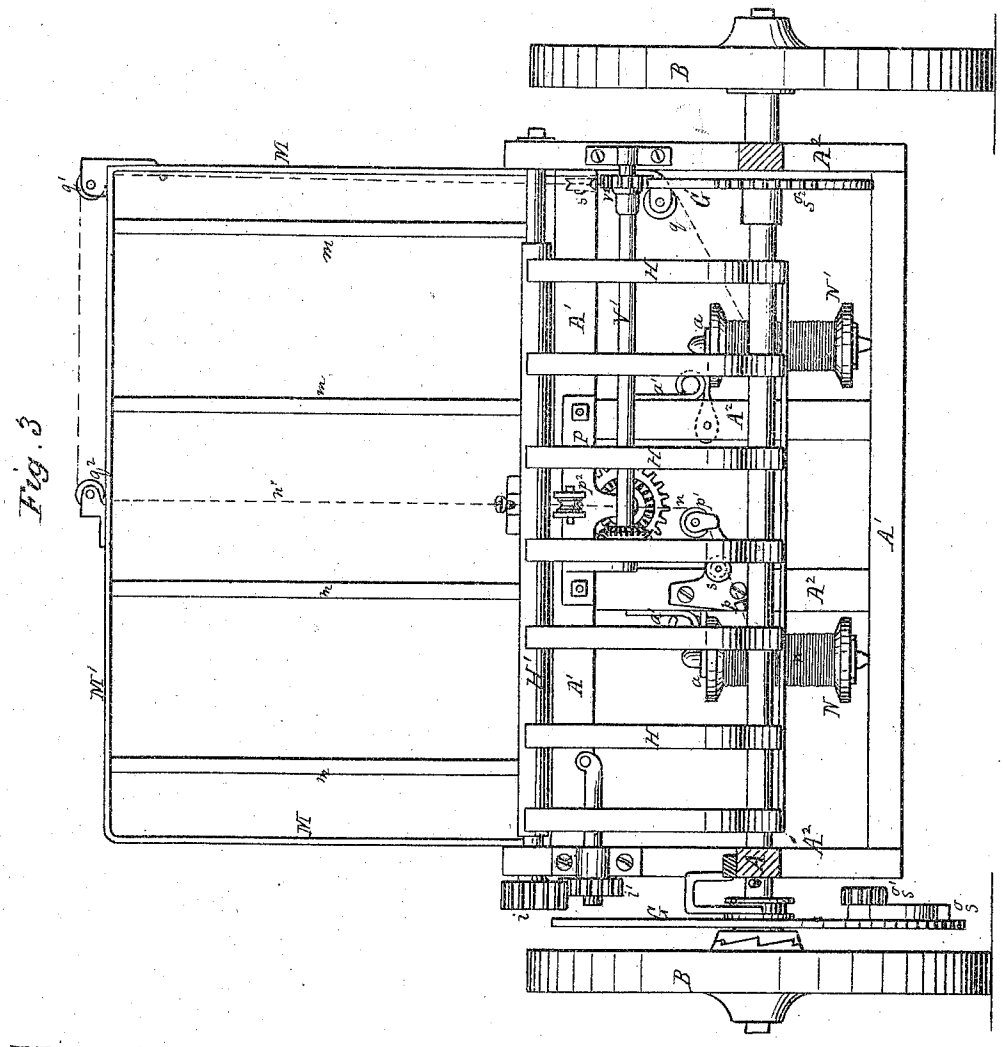


Fig. 3



Witnesses.

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UNITED STATES PATENT OFFICE.

QUINCY A. SCOTT, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **140,083**, dated June 17, 1873; application filed May 9, 1873.

To all whom it may concern:

Be it known, that I, QUINCY A. SCOTT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Binding Grain, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a machine embracing my improvements. Fig. 2 is a vertical longitudinal section through the same. Fig. 3 is a front elevation of the same, partly in section, the section-line crossing in rear of the gathering-rake. Fig. 4 is a perspective view of the band-spool, its spindle, pivoted upper bearing, and retaining-latch, detached. Fig. 5 is a perspective view of the twister, and its bearing-plate, and actuating devices, detached; and Figs. 6, 7, 8, 9, and 10 represent details hereinafter described.

Similar letters of reference denote corresponding parts wherever used.

My invention consists, first, in a novel construction of the twister, whereby it is made to twist the bands upon its opposite sides or faces at the same time, in such manner as to tie the band closely against the bundle, and also to unite the two spool-wires, cords, or bands preparatory to the reception of another gavel or bundle; second, in a novel method of applying the spindles of the spools containing the wires, cords, or bands, whereby an empty spool may be quickly and easily replaced by a full one without special skill or attention on the part of the attendant; third, in a novel construction and arrangement of basket or cradle for receiving and dumping the bundles in suitable quantities for forming a shock; and, fourth, in certain details of construction and arrangement hereinafter fully set forth.

In the accompanying drawings, A represents a rectangular main frame mounted on two independent wheels, B B, (either or both of which may be made drivers, as desired,) and two carrying-wheels, B^2. About midway of the length of frame A is an upright frame, A^1 A^2 A^3, in which the binding mechanism is mounted, as hereinafter described. In advance of this upright frame and of the main axle I locate a rake-head or shaft, C, mounted on a shaft, D, which has its bearings in the main frame, said rake-head being provided with a series of pendent curved teeth, C^1, which are bent in form substantially as represented in Figs. 1 and 2—that is to say, bending back underneath the rake-head, and extending downward and forward in the arc of a circle to a point at or near the surface of the stubble, thence extending forward in a right or nearly a right line, slightly inclining to the surface of the ground toward their points to insure said points projecting below the surface of the stubble, on which the grain to be raked up rests, and causing such stubble to act as a rake to move the grain well back upon the rake-teeth C^1. The rake-head C is composed of a series of sleeves or sections to which the teeth are secured (one or more) to each section, and to these sleeves are also secured a series of slightly-curved horizontal slats, C^2, which extend in rear of the rake-head, and are united to a common cross-bar or rail underneath or slightly in rear of the main axle. These slats C^2 may, if preferred, form a heel extension of the rake-teeth, as shown. The transverse bar at their rear ends serves to unite the teeth and the sectional head, causing them to move together when it is desired to rock or raise them off the ground for transportation, or for passing an obstruction, and also by resting underneath the axle or other stop to hold all the teeth in working position. The teeth may be further connected by a transverse slat, C^3, at their lower ends, as shown. E is a bent arm rigidly connected with the rake-head at one end, said arm extending forward through a loop, *e*, on the end of a lever, E^1, pivoted to the frame A and extending forward into convenient position to be operated by the driver in his seat F. A spring, E^2, attached to the frame, with its free end resting on the arm E, serves to hold the rake-teeth down to their work, except when raised by the lever E^1. The shaft D upon which the tubular sleeves forming the rake-head are mounted is armed with a series of teeth, *d*, located between the sections of the rake-head and alternating with the teeth C^1 of the rake, and extending upon opposite sides of the shaft D, as shown. These teeth are bent in

form substantially as represented in Figs. 1 and 2, and are designed to take up the grain received upon the rake C^1 and to deposit it in an elevated cradle hereafter described, an intermittent rotary motion for this purpose being imparted to the shaft D by the following arrangement of gearing: A spur-pinion, D′, keyed to one end of shaft D, engages with a spur-segment, *g*, on the driving-wheel or disk G once in each revolution of the latter; and said segment having a number of teeth equal to one-half of those on pinion D′, a half revolution is imparted to shaft D at each revolution of wheel G. By the addition of a second segment, *g*, to the wheel G, two movements or semi-rotations of shaft D and arms *d* may be given, or by making the number of teeth on the segment equal to the number on the pinion D′ an entire revolution may be imparted to shaft D, and one set of arms *d* may be thereby dispensed with. In either case the arms *d* which raise the grain off the rake-teeth will, by the relative arrangement of the pinion and segment *g*, be caused to assume a vertical or nearly vertical position over shaft D, for depositing the grain in the cradle, when a spur formed on the forward end of a lever, *h*, enters a notch in the hub of pinion D′ (see dotted lines, Fig. 1) and prevents the further rotation of the shaft until the grain deposited in the cradle has been removed, as hereinafter explained, when the spur is withdrawn by a cam or pin on the main axle or hub of the drive-wheel acting on the rear or heel end of lever *h*, and lifting the spur out of the notch in the hub of pinion D′. A spring, h^1, resting on the forward end of lever *h*, serves by its tension to hold the spur in lock with the pinion-shaft D when not withdrawn by the cam, as explained.

The grain-cradle above referred to, and which receives the grain from the elevating-fingers *d*, consists of a series of curved fingers or slats, H, attached to a rock-shaft, H′, to which a rocking or vibratory movement is imparted by means of a barrel-pinion, *i*, keyed to one end of said shaft, which engages with the segment *g*, and has thereby imparted to it a movement in one direction similar to that given to the lifting-fingers *d*, causing them to lift the grain in the fingers or cradle H over the shaft H′, and to discharge and compress the grain therein into the binding-box or receptacle, where it is grasped or held, as will be explained, when a reverse movement is imparted to shaft H′, and fingers H returning the latter into position to receive another gavel by means of a transmitting-pinion, i^1, engaging with a second segment, g^1, on wheel G, and also with the pinion *i*. The binding-box or receptacle is composed of a series of inclined angular rods or slats, K, attached at their rear lower ends to a transverse bar of the frame A, as shown, and at their forward angular ends to the upper transverse bar A^1 of the upright frame, these rods or slats forming the flooring and front of the box. The back is formed by a series of rods or slats, *k*, attached to a shaft, K^1, and to which an intermittent rotary movement is imparted for discharging the bound bundle by means of a pinion, K^2, which engages with the segment *g* on wheel G. The shaft K^1 is locked between the intervals of its movements, and while its arms are in the vertical position shown, forming the back of the binding-box or receptacle, by means of a spur on a lever, *l*, held in mesh with a notch in a hub on pinion K^1, or a collar on shaft K, by a spring, *l′*, and released by the action of a pin or cam on the main shaft or hub of the drive-wheel, in the same manner as explained for locking and releasing the elevator-shaft D. L is a rock-shaft mounted in the upper ends of uprights A^3, provided with a compressing-arm, L′, and with any desired number of parallel compressing-teeth, which close over the grain after it is deposited in the binding-box or receptacle and hold it firmly therein during the operation of binding. A rocking movement is imparted to this shaft, corresponding to and timed with those of shaft H′, of cradle H, so that as the latter rises and rotates to deposit the grain in the box the arm L′ is withdrawn or removed out of the way to permit the grain to be deposited in the box or receptacle, and as the arms H are withdrawn the arm L′ follows it and closes over the grain in said receptacle, the movements of shaft L being imparted to it by pinion i^2 and a transmitting-pinion, i^3, engaging with and operated by the pinion *i* on said shaft H′. M M are uprights attached to the upper end of the frame A^1 A^2, and connected at their upper ends by a transverse bar, M′; or the upright M and bar M′ may be made in one bent piece or angular iron, as represented. The upper ends of a number of elastic slats *m* are attached to the cross-bars M′, and the lower ends of said slats are looped around the shaft L, and these slats, which are so spaced as to permit the arms H of the grain-cradle to pass between them, serve to receive the grain thrown up by the cradle, and to hold it until, by the downward movement of arms H, it is compressed into the binding-box or receptacle. Two binding wires, cords, or bands are employed, contained on spools N N, which are mounted on removable spindles *o*, (see Fig. 4,) which have their lower bearings in the lower transverse bar A^1 of the upright frame, the upper ends being mounted in loop-bearings *a*, pivoted in the uprights A^2. The spindles O at or near their lower ends are provided with arms *o*, (or a disk may be used, if preferred,) and with three or more spurs or vertical points, *o′*, equidistant from the center of spindles O. The spools, prepared, centered, and wound, if desired, at the factory, are provided with sockets corresponding to these spurs *o′*, so that when placed upon the spindles and engaged with the spurs *o* the centers of the spool and spindle will exactly coincide, without reference to the relative size of the spindle and the perforation through the

spool. The upper ends of the spool may be centered by a similar device placed on the spindle and provided with a hub adapted to rotate within the loop-bearing *a*, thereby insuring the perfect centering, and consequent even movement, of the band-spools. A latch, a^1, serves to hold the pivoted loop-bearing *a* down on the spindle after the spool and spindle have been put in place.

With the spools arranged as described and shown, the bands are passed thence as follows: The wire or band *n*, from spool N, through a loop, *p*, thence through the tension devices, and under pulley p^1, thence upward to and around a pulley, p^2, thence through an eye in plate P (in lugs or ears of which pulley p^2 is mounted) to a point directly in front of the twister, where it is united to the band *n'*, which, on leaving the spool, N', passes to a friction-pulley, *q*, at one side of the upright frame, thence upward across a tension device or pulley, *s*, and through a guiding loop or pulley directly over said tension device, thence upward through a perforation in bar M', and over pulleys q^1 q^2 mounted thereon, the latter pulley, q^2, being arranged about midway of the bar M', and from thence the band descends at a point directly in front of the twister, and is united to the band *n*, as stated above.

The twister is made as follows: A small central pinion, *r*, is used, by preference, provided with a spindle, the ends of which project beyond the faces of the pinion, and are provided, one end with a right and the other with a left-hand screw, as shown in Fig. 8, to receive the enlarged heads or journals *r'*; or, if preferred, one of these heads may be permanently riveted to the pinion, as only one need be made removable; or instead of being secured by the central spindle they may be screwed directly to the faces of the pinion. The heads or journals *r'* are made slightly larger than the pinion, and, by preference, are made beveled or tapering from the outer face toward the pinion, such construction serving to prevent endwise displacement of the pinion when placed in its box or bearings. These heads are provided with radial notches *t* upon opposite sides of their peripheries, which extend inward toward the center to any desired depth, and are so located with reference to the teeth of the pinion that the wires or bands, entering the notches *t*, will pass between two of the teeth to a sufficient depth to prevent its interference with the operation of the pinion, and the enlargement of the twister-heads and journals *r'* beyond the periphery of the pinion prevents the wire from entering between the teeth of the pinion, except at the desired point, viz., through the slits or notches *t*. The twister thus formed, with one of its heads removed for the purpose, is inserted in a cylindrical socket, U', in a plate, U, the bearings in which conform in taper or shape to the taper or shape of the journals *r'*, when, the head removed being secured in place endwise, movement of the pinion or twister in its bearing U' is effectually prevented. A longitudinal slit, *t'*, through the sleeve U', admits the bands to the twister, as will be further explained. The plate U is secured to the upright frame A^1 A^2 about midway of the machine, with the twister directly in rear of the wires or bands *n n'*, as above stated. The twister-heads may, if desired, be constructed separate from the enlarged journals *r'*, and secured thereto either through the pinion-spindle or by screws, as explained, for attaching the journals. Thus, in Fig. 10 an S or scroll-shaped head is represented, which will receive the bands on opposite sides of its center or shaft through the slit *t;* and in Fig. 9 the head is shown provided with curved radial slits and with clamping-jaws t^2, which are held open by a spring for the reception of the band, but which, by the action of the band upon the inner end of the clamping-lever, is closed to prevent the admission of the other end or band, thereby compelling it to enter the opposite jaw of the twister. Ordinarily, however, the plain radial slits or notches *t*, used in connection with the enlarged heads or journals and upon opposite sides thereof, will be found to answer the purpose, and even with the slits thus formed the particular shape or size of the slit or notch is immaterial so long as they prevent the wires or bands from becoming entangled with the teeth of the pinion, and insure the rotation or twisting of the two ends or bands together.

The twister thus constructed and arranged is operated as follows: The small central pinion *r* engages with and is intermittently rotated by a spur-wheel, V, mounted on a shaft, *v*, which has its rear bearing in plate U, and a forward bearing in a plate, P, and to which shaft *v* motion is imparted by a bevel-pinion, v^1, engaging with and operated by a bevel-pinion on the inner end of a transverse shaft, V', the outer end of which is armed with a spur-pinion, v^2, which receives motion from a cogged segment, g^2, on a driving-wheel, G', on the main axle, the number of teeth on the segment g^2 in connection with the relative sizes of the communicating gearing, being such as to impart intermittently any desired number of revolutions to the twister in a manner that will be readily understood. The wheel V which drives the twister is armed on its forward face with a knife, *w*, which, once at each revolution, cuts the twisted wires or bands close against the forward face of the twister-head.

The operation of binding is as follows, viz: The gavel in the cradle H', in being carried to and compressed in the binding-box, is carried against the joined ends of bands *n n'*, and, moving the same backward and downward with it, the lower strand *n* is carried through the slit *t'* into one jaw of the twister, after which the compressing-arm L', against the arms $l^\times$ of which the upper strand or band *n'* rests, is advanced, carrying forward said upper portion of the band and closing it over the compressed

bundle. Just before the upper wire or band reaches the twister the movement of the latter begins, the gearing being properly timed for this purpose, carrying the jaw which received the lower wire past the slit t', when the upper band or wire coming down is carried into the opposite slit, and is held by the arms $l^{\times}$ while the twister is rotated. By this arrangement the wire is twisted tightly against the bundle, and also on the opposite side of the twister, uniting the two bands or wires for another operation, when the knife w severs the bands between the two twists, releasing the bundle, which, by rotation of shaft K^1, is thrown backward out of the binding-box, drawing the ends of the wire-band out of the twister, and the bundle, thus freed, is received and held by a basket, X, until a sufficient number has accumulated to form a shock. The basket or cradle X is made semi-cylindrical in form, composed for the purpose of securing lightness and ease of operation, of end-plates united on their lower curved faces by a series of light slats, x. The end plates are provided with journals, which are mounted in pendent brackets X′ on the frame A. One of these journals is provided with a crank-arm, from which a connecting-rod, y, extends forward, connecting it with a lever, Y, arranged within convenient reach of the driver on his seat on the machine, by means of which the attendant can tilt the cradle or basket for discharging the grain at will.

The tension device s, by preference, I make of two small agate disks, mounted on a common shaft or pivot, and pressed together by a spring, the tension of which may be regulated by a thumb-screw or nut. The wires passing between these disks will be drawn with the required tension around the band. The friction-pulleys over which the bands pass may, also, where wire-bands are used, be made of the same material, as this will better withstand the rapid wearing-action of the wire than any other material with which I am acquainted. Porcelain may be substituted for the larger pulleys, as less expensive. One of these friction-pulleys may be placed on each arm or jaw, $l^{\times}$, of the compressing-arm L′ for relieving the band, which is carried over the bundle and to the twister by said arm, of the friction which would otherwise result.

Having now described one way in which my invention may be carried out in practice, I desire to state that I do not wish to be confined to the specific construction and arrangement of parts as shown and described; nor to their use in a separate machine, as it will be evident that with the rake and ground-wheels removed my binding device may be applied to a harvesting-machine in position to receive the grain as it is discharged therefrom, by any of the usual or approved devices for that purpose; and, also, that other changes may be made without departing from the spirit of the invention herein described.

What I claim as new, and desire to secure by Letters Patent, is—

1. The central twister-pinion provided with journals and twister-heads on its opposite sides or faces, of a diameter equal to or greater than the diameter of the pinion, for the purposes substantially as described.

2. The twister or tying head and pinion, adapted to unite the two bands n n', in combination with the cradle H and compresser-arm L′, whereby one band is carried into the twister by the movement of the gavel in the cradle against the tension of said band, and the other by the return-arm L′, which compresses the gavel in the binding-box, substantially as described.

3. The employment, in a grain-binder, of the removable spool-spindles O, provided with the arms or spurs for centering the band-spools, substantially as and for the purposes set forth.

4. The semi-cylindrical basket or cradle X, arranged to receive the bundles as they are automatically discharged from the binding-box, in combination with mechanism substantially as described, whereby a positive movement is imparted to said basket, for dumping it, as described.

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