No. 854,917. PATENTED MAY 28, 1907.

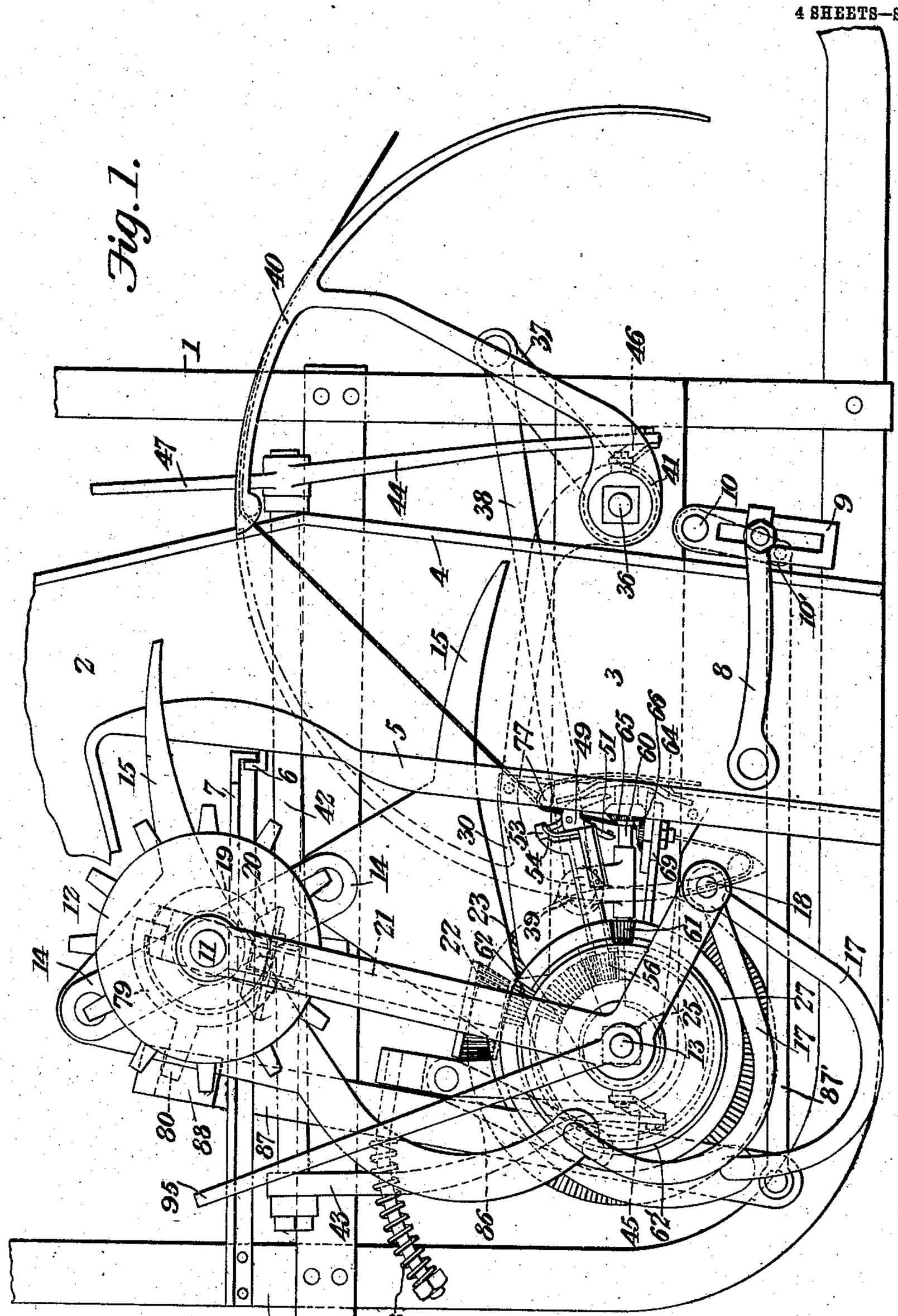
W. H. TILSON.

BINDING MECHANISM FOR CORN HARVESTERS.

APPLICATION FILED FEB. 6, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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4 SHEETS—SHEET 2.

Fig. 2.

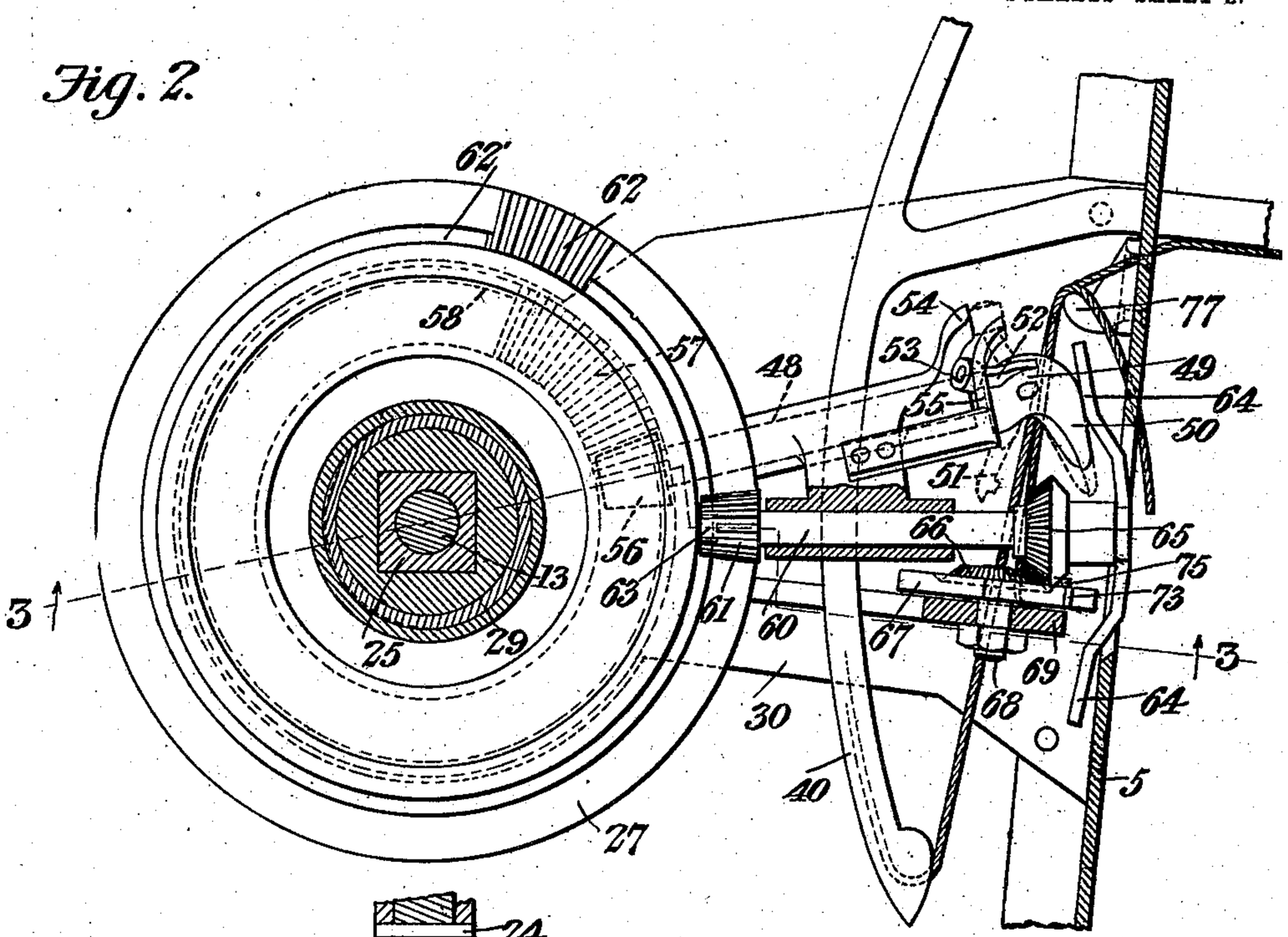
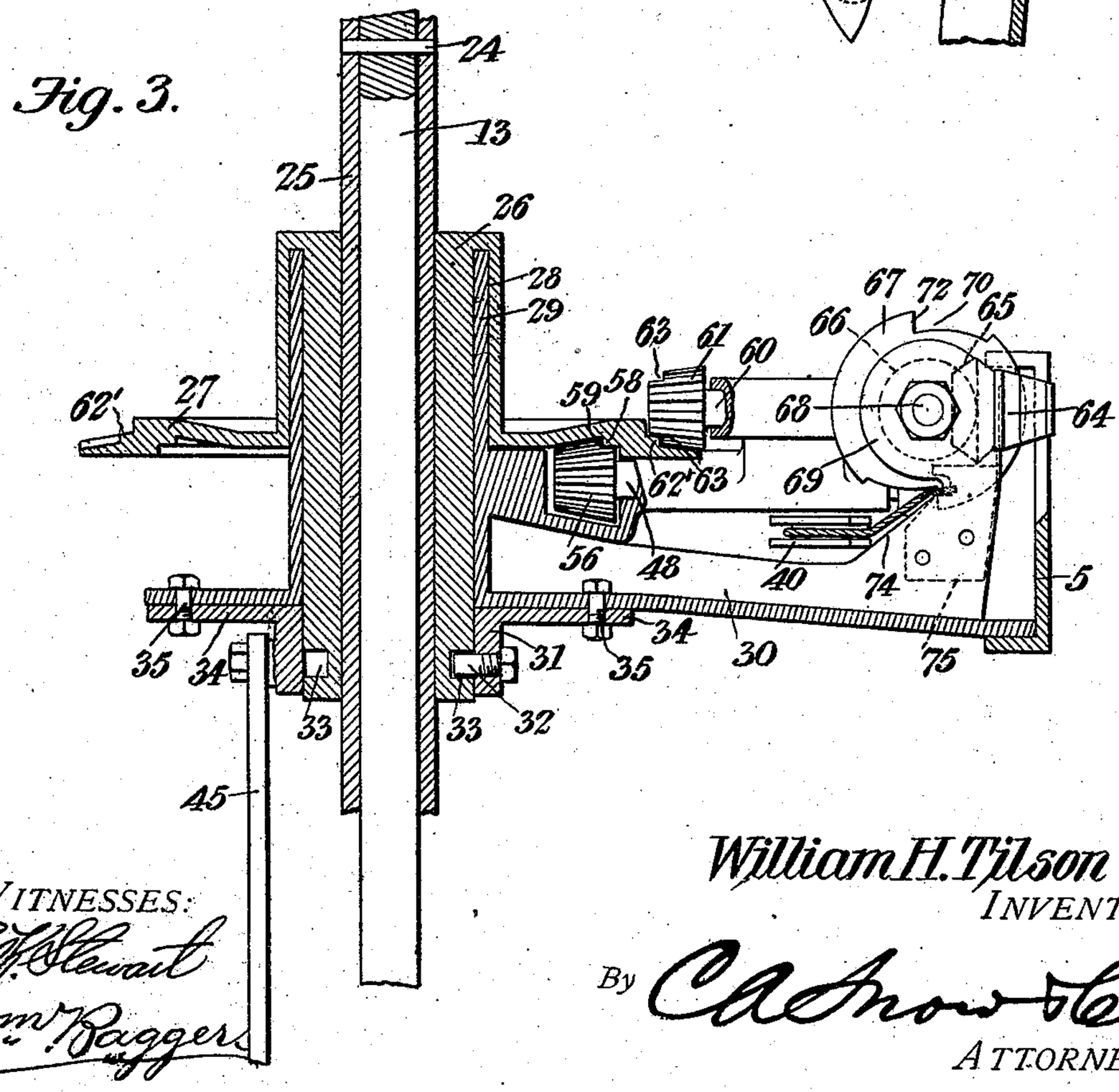


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

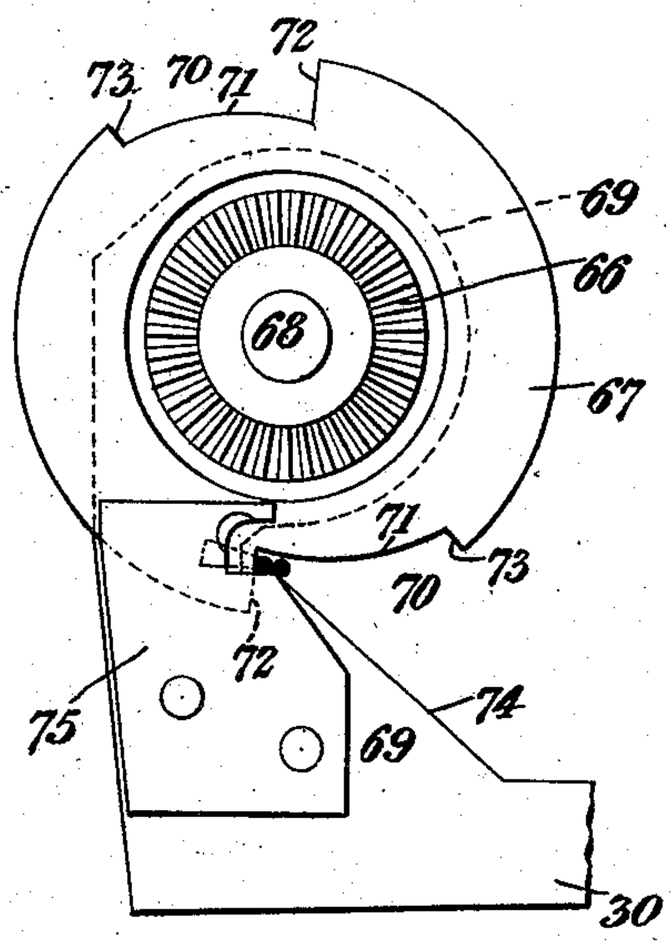


Fig. 5.

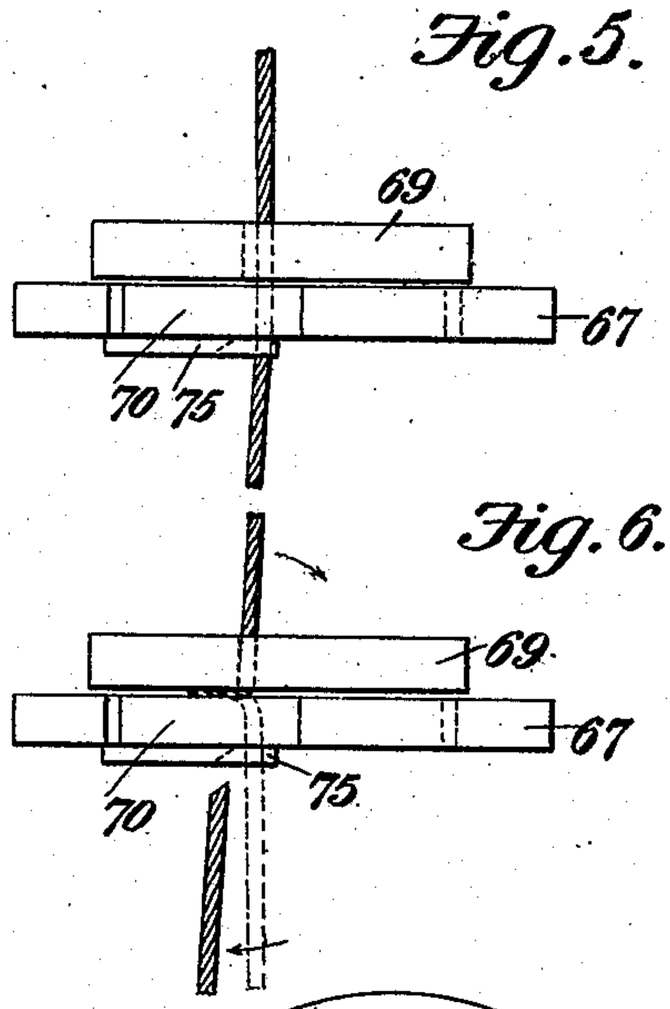


Fig. 6.

Fig. 10.

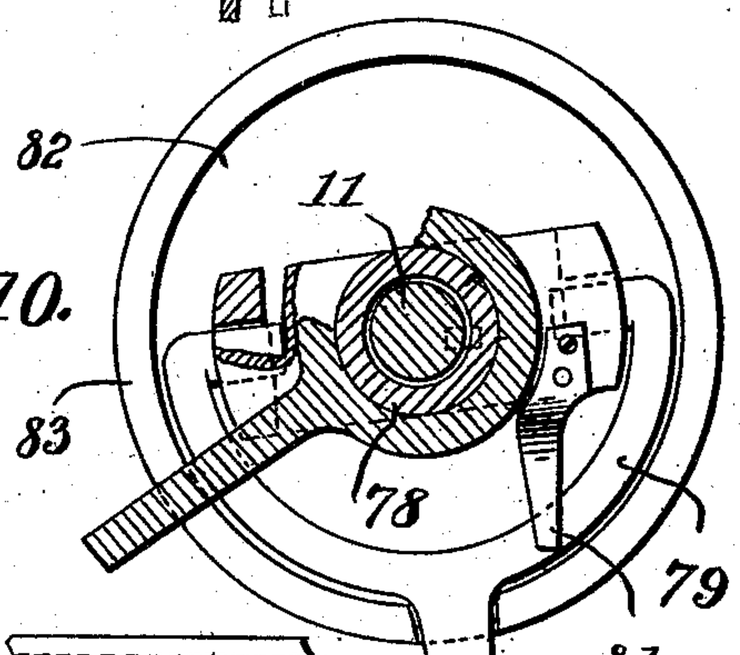
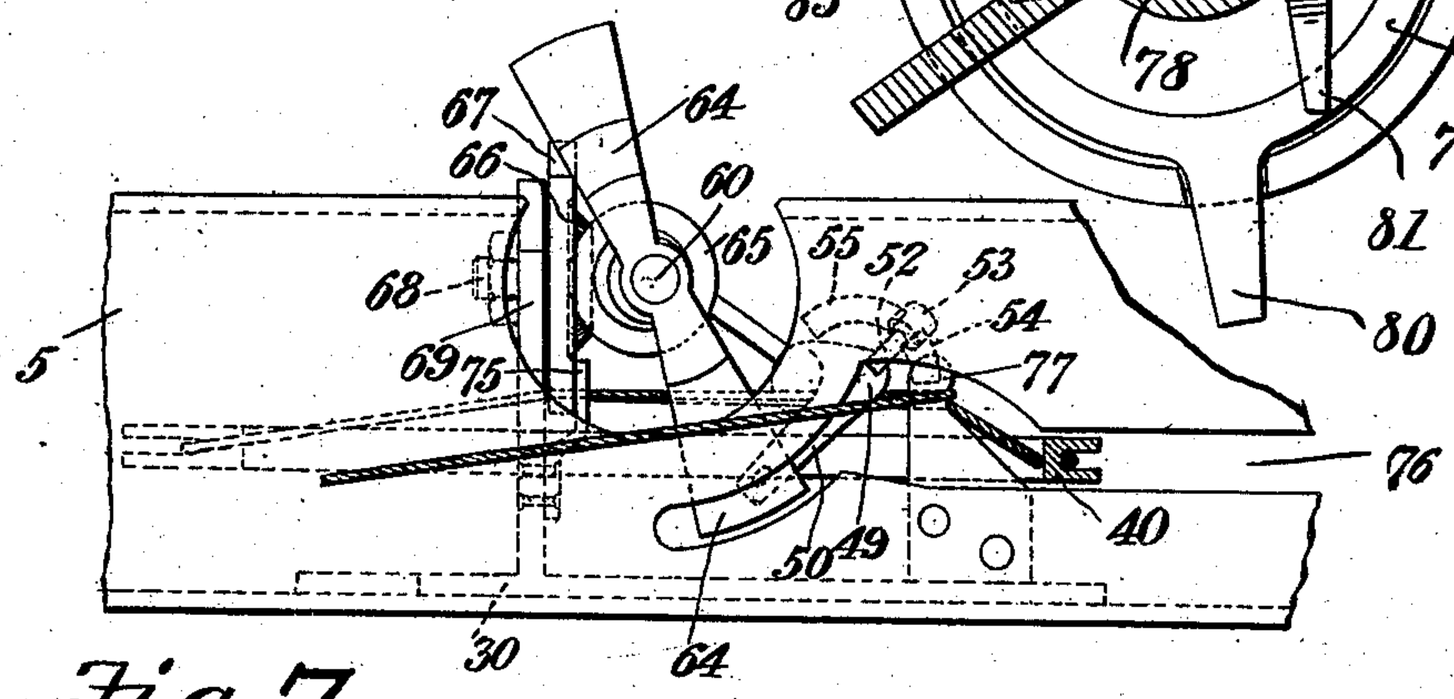


Fig. 7.



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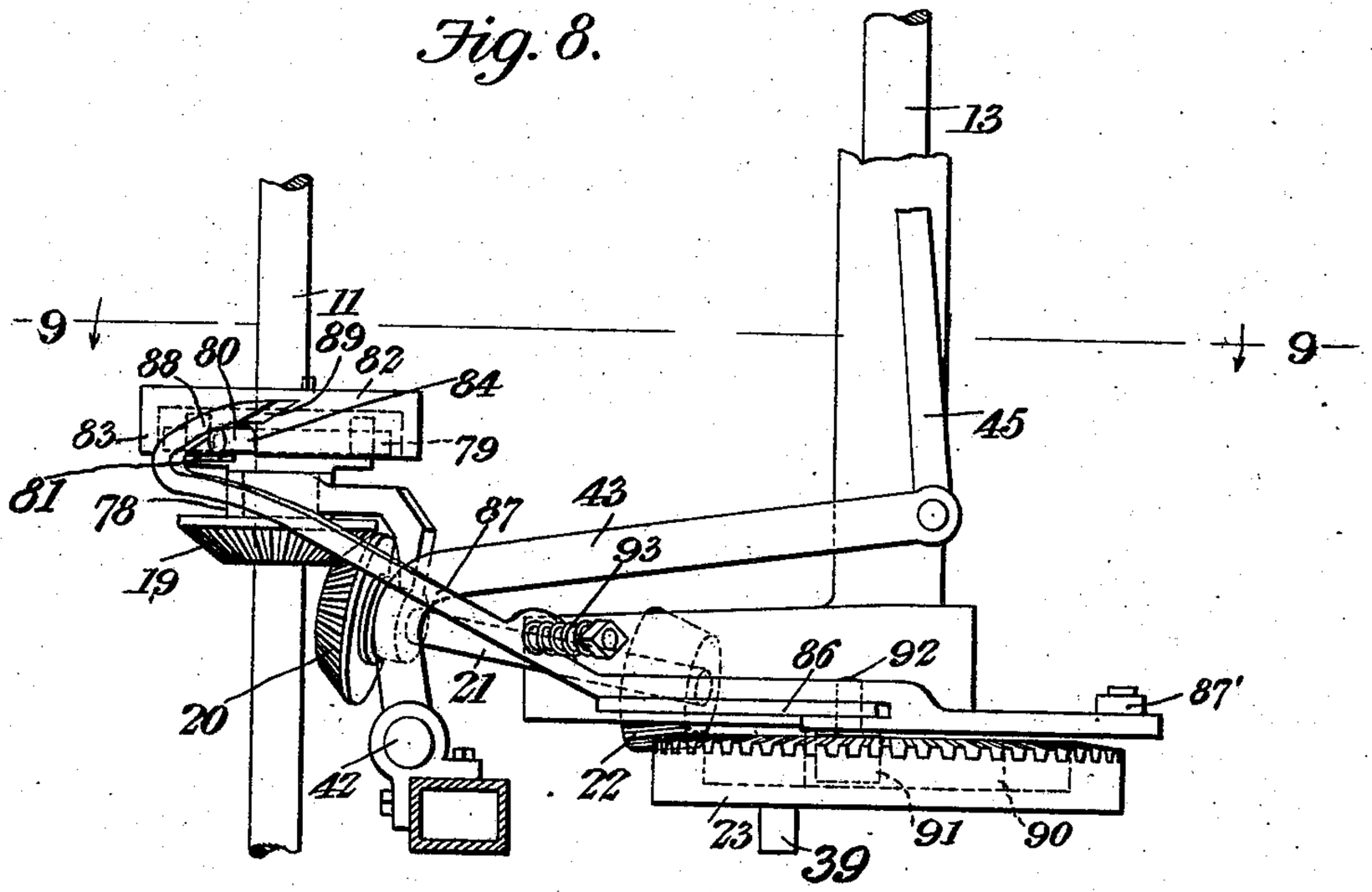
4 SHEETS—SHEET 4.

Fig. 8.



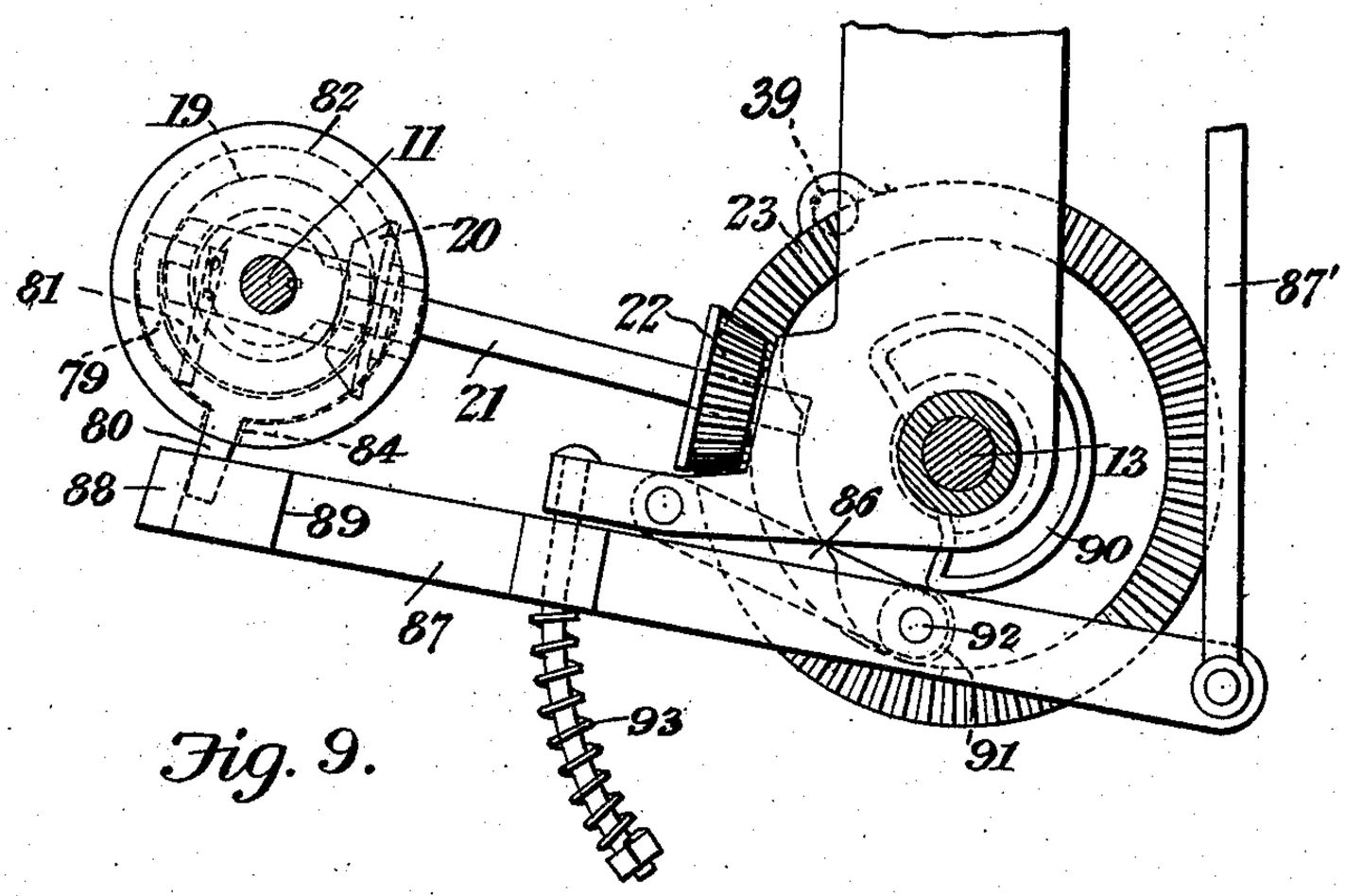


Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM H. TILSON, OF PLAINVIEW, TEXAS.

BINDING MECHANISM FOR CORN-HARVESTERS.

No. 854,917. Specification of Letters Patent. Patented May 28, 1907.

Application filed February 6, 1906. Serial No. 299,753.

To all whom it may concern:

Be it known that I, WILLIAM H. TILSON, a citizen of the United States, residing at Plainview, in the county of Hale and State of Texas, have invented a new and useful Binding Mechanism for Corn-Harvesters, of which the following is a specification.

This invention relates to an improved binding mechanism for corn harvesters and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The objects of the present invention are to provide binding mechanism of simple and improved construction, whereby the corn stalks may be tied into bundles; the binding operation being automatically performed; and with these and other ends in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described and particularly pointed out in the claims.

In the drawings, Figure 1 is a top plan view illustrating a corn binding mechanism constructed in accordance with the principles of the invention. Fig. 2 is a sectional view laid at right angles to the axis of the knotter shaft and showing the knotting mechanism on a larger scale than in Fig. 1; the needle being advanced to place the cord in position to be operated upon by the knotter bill. Fig. 3 is a vertical sectional view taken on the plane indicated by the line 3—3 in Fig. 2. Fig. 4 is a face view of the cord holder or twine holder, showing also the twine cutter coöperating therewith. Figs. 5 and 6 are top plan views illustrating the twine holding mechanism, respectively prior to and after the cutting of the twine. Fig. 7 is a side elevation illustrating a portion of a knotting mechanism. Fig. 8 is a sectional view showing portions of the packer shaft and of the knotter shaft, and illustrating the mechanism for transmitting motion intermittently from the former to the latter. Fig. 9 is a sectional detail view taken on the plane indicated by the line 9—9 in Fig. 8. Fig. 10 is a transverse sectional view of the packer shaft showing a bottom plan view of the mechanism for transmitting motion intermittently therefrom.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

1 designates a portion of the frame of a corn harvester to which the invention is applied, and 2 is a throat or passageway through which the corn stalks pass in a standing or upright position into the chute 3 upon the floor of which the butt ends of the stalks are supported; said chute being bounded by the guide rails 4 and 5, the former of which is stationary, while the latter is vertically movable, as will be presently more fully described. The movable rail 5 has been shown as being provided with an L-shaped lug 6 engaging and guided upon a bracket 7 suitably supported upon the frame, and which is simply for the purpose of bracing and reinforcing the guide rail. The discharge end of the chute is provided with a trip or closure 8 extending from a crank 9 upon an upright shaft 10 which is normally in a closed position across the discharge end of the chute.

Adjacent to the throat or passage 2 is a vertically disposed shaft, which will be designated as the packer shaft. This shaft, 11, is constantly driven from some suitable source of power, which may be some driven part of the harvesting machine in connection with which the present invention is used; the shaft 11 has been shown as equipped with a sprocket wheel 12 to enable it to be driven. Another vertical shaft 13, which is known as the knotter shaft, is supported a short distance in rear of the packer shaft, which latter is provided with cranks 14 upon which the packer arms 15 are supported for gyration; said packer arms being connected pivotally with links 17 pivoted upon a pin or shaft 18. The free ends of the packer arms extend across the chute 3 and serve to move the corn stalks in the direction of the discharge end of the latter and to pack said stalks in advance of the trip 8 in a position to be operated upon by the binding mechanism.

The packer shaft 11 carries a bevel pinion 19 meshing with a bevel pinion 20 upon one end of a shaft 21, the other end of which carries a bevel pinion 22 meshing with a bevel gear 23 upon the knotter shaft 13, to which latter motion may thus be transmitted. Special means are provided whereby this motion transmitting means will be intermittently operated, and said special means will be hereinafter more fully described.

Secured upon the shaft 13 by means of a pin or key 24, so as to rotate with said shaft, is a sleeve 25 of non-circular cross section. Vertically movable upon the sleeve 25 is a

hub 26 carrying a wheel or disk 27 of peculiar construction, as will be presently described. The hub 26 is provided with an annular recess 28 revolubly engaging an annular flange 29 formed upon a bracket 30 the outer end of which is bolted upon and firmly connected with the guide rail 5.

31 is a collar, revolubly engaging the lower end of the hub 26 and having a pin or member 32 engaging an annular groove 33 in said hub; the collar 31 has a flange 34 which is rigidly connected with the bracket 30, as by means of bolts 35. It will thus be seen that the bracket member 30 is connected with the hub 26 for endwise movement parallel to the axis of the shaft 13, and that said bracket member will be held stationary owing to its connection with the guide rail 5, while the hub 26 is free to rotate. Practically, the bracket 30 supports the hub 26 and its related parts. Vertical adjustment of the hub and the bracket member may be effected by means which are to be presently described.

36 designates a needle shaft which is supported adjacent to the guide rail 4 at the side of the chute 3 opposite to the knotter shaft, said needle shaft being provided with a crank 37 which is connected by means of a link rod 38 with a crank pin 39 connected with and driven by the knotter shaft 13, from which later motion will thus be transmitted to the needle shaft to rock or oscillate the latter in its bearings. The needle shaft carries the needle 40 which oscillates with said shaft and which is vertically adjustable thereon by means of a collar and set screw 41. To provide for the vertical adjustment of the needle and of the hub 26 and bracket 30 upon the knotter shaft, a rock shaft 42 is supported in suitable bearings and provided with arms 43 and 44, which are connected by means of links 45 and 46 respectively with the collars 31 and 41. The rock shaft 42 is operable by means of a hand lever 47, and it will be readily seen that by manipulating said lever, the collars 31 and 41, and all related parts, will simultaneously receive vertical adjustment.

Upon the bracket 30 there is supported for rotation a shaft 48 carrying the knotter bill 49 which is of the usual well known construction and which includes a stationary member 50 and a pivoted member 51; the latter having an arm 52 carrying an anti-friction roller 53 adapted to engage the cam members 54 and 55 whereby the movable member of the knotter bill is moved respectively to an open and to a shut position; the cam members 54 and 55 are supported upon stationary parts connected with the bracket 30, such as parts of the bearing for the shaft 48. The latter carries at its inner end, that is to say the end which is nearest the knotter shaft 13, a bevel pinion 56 which is adapted to be engaged, at the proper time, by a gear portion 57 upon the under side of the disk 27; the gear portion or mutilated gear 57 being of just sufficient extent to impart one complete revolution to the shaft 48 during the period of the complete rotation of the disk 27. The latter is also provided with a key flange, or locking flange, 58, adapted to engage a notch 59 in the pinion 56, which latter will thus be locked against rotation at all times except when it is engaged by the mutilated gear 57; the key flange, or locking flange, 58, being obviously extended completely around the disk 27, in the plane of the periphery of the mutilated gear 57, except upon the portion of the disk occupied by said mutilated gear.

The shaft 48 obviously occupies a position radial to the knotter shaft 13. Supported upon the bracket 30 is another shaft, 60, which is likewise radial to the shaft 13 and which carries at its inner end a bevel pinion 61 adapted to be engaged by a gear portion 62 upon the upper side of the disk 27, the gear portion, or mutilated gear 62, being of sufficient extent to impart to the pinion 61 and shaft 60 just one-half of a revolution during the period of rotation of the disk 27. The latter is provided with a key or locking flange 62′ adapted to engage one of two diametrically opposite notches 63 in the pinion 61, which will thereby be locked against rotation at all times except when engaged by the gear section or mutilated gear 62. The shaft 60 carries at its outer end radially extending wings 64 adapted, when the shaft rotates, to wipe over the face of the stationary member 50 of the knotter bill for the purpose of removing from the latter the knot formed thereby.

The shaft 60 carries a bevel pinion 65 meshing with a bevel pinion 66 which is formed upon the face of a disk 67 mounted upon a short shaft 68 which is supported for rotation in a web 69 upon the bracket 30. The disk 67 coöperates with the web 69 to hold the end of the binding twine, and said disk will therefore be termed the twine holder. The pinions 65 and 66 are of the same dimensions, and the disk 67 will consequently make one full rotation to each rotation of the shaft 60 and will be locked against rotation when the shaft 60 is locked by the means provided for the purpose, as hereinbefore described. Said disk 67 is provided in diametrically opposite sides with cam-shaped recesses 70 having eccentric faces 71 and shoulders 72, 73; the longer shoulders, 72, being disposed at the front ends of the recesses with regard to the direction of rotation of the disk. The web 69 has an inclined shoulder 74 and upon said web is mounted a twine cutter 75. It will be observed that the normal position of the disk 67 when at rest is such that one of the shoulders 72 will be located slightly in advance of the cutting edge of the twine, thus preventing any possibility of the twine coming accidentally into

engagement with the cutting edge. When the twine has been cut in tying the bundle, the end of the twine is retained between the disk 67 and web 69, as shown in Fig. 6.

The movable guide rail 5 has a slot 76 constituting a needle passage, and upon said guide rail is secured a finger 77 which extends across the slot 76 and lies directly in the path of the twine, so as to intercept and guide the latter. The position of the twine holding finger 77 is such, with relation to the eye of the needle when the latter is fully advanced as shown in dotted lines in Fig. 1 of the drawings, that the twine passing from the eye of the needle and over said finger will be led directly across the knotter bill and across the shoulder 74 of the web 69 in the path of the shoulder 73 at the rear end of the recess 70 of the disk 67, which, at the time, is in operative engagement with the shoulder 74. Beyond thus guiding the twine, the finger 77 will in no wise obstruct the latter.

In Figs. 8 and 9 of the drawings has been illustrated the mechanism whereby motion will be transmitted to the knotter shaft, intermittently, and at the proper times. The bevel pinion 19 upon the packer shaft 11 has a hub 78 upon which is pivoted a yoke 79 provided with a pin 80; the free end of the yoke which carries the pin being normally forced in an upward direction by the action of a suitably arranged spring 81. The pinion 19 is loose upon the shaft 11, and fixed upon said shaft directly above said pinion is a disk 82 having a depending flange 83 provided with a notch 84 adapted to be engaged by the pin 80, which latter is normally moved in the direction of the notched edge of the disk 82 by the action of the spring 81. 86 represents a suitably supported, pivoted link upon the free end of which is pivotally mounted a lever 87 one end of which carries an upturned hook 88 having a beveled point 89 which extends slightly above the horizontal plane of the notch 84 in the flange 83 of the disk 82. The opposite end of the lever 87 is connected by means of a link 87′ with an arm or crank 10′ extending from the spring actuated shaft 10 having the crank 9 carrying the trip 8. The knotter shaft 13 carries a cam 90 which extends around about two-thirds of the circumference of said shaft, and which, when the shaft is at rest and during the first two-thirds of its revolution, engages an anti-friction roller 91 upon the fulcrum pin 92 of the lever 87, thus holding the free end of the link 86 and the fulcrum of the lever 87 spaced at some distance from the shaft 13. The proportions of the gearing used for the transmission of motion is such that the knotter shaft 13 will make precisely one revolution to three revolutions of the packer shaft 11.

When the machine is in operation and when the operation is about to start, the end of the twine is held between the disk 67 and the web 69, extending from thence across the knotter bill, over the finger 77, and through the eye of the needle to the twine reel or source of supply, the needle being in the position illustrated in Fig. 1 of the drawings in full lines, the twine being thus laid directly across the chute 3. The needle and the knotter mechanism have previously been adjusted vertically, by the means provided for the purpose, to suit the length of the corn stalks that are to be operated upon. As the corn stalks are fed into the chute 3 by means of the packers, they are packed against the twine, as will be readily understood, and the bundle stalks will presently begin to press against the trip 8, which latter, be it observed, is adjustable upon the crank 9 of the shaft 10, for the purpose of regulating the size of the bundle. The pressure upon the trip 8 will presently rock the shaft 10, thereby oscillating the crank 10′ and thereby causing the link rod 87′ to exert strain upon the end of the lever 87 with which it is connected. The opposite end of said lever, carrying the hook 88, will thus be moved outward from the packer shaft, thus releasing the pin 80 of the yoke 79, which latter is forced in an upward direction by the action of the spring 81, thus placing the pin 80 in the path of the notch 84 in the flange of the disk 82, which latter revolves with the packer shaft. This constitutes a clutch mechanism whereby the pinion 19 is locked upon the packer shaft so as to rotate with the latter. Motion is now transmitted to the knotter shaft, and during the first two-thirds of the revolution of the latter, the position of the lever 87 remains unchanged. At the beginning of the last third of the revolution, the friction roller 91 encounters the portion of the cam member 90 which slopes in the direction of the axis of the knotter shaft; the lever 87 will now swing upon the pin or pivot which connects it with the link rod 87′, being actuated in this direction by a suitably arranged spring 93, thus moving the beveled hook 88 into the path of the pin 80, which latter, as the packer shaft 11 approaches the completion of its third revolution, is engaged by said hook and is thereby forced out of engagement with the notch 84 in the flange of the disk 82, thus releasing the pinion 19 from said disk. About the same time, the bundle is discharged from the binding chute by suitable means provided for the purpose, and the trip carrying shaft 10 is restored by the actuating spring 93 to its initial position, thus restoring, or aiding in the restoration, of the lever 87 to its initial position with the friction roller 91 at the starting end of the cam 90.

The gear portions 57 and 62 of the disk 27 are so disposed that the gear portion 57 will

be in advance of and very slightly overlapped by the gear portion 62, the precise relative arrangement of said gear portions with relation to each other and to the pinions 56 and 61 engaged thereby being such that the operation of the pinion 61 will begin practically at the moment when the pinion 56 ceases to be operated. The gear portions 57 and 62 together occupy about one-fifth of the circumference of the disk 27, and they are so disposed that said disk will complete about two-fifths of a revolution before the gear section 57 engages the pinion 56. It follows that the needle will be almost completely advanced to the limit of its throw or movement before the knotter bill will begin to rotate, and that it will have barely begun to recede by the time the shafts 48 and 60, and related parts, have completed their operation.

When the needle advances, it lays the twine, which is looped around the bundle, across the knotter bill, alongside of the previously cut end, and by the rotation of the knotter bill the knot is formed in the usual manner; this being accomplished, and the knot being still held between the jaws of the kuotter bill, the disk 67 is started to rotate, and one of the shoulders 73 of said disk will force the twine ends into engagement with the cutter whereby they are severed, one end passing off with the bundle, while the other end is pinched and held between the disk 67 and the web 69. Simultaneously with the operation of the disk 67, one of the wings 64 extending from the shaft 60 will remove the knot from the knotter bill, thus enabling the bundle to be discharged. The discharge of the bundle may be effected positively by means of radial arms extending from the knotter shaft, a portion of a discharge arm being shown at 95 in Fig. 1 of the drawings.

Having thus described the invention, what is claimed is:—

1. A stalk chute, a rock shaft, a trip connected with said rock shaft and extending across the chute, a constantly driven vertical shaft, a pinion loose upon said shaft, a spring actuated yoke connected pivotally with the hub of said pinion and having a terminal pin, a clutch member connected fixedly with the shaft and having a flange provided with a notch for the reception of said pin, a pivotally supported link, a lever pivoted upon said link and having at one end a beveled hook the point of which extends above the horizontal plane of the notch in the clutch member upon the shaft, an arm extending from the trip carrying rock shaft, a link rod connecting said arm with the link supported lever, a knotter shaft operated at intervals by the constantly driven shaft, a pinion meshing with the loose pinion upon the constantly driven shaft, a cam member upon the knotter shaft, a friction roller upon the fulcrum pin connecting the lever with its supporting link, and spring means for forcing said lever in the direction of the cam member.

2. In a binding mechanism, a knotter shaft having a non-circular sleeve, a member slidably engaging said sleeve and carrying a disk provided with gear portions, a bracket member connected with the slidable member, means for retaining the bracket member stationary while the slidable member rotates, and operative parts of the knot tying and twine cutting mechanisms supported upon the bracket member and operable by the gear sections upon the rotary and slidable disk.

3. A knotter shaft, a non-circular sleeve connected therewith, a hub slidably engaging said sleeve and having an annular recess and a disk provided with gear sections, a bracket having an annular flange engaging the recess in the hub, means for connecting the bracket with the hub for slidable movement with the latter, means for retaining the bracket stationary while the hub rotates with the knotter shaft, knot tying and twine cutting means supported upon the bracket and operable by the gear sections upon the disk supported by the rotary hub, and means for effecting adjustment of the latter and related parts.

4. In a binder mechanism for corn harvesters, a stalk chute, a rock shaft, a trip connected with said rock shaft and extending across the chute, a constantly driven vertical shaft, a pinion loose upon said shaft, a spring actuated yoke connected pivotally with the hub of said pinion and having a terminal pin, a clutch member connected fixedly with the shaft and having a flange provided with a notch for the reception of said pin, a pivotally supported link, a lever pivoted upon said link and having at one end a beveled hook the bevel of which is located in the same plane as the path of the notch in the flange of the clutch member fixed to the constantly driven shaft, an arm extending from the trip carrying rock shaft, a link connecting said arm with the link supported lever, a knotter shaft operated at intervals by the constantly driven shaft, a pinion meshing with the loose pinion upon the constantly driven shaft, a cam member upon the knotter shaft, a fulcrum pin mounted upon the lever supporting link and spring means for forcing said lever in the direction of the cam member.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM H. TILSON.

Witnesses:
F. F. Smith,
F. R. Frazar.