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S. JOHNSTON.

Grain-Binders.

No. 222,632. Patented Dec. 16, 1879.

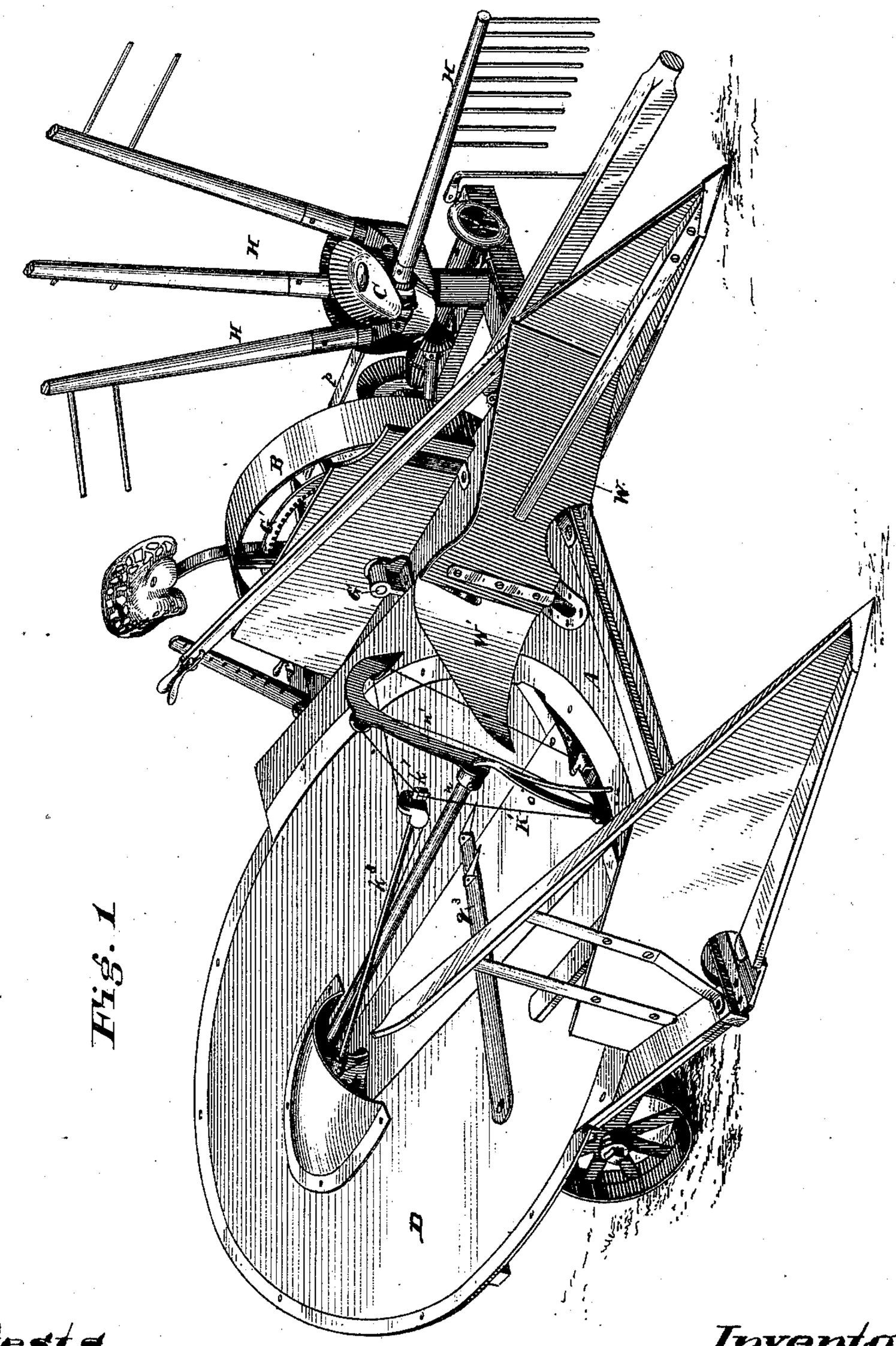

Fig. 1

Attest:

S. Whittemore

R. Schiloh

Inventor

Samuel Johnston

by his attorney

Geo. H. Sandy

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Fig. 2

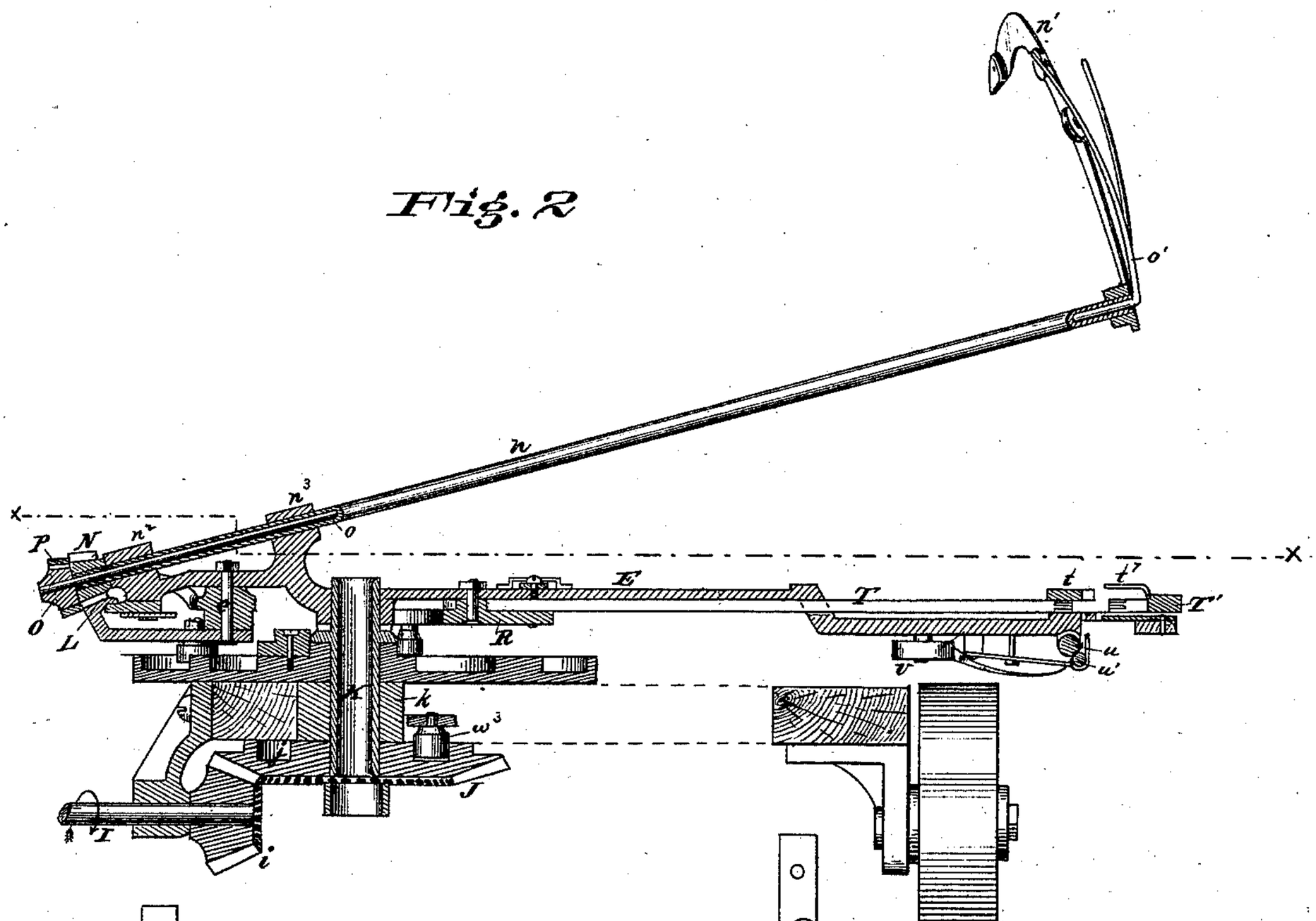

Fig. 3

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Geo. Harding

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Fig. 4

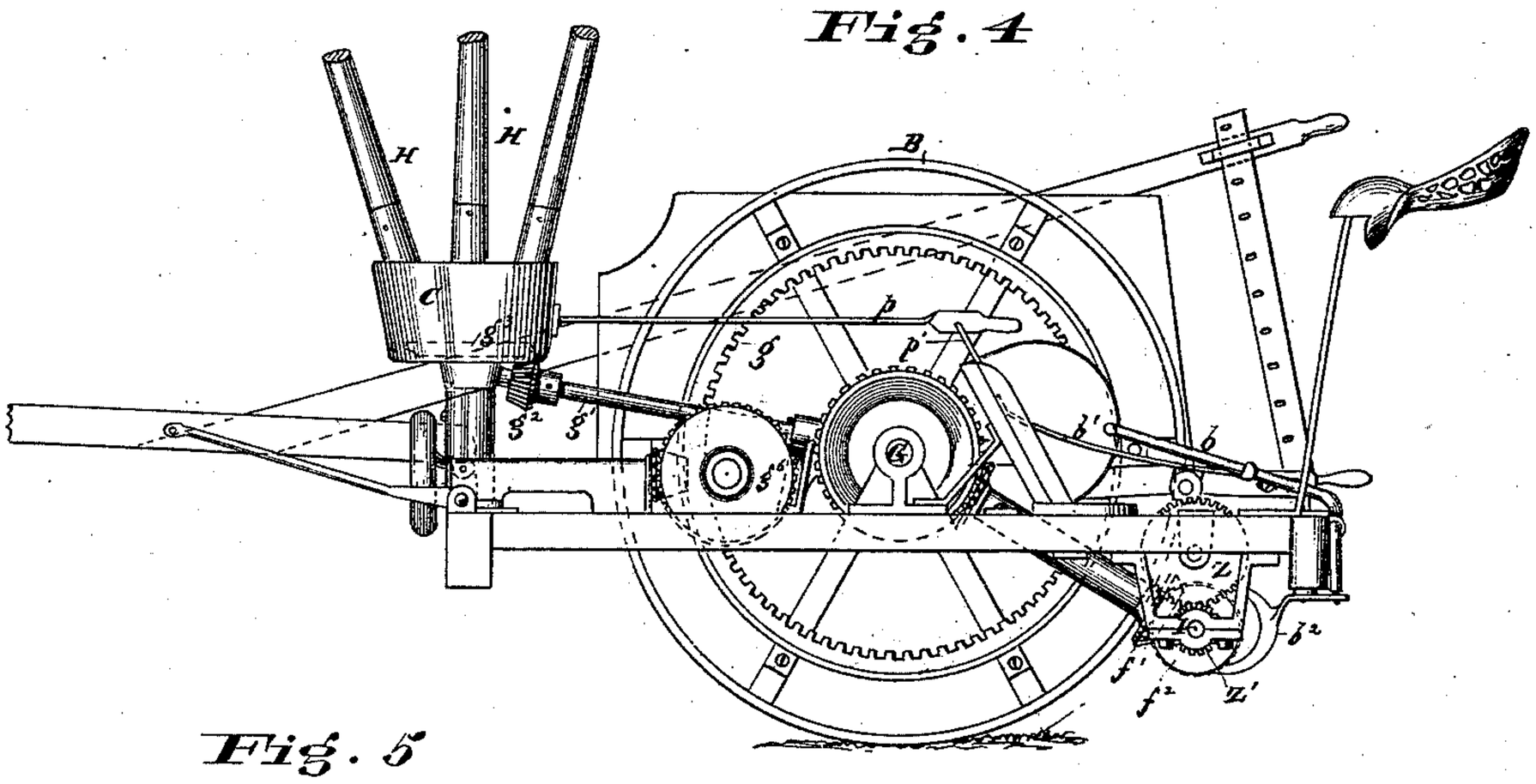


Fig. 5

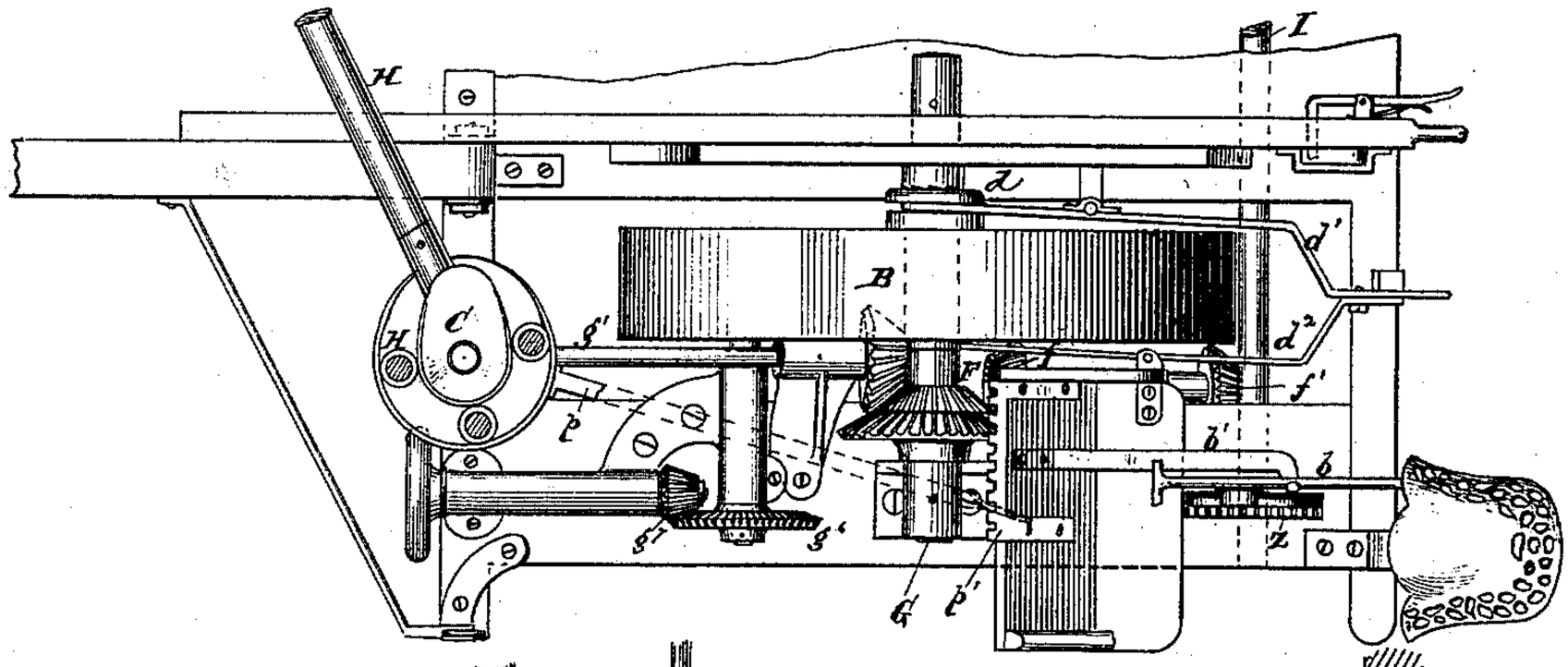


Fig. 6

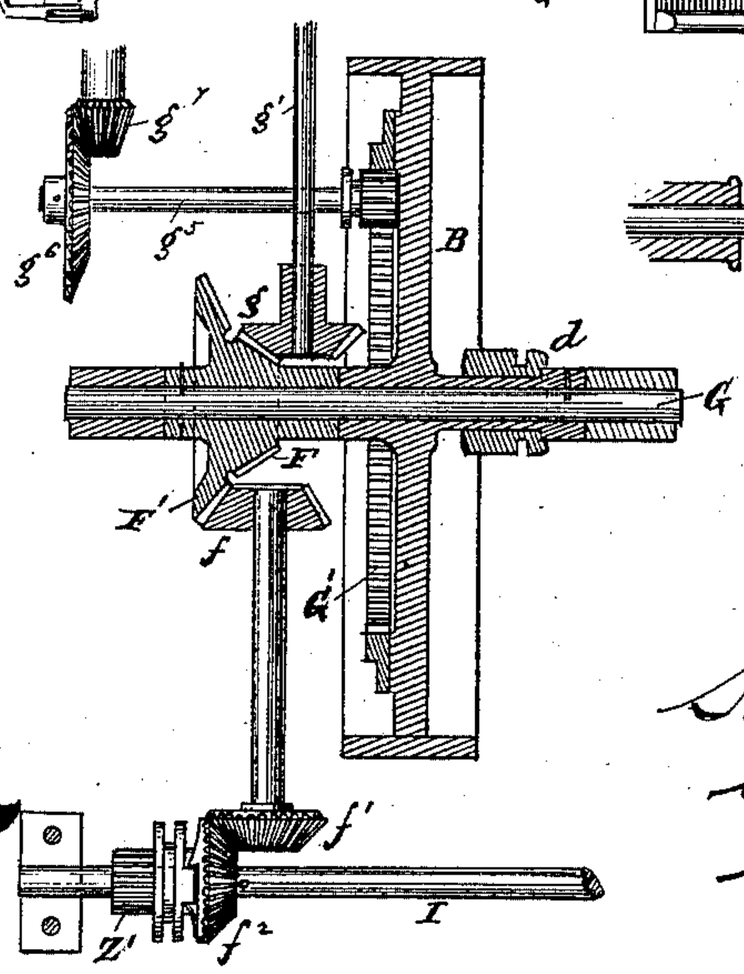
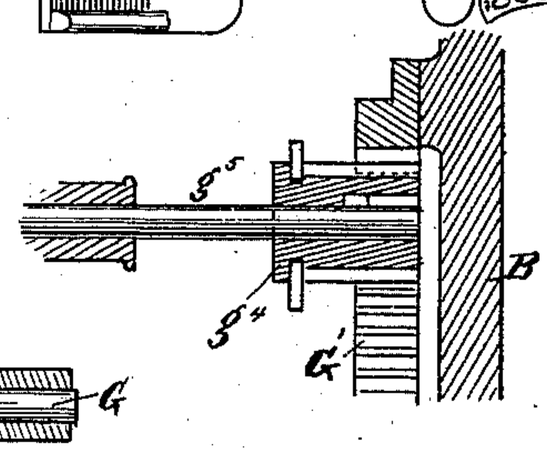


Fig. 7



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Geo. H. Gaudy

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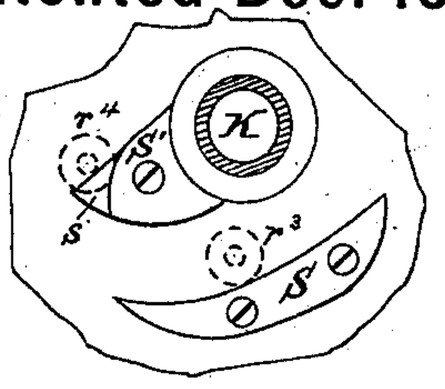

Fig. 9

Fig. 8

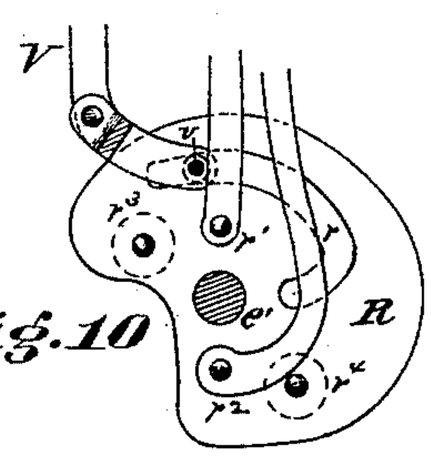

Fig. 10

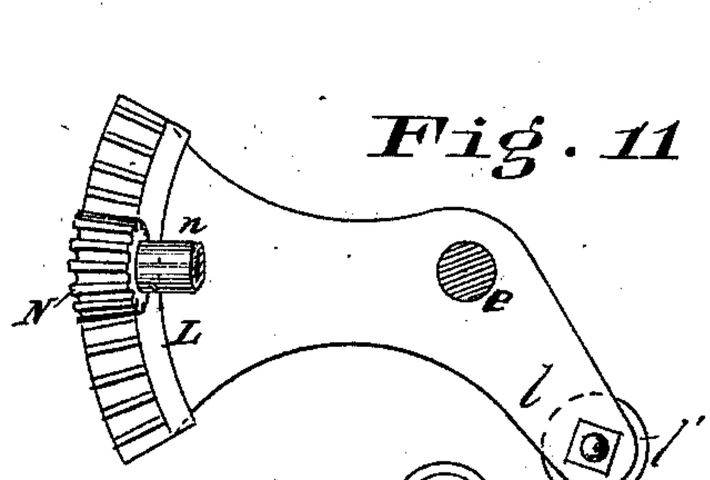

Fig. 11

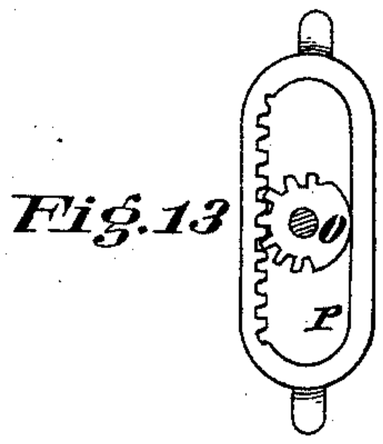

Fig. 13

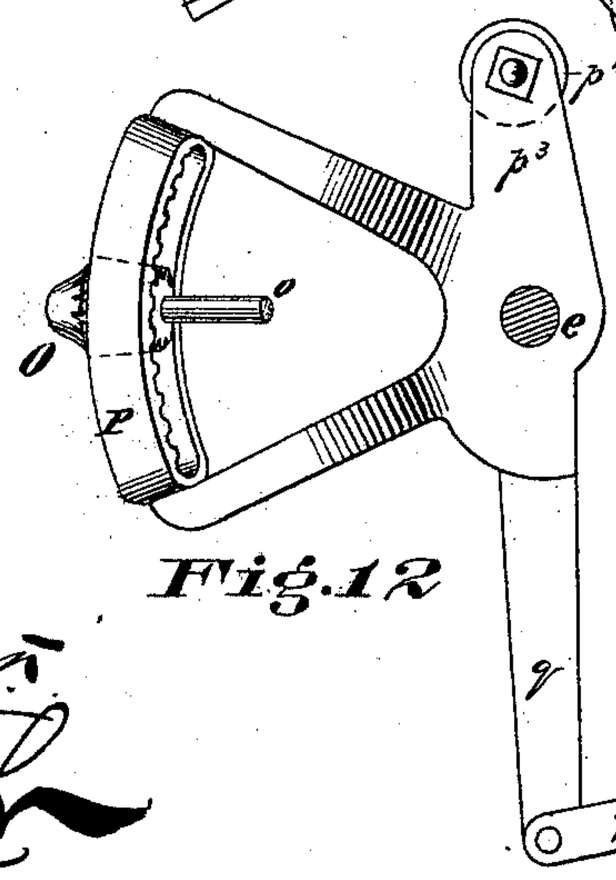

Fig. 12

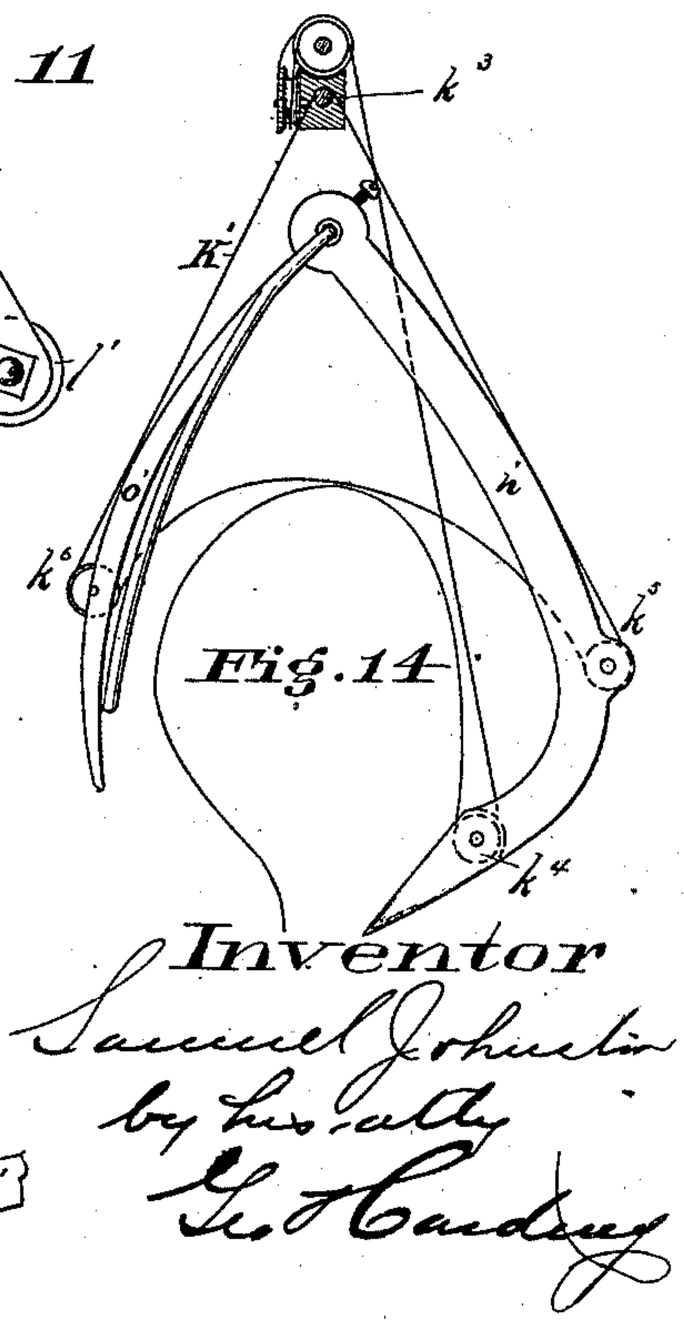

Fig. 14

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by his atty

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S. JOHNSTON.

Grain-Binders.

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Fig. 15

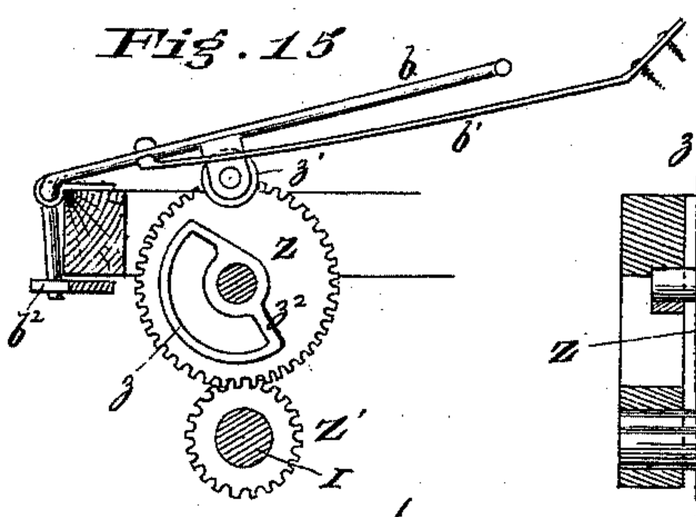


Fig. 16

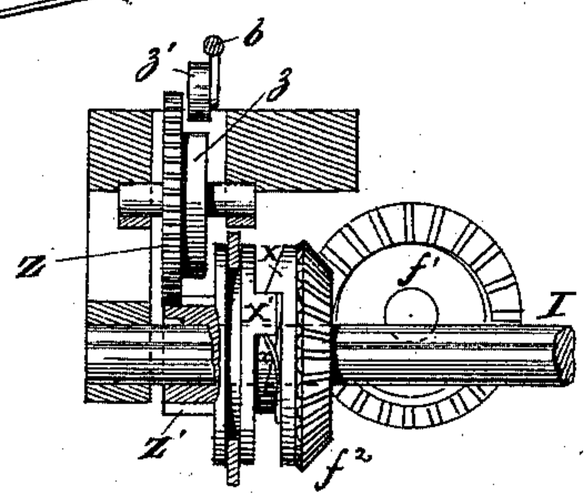
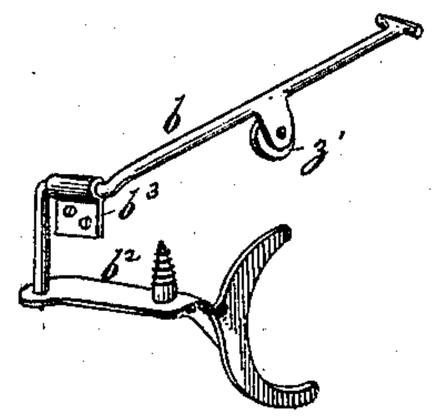


Fig. 17



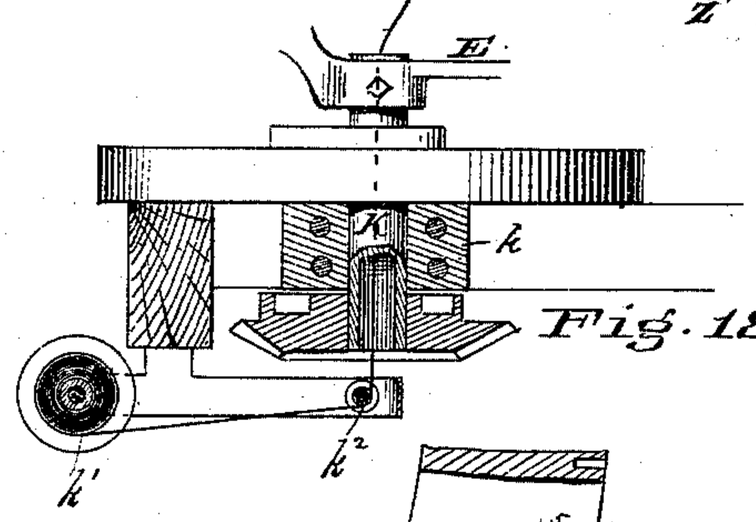
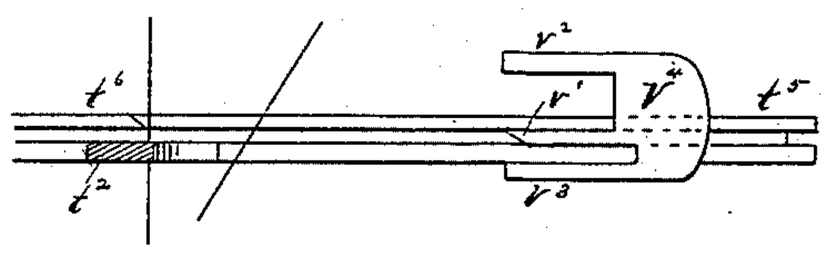


Fig. 18

Fig. 22



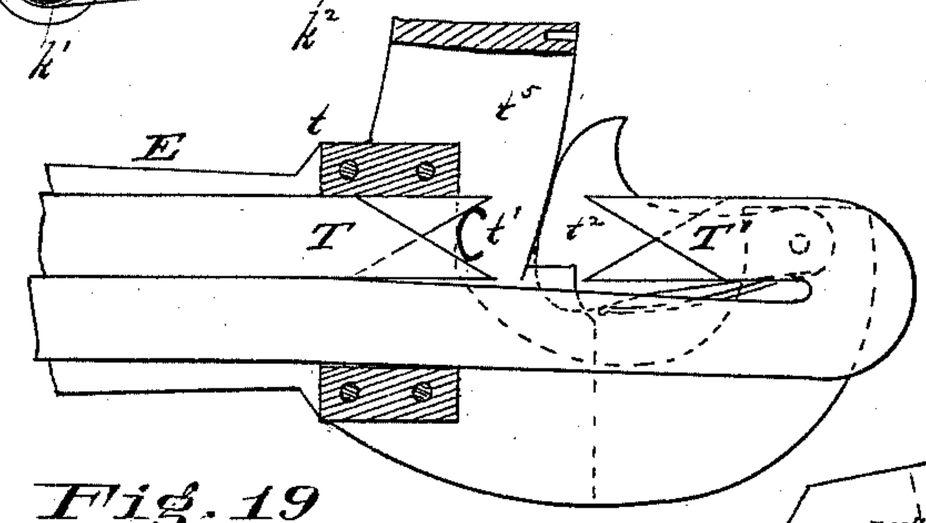
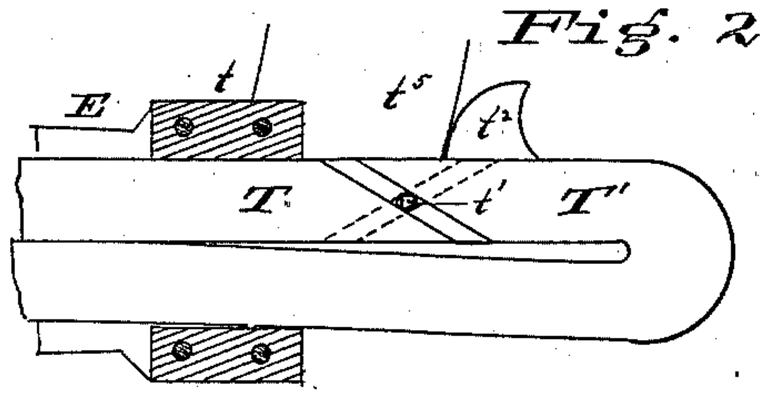


Fig. 19

Fig. 20



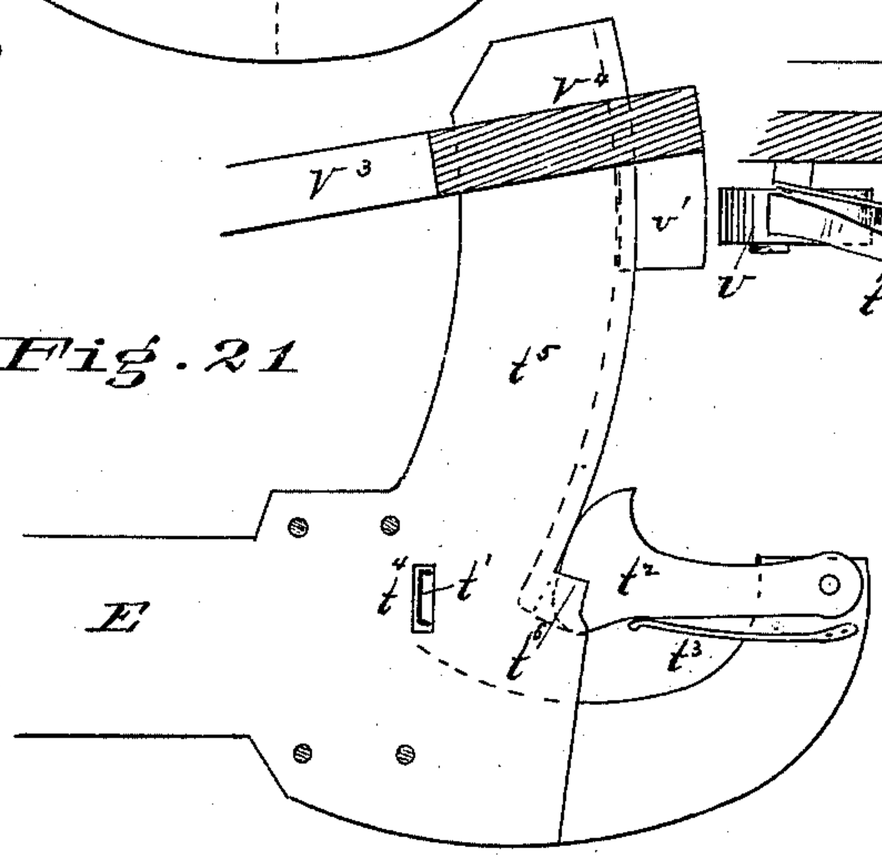


Fig. 21

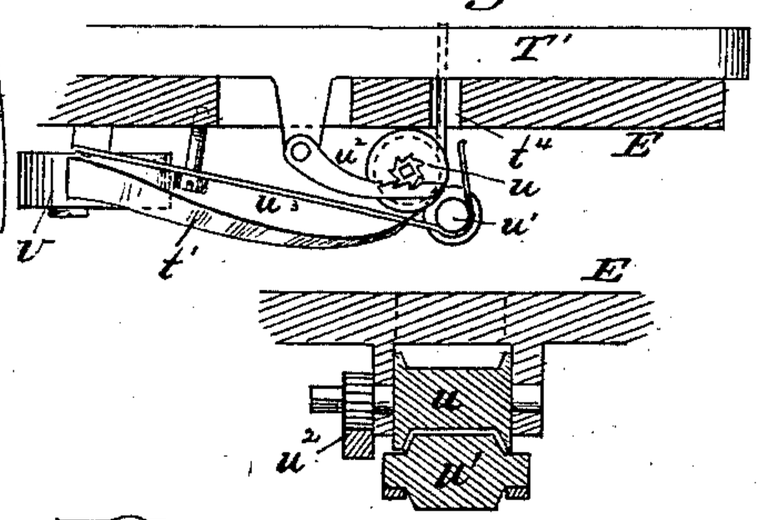
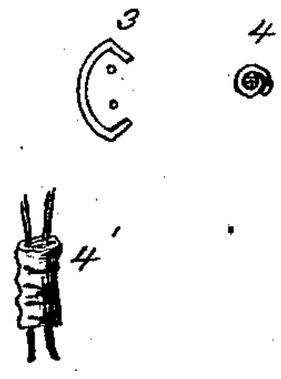


Fig. 24

Fig. 23

Fig. 25



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Inventor

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Geo. F. Bandley & Co

UNITED STATES PATENT OFFICE.

SAMUEL JOHNSTON, OF BROCKPORT, NEW YORK.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **222,632**, dated December 16, 1879; application filed June 12, 1879.

To all whom it may concern:

Be it known that I, SAMUEL JOHNSTON, of Brockport, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Harvesting and Binding Machines, of which the following is a specification.

My invention relates to mechanism operating to cut, gather, and bind grain, and discharge the same bound in a sheaf; and it consists in devices and combinations of devices hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a perspective view of the machine embodying in it my improvements. Fig. 2 is a section through the mechanism by which the band is placed around the bundle and secured there. Fig. 3 is a plan of same. Fig. 4 is a side elevation of the entire machine, showing the driving machinery. Fig. 5 is a plan of the driving machinery. Fig. 6 is a sectional plan of the driving mechanism. Fig. 7 is a detailed section of the gearing which operates the cutter-bar. Fig. 8 is a plan of the mechanism by which the inner divider is operated. Fig. 9 is a plan of the cam which operates the binding mechanism. Fig. 10 is a plan of the plate operated by cam shown in Fig. 9, and which imparts motion to the binding mechanism. Figs. 11, 12, and 13 are detailed views of the mechanism which oscillates the shafts carrying the compressing-arm and band-carrier. Fig. 14 is an elevation of the compressing-arm and band-carrier and compressing-band. Figs. 15, 16, and 17 are views showing the mechanism by which the continuously-rotating platform is thrown in and out of gear. Fig. 18 is a view showing the means by which the band is supplied to the band-carrying arm. Figs. 19, 20, 21, 22, 23, and 24 are detailed views of the binding and severing mechanism. Fig. 25 shows the metallic ribbon in its various forms before, during, and after being operated on by the binding mechanism.

Like letters of reference correspond to like parts of the machine.

A represents the platform; B, the driving-wheel, and C the guide-cam for the reeling mechanism of a harvesting-machine. D is a cover to the binding mechanism, and is supported by and revolves with the binding-frame E. The bevel-gear F, which is mounted upon and secured to the driving-shaft G, gears into a bevel-gear, g, secured upon a shaft, g', and gives a rotary motion to the reel-arms H H by means of another set of bevel-wheels, g^2 and g^3. The reel-arms are provided with teeth wherewith to gather the grain. The reel-cam C may be moved upon its center by means of a lever, p, which is secured in any desirable position by a rack, p'. By the proper movement and adjustment of this lever p the reel-arms move a greater or less distance back upon the platform A, by which adjustment the band is make to pass around the desired part of the grain when in the form of a bundle.

The relative proportions of the gearing which drives the reel-arms and the gearing for driving the binding mechanism across the front of the platform are such that the binding mechanism passes from right to left on the platform across the front in the interval between the passage of two successive reel-arms across the front line or track pursued by the binding mechanism, compressing-arms, and band-carrying arm, so that the reel-arms shall not throw the grain on top of the binding mechanism, compressing-arm, and band-carrying arm while they are traveling across the platform.

The bevel-gear F′, which is secured to the shaft G, meshes into a bevel-wheel, f, which, in turn, puts in motion a pair of bevel-wheels, f' and f^2, through the agency of a shaft. The bevel-gear f^2 causes a shaft, I, to rotate. Upon the opposite end of said shaft I is a small bevel-wheel, i, which meshes into a larger wheel, J, which is provided with a camway, j, the object of which will be hereinafter explained.

The bevel-gear J is secured upon a vertical hollow shaft, K, which rotates in bearings k, and imparts a rotary motion to the binding-frame E, which carries the binding mechanism and other parts directly related thereto.

At one end of the binding-frame E, and at point e, is pivoted the segmental gear L, having a projecting piece, l, carrying a roller, l', which travels in a camway, M, imparting an oscillating motion to the segmental gear L, which meshes into the pinion N, causing a rotating motion of said pinion, and also to a hol-

low shaft, n, upon which it is secured, and an oscillating motion to the band-carrying arm n', which is secured to shaft n at the other end. The shaft n rotates in bearings n^2 n^3.

O is a small pinion secured upon a shaft, o, rotating within the hollow shaft n, which acts as a bearing to said shaft. The upper end of this shaft o is formed into or has secured to it a compressing-arm, o', which oscillates with motion corresponding to that of the shaft o and pinion O. The pinion O is rotated by means of a segmental rack-frame, P, which is pivoted at e, and has an oscillating motion imparted to it by the arm p^3, carrying a roller, p^4, which moves in a camway, Q. Secured to or forming part of the oscillating rack P is an arm, q, which moves a discharging-rake, q^3, by means of a rod, q', and crank q^2, so that the bundle, when completed and bound, is discharged from the revolving platform.

Pivoted to the binding-frame E is a plate, R, which has a fulcrum at e'. This plate R is provided with a camway, r, and two crank-pins, r' r^2. This plate R is oscillated upon its fulcrum e' in a horizontal plane by the rollers r^3 r^4 striking the cam-pieces S S'. The roller r^3 is longer than the roller r^4, and consequently is acted upon by the portion s of cam-piece S' for the purpose of throwing the roller r^4 inwardly, thereby bringing it within the range of the cam-piece S. This is shown in Figs. 9 and 10.

Upon the end of the binding-frame E farthest from the shaft K is the binding mechanism proper, which mechanism is operated directly by the oscillating piece R, just described.

The crank-pins r' and r^2 impart motion simultaneously to the rods or bars T T' (supplied at their extremities with crimping-jaws) only in opposite directions, thereby causing said jaws to close upon each other. These jaws are kept from moving laterally by the box t. The jaws are V-shaped, and are supplied with teeth, so that the teeth of one may pass between the teeth of the other, thereby allowing said jaws to close tightly upon the metallic ribbon t', crimping it in the manner hereinafter described.

The band is held by the eccentric band-holder t^2, which is kept tight by the spring t^3. The metallic ribbon is held in the box U, and is then given half a turn and passed between the rollers u u', which crimp it into the shape shown in Fig. 23. The metallic ribbon t' is fed to the crimping-jaws T T' by means of the ratchet-wheel and pawl u^2, which is operated by the jaw T'. The roller u' is kept tightly against the roller u by the spring w^3. The rollers u and u' crimp and feed the ribbon t' through the slot t^4, where the jaws T T' crimp it around the two ends of the bands, and at the same time one of the crimping-jaws cuts the ribbon by means of a knife-edge of the slot t^4.

The various shapes taken by the ribbon are shown in Fig. 25. In the box U it is straight, as at 1. The rollers u u' crimp it as shown at 2, the crimping-jaw T crimps it as shown at 3, and when the two jaws T T' come together the final result is shown at 4 and 4'.

Working in the camway r in plate R is a pin, v, which imparts motion to a rod, V, operating a toggle-joint, V' V^2 V^3, with a final result of an oscillating movement to the lever and head V^3 V^4, whose fulcrum is at V^5, the object of which is to force the bands which have been carried in front of the guide t^5 and band-holder t^2 between said guide and band-holder by means of the pieces v^2 v^3 of the head V^4, which holds them; and, finally, after the jaws T T' have crimped the ribbon t' around the bands the knives v' and t^6 cut the band immediately above the band-holder t^2, and thereby set the bundle free, when it is discharged by the rake q^3. The piece t^7 pushes the bands within the grasp of the metallic ribbon before the jaw T' comes into action, and thereby insures the encircling of the bands by the ribbon. When the band has been cut by the knives v' and t^6 the end of the band is held tightly between the guide t^5 and eccentric jaw t^2, which forms the band-holder, and is ready for the next bundle.

The band for binding the grain is held upon a reel, k', and from this supply it passes over a small idler, k^2, through the hollow shaft K, and then over roller on the compressing-spring rod k^3, which is held in bearings on the binding-frame E, and from this rod k^3 it passes over the roller k^4 in the extremity of the band-carrying arm n', and then between the band-holder t^2 and guide t^5, where it is securely held.

The compressing-band K' is held by the nut k^7, and passes over the roller k^6 in the compressing-arm and the roller k^5 in the band-carrying arm, as shown in Fig. 14. The tension of the band K' is given by the spring k^3.

The inner divider is composed of three parts. The part W is hinged to the stationary part at w, and is moved to and fro upon w as a fulcrum by the bar w', which is attached to a lever, w^2, whose fulcrum is at w^4, and which is operated by camway j, in which the roller w^3, which is secured to lever w^2, moves.

Hinged to the end of the part W is a part, W', which moves with the part W, and also has an additional motion imparted to it by the cam w^5, through the agency of a roller and lever.

By arranging the driving mechanism on the side of the driving-wheel B opposite to the binding mechanism, the great weight of the platform, with its binding mechanism, is balanced to a certain extent.

The shaft I, which operates the binding-frame E through the agency of bevel-gear, is thrown in and out of gear with the bevel-wheel f^2 by the following means: Secured to the shaft I is a pinion, Z', and grooved wheel, which wheel is provided with a projection, X', which presses against the tooth X on the bevel-wheel f^2. The projection is prevented from backward motion by means of a spring, x'. In addition to this clutch there is another and

smaller one between the grooved wheel and bevel-wheel f^2, as shown in Fig. 16. Meshing into the pinion Z′ is a gear-wheel, Z, carrying upon it a cam, *z*. Situated over the cam *z* is a roller, *z′*, attached to a bell-crank lever *b*, which is kept up by the spring *b′*. The lever *b* works in a bearing, b^3, and moves a second bell-crank lever, b^2, which is provided with jaws which fit into the groove in the wheel attached to the pinion Z′. These levers are shown in Fig. 17. The gearing is so constructed that the wheel Z makes the same number of revolutions as the revolving platform and binding mechanism. As shown in Fig. 16, the binding mechanism and revolving platform are in gear. To throw them out of gear the lever *b* is pressed down, and the roller *z′* moves upon the cam *z* until the diameter of said cam suddenly diminishes, when the roller *z′* and lever *b* are depressed. The roller *z′*, striking the portion z^2 of the cam, brings the wheels Z and Z′ to rest. At the same time the two bell-crank levers *b b′* produce a lateral motion of the pinion Z′ and the grooved wheel carrying the clutch X′, which throws it out of contact with the tooth X of the bevel-wheel f^2, which revolves idly until the pressure is removed from the lever *b*, when the spring *b′* raises the roller *z′* and releases the cam, and thereby throws the projection X′ into contact with the tooth X, which sets the binding mechanism into action once more. By this means of throwing in and out of gear the binding mechanism it is readily seen that the compressing-arm and band-carrier can be brought to rest only at the back of the machine and out of the sweep of the reel-arms H H.

The knife-bar is operated by the gear-wheel G′, which is secured to the driving-wheel B, through the agency of the pinion g^4, shaft g^5, and bevel-gears g^6 and g^7. The pinion g^4 slides upon the shaft g^5, but revolves with it, and may be thrown in or out of gear at will by the lever d^2.

The driving-wheel B may be thrown in or out of gear with the shaft G by the clutch *d* and lever *d′*.

As shown, the rotating platform and binding mechanism move from the grain to the stubble side; but by a slight modification the reverse movement can be imparted to the said platform and its appendages, but not with quite so good a result.

In the operation of the machine, grain is pressed on the cutters by one of the reel-arms, and then back onto the platform, to secure its being bound at or near the middle of the bundle. A second and third reel-arm carries the grain to the same point. Immediately after the third reel-arm has carried the grain to that point, and in the interval before the fourth reel-arm has caused the grain to fall on the platform, the rotating shaft K causes the compressing-arm and band-carrier to pass across the platform from right to left, thus avoiding the cut grain being thrown upon them while revolving, which is of the first importance in the application of a rotating binding apparatus in connection with a revolving reel.

The grain being thrown upon the platform, the compressing-arm *o′* descends, and shortly after the inner divider, W, presses the grain together, and then the cam w^5 actuates the part W′, which more completely presses the grain. Then the band-carrier descends, and the compressing-band presses the grain tightly, while the band for binding is passed around the bundle and pressed between the band-holder t^2 and the guide t^5 by the head V^4.

The metallic ribbon being fed between the jaws T T′, the piece t^7 pushes the bands back within the metallic ribbon, and then the crimping-jaws T T′ close and crimp this ribbon around the band, and at the same time cut it off from the rest of the ribbon, forming a metallic clip. Then the knives *v′* and t^6 cut the band, leaving the end secured within the band-holder and ready for the next bundle.

The cutting movement is imparted to the knife *v′* by the action of the end of the cam-way *r* in plate R. When the band is severed the rake q^3 discharges the bundle from the platform, and the same operation is performed once again. During this operation of binding the platform and binding mechanism revolve, carrying the bundle with them. Just before the discharging of the bundle the band-carrier ascends, and allows the rake q^3 full action.

Having thus described my invention, what I claim is—

1. The combination, with the spring-rod K^3, band-carrying arm *n′*, and opposing compressing-arm *o′*, of the endless compressing-band running freely over pulleys in the points of the band-carrying and compressing arms, and kept taut by the spring-rod, substantially as described.

2. An inside divider composed of parts W and W′, in combination with a cam, w^5, for controlling the motion of the part W′, substantially as and for the purpose specified.

3. The combination, with the binding and compressing arms sweeping across the front of the platform to gather the grain, of the two-part vibrating divider, as and for the purpose set forth.

4. In combination with the reel for the metallic ribbon, and with mechanism for applying to the band-clips severed therefrom, the intermediate feed-rolls, constructed so as to give a preparatory crimp to the ribbon in the act of feeding it.

5. In combination with a binder-arm and band-securing mechanism, a band-holder consisting of an eccentric dog on one side of the slotted approach to said mechanism, working against an opposing clamping-surface on the other side of said slot, and arranged relatively to the delivery of the band thereto so that the latter enters sidewise between the two surfaces in the direction of their convergence.

6. The combination of the reciprocating crimping-jaws T T′, the opposing faces of the

jaws being V-shaped, and each jaw built up of leaves, alternating with those of the other, so that the jaws may close up tightly as they reciprocate.

7. The combination, with the reciprocating crimping-jaws, formed as described, of mechanism for feeding the ribbon of metal lengthwise between their V-faces, substantially as described.

8. The combination, with the reciprocating crimping-jaws, of mechanism for feeding a ribbon of metal between them and giving it a preparatory crimp as it is fed, substantially as described.

9. The combination, with the reciprocating crimping-jaws, of mechanism for feeding a ribbon of metal thereto and giving it a preparatory crimp as it is fed, mechanism for introducing the ends of the band, and mechanism for severing the band and metal.

10. The combination, with the rotating binding-platform and the binding mechanism carried thereby, of clutching devices in the train of driving-gear operating, when unshipped by the attendant, to bring the platform uniformly to a stop, with the binding-arms directed away from the reel.

11. In combination with the band-carrying arm, the band-securing mechanism, and their carriage, the pivotal driving-gear, perforated axially to admit the band material to its arm at the center of motion.

12. In combination with a binding-arm sweeping about a vertical axis to gather and present the gavel for delivery, and having an independent movement upon an axis transverse to the first to carry the band about said gavel, a driving-gear concentric with the vertical axis, and itself perforated axially to admit the band material to the arm.

13. The combination, with the binding and compressing arms having pinions upon the ends of their respective shafts, of the rack-frames meshing with said pinions and cams for actuating the rack-frames to open and close said arms.

14. The combination, with the revolving platform and with the binding-arm carried thereby, of the stationary cam-plate beneath the platform and a rack-frame pivoted to the platform, meshing with a pinion upon the end of the binding-arm shaft, and vibrated to actuate the arm by a projection upon its heel taking into a cam-groove in the plate.

15. The combination, with the revolving platform and with the binding and compressing arms mounted thereon and moving therewith, of the stationary cam-plate beneath the platform, and rack-frames pivoted to the platform, meshing with pinions upon the ends of the shafts of the binding and compressing arms, and vibrated by projections upon their respective heels taking into cam-grooves in the plate to cause the arms to open and close.

16. The combination of the revolving gathering compressing device and band-carrier with the mechanism for holding the band and crimping the metallic clip around the bands, substantially as and for the purpose specified.

17. The mechanism for throwing in and out of gear the revolving platform and binding mechanism, composed of the following parts: gear-wheels Z Z′, cam z z^2, roller z', levers b b^2, spring b', bevel or driving wheel f^2, and clutch X X′, operating substantially as and for the purpose set forth.

In testimony of which invention I hereunto set my hand.

SAMUEL JOHNSTON.

Witnesses:

R. A. TILGHMAN,

A. MOORE.