No. 875,710. PATENTED JAN. 7, 1908.

A. M. HEMBERG.

GRAIN BINDER.

APPLICATION FILED JULY 13, 1907.

3 SHEETS—SHEET 1.

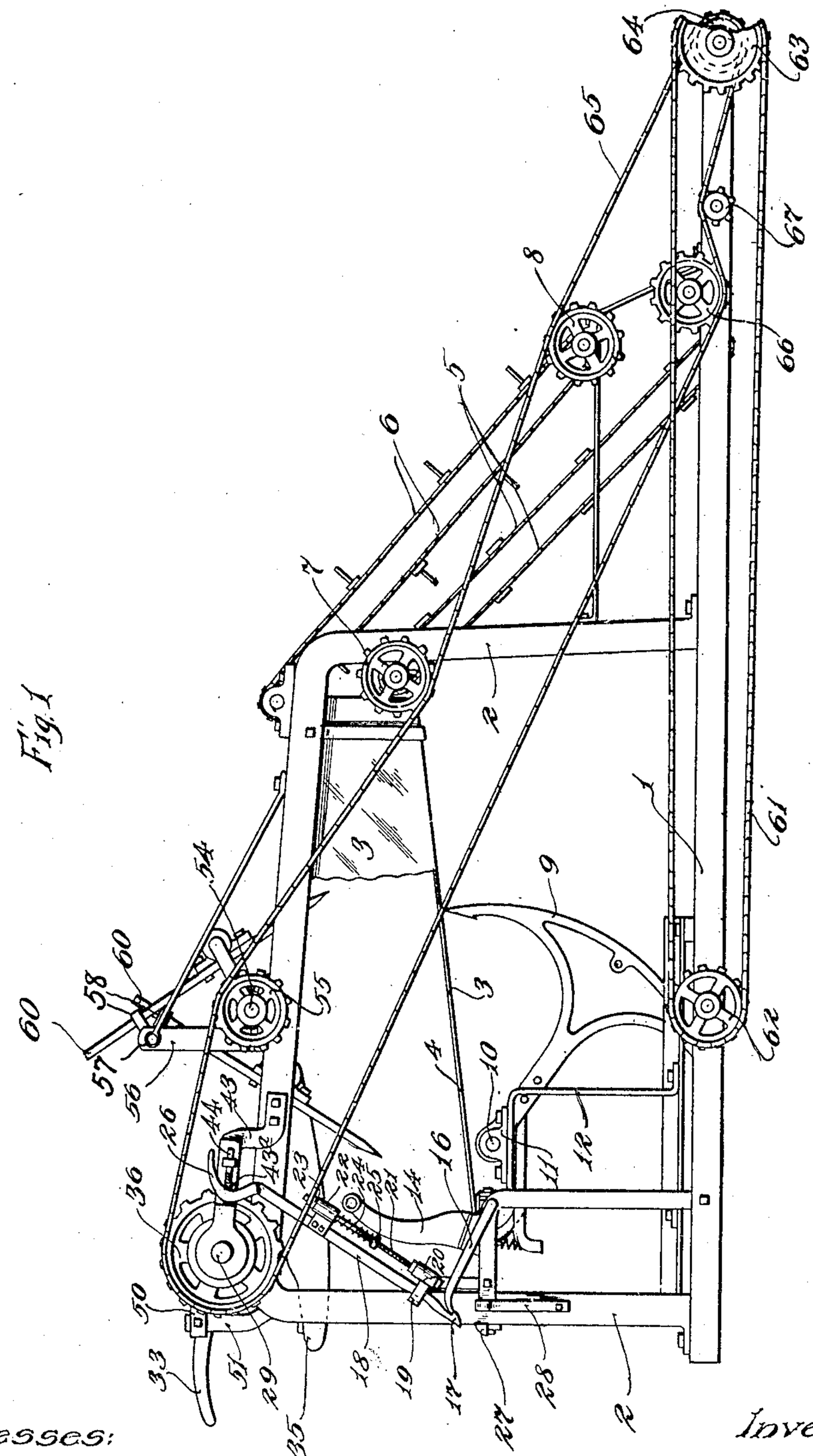

Fig. 1.

Witnesses:
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A. H. Opsahl.

Inventor:
Amandus M. Hemberg.
By his Attorneys:
Williamson & Merchant

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3 SHEETS—SHEET 2.

Fig. 6

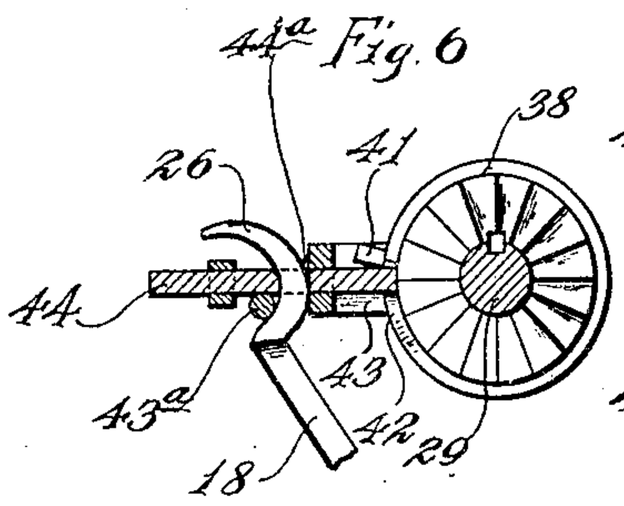


Fig. 5

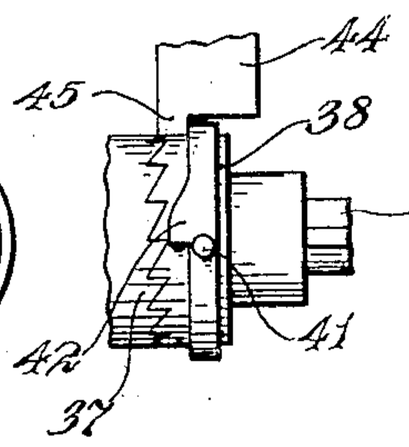


Fig. 4

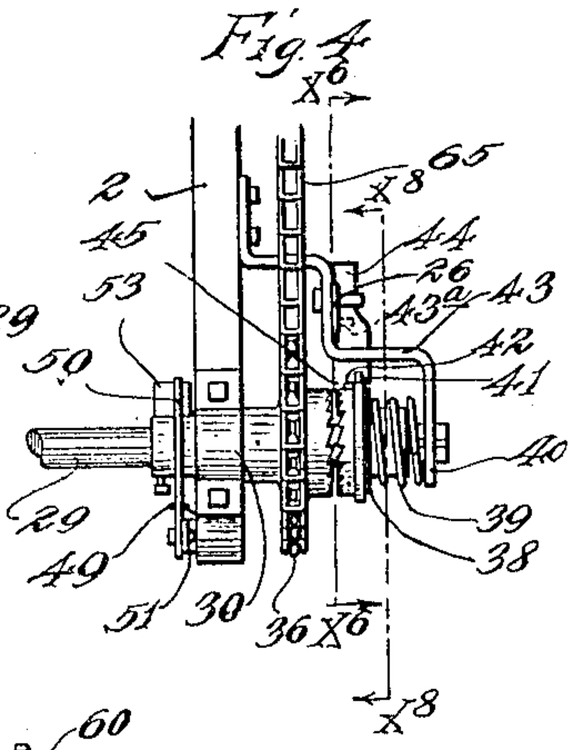
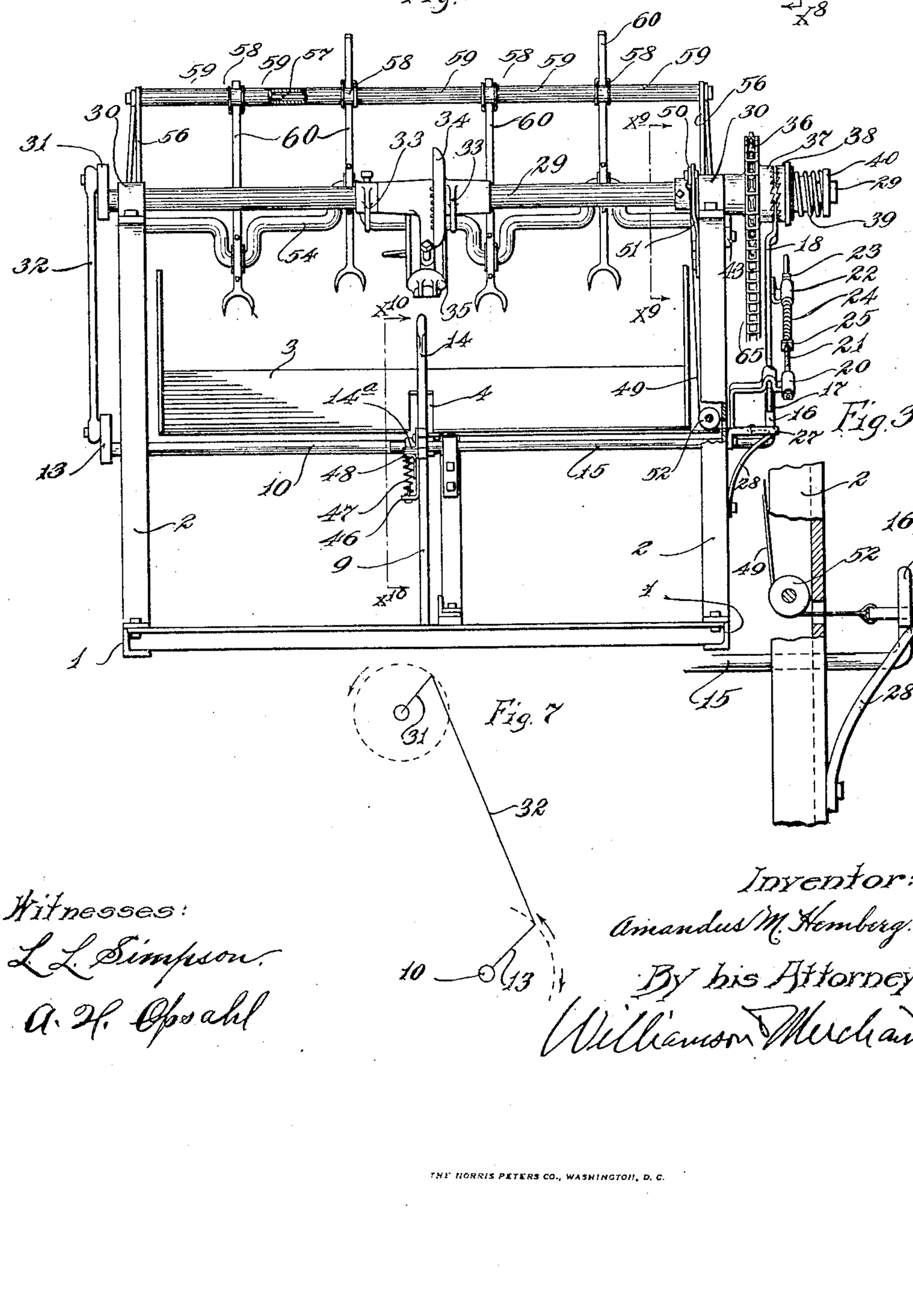


Fig. 2



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3 SHEETS—SHEET 3.

Fig. 9

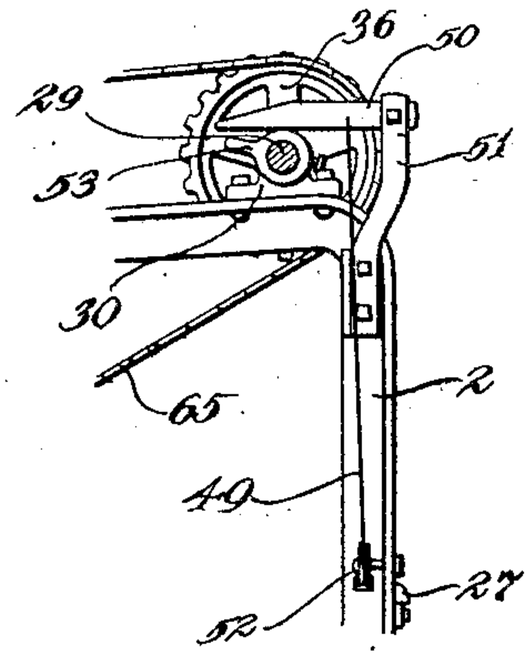

Fig. 8

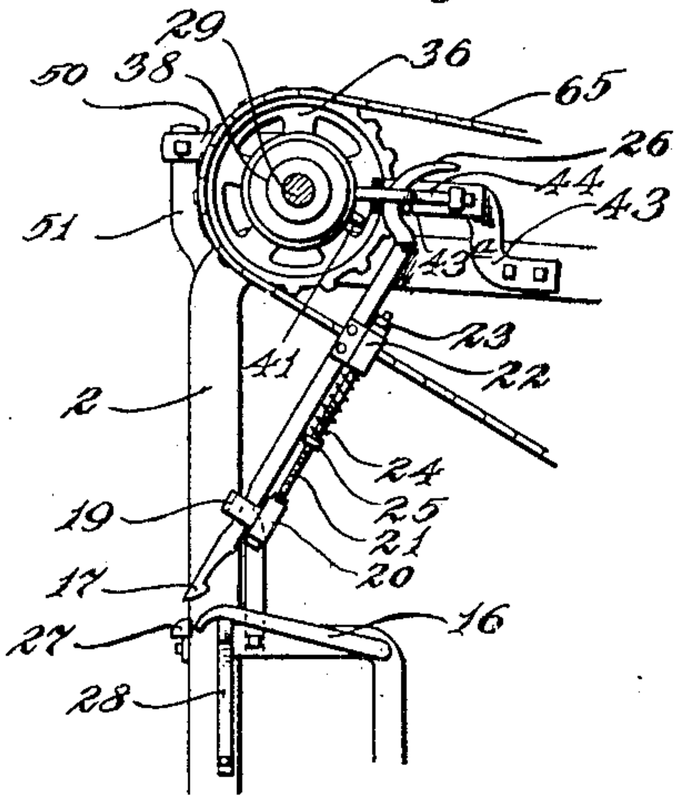

Fig. 10

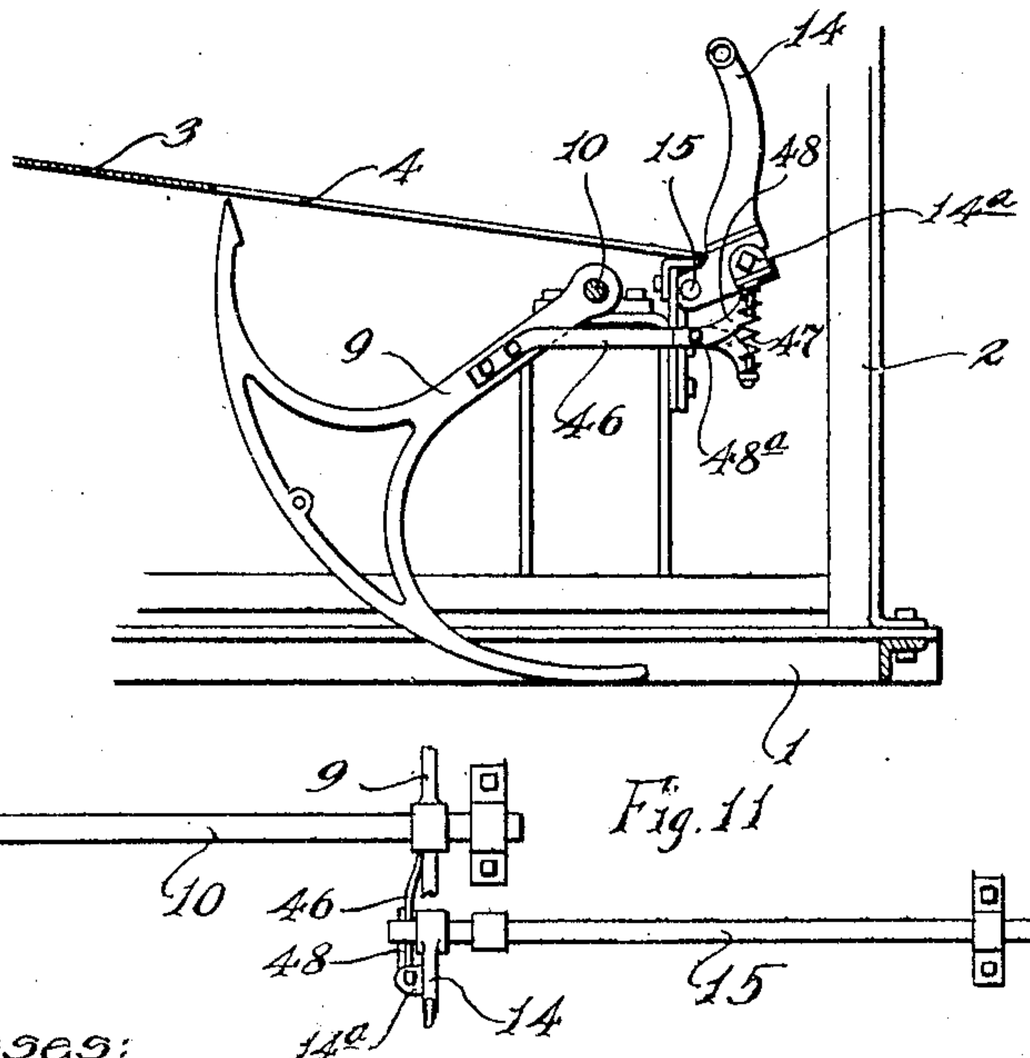

Fig. 11

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UNITED STATES PATENT OFFICE.

AMANDUS M. HEMBERG, OF MINNEAPOLIS, MINNESOTA.

GRAIN-BINDER.

No. 875,710. Specification of Letters Patent. Patented Jan. 7, 1908.

Application filed July 13, 1907. Serial No. 383,649.

To all whom it may concern:

Be it known that I, AMANDUS M. HEMBERG, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Grain-Binders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide an improved grain binder, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claims. The improved binder, while capable of general use, was especially designed for application to a harvester of the character set forth and claimed in my U. S. Letters Patent No. 792,592, of date June 20, 1905.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to these drawings, Figure 1 is a view in front elevation, with some parts broken away, showing my improved binder and a portion of a harvester to which the same is applied. Fig. 2 is a left side elevation of the parts shown in Fig. 1, some parts being broken away and some parts being sectional. Fig. 3 is a detail partly in side elevation and partly in section, showing on an enlarged scale a so-called trip intercepting latch and coöperating parts. Fig. 4 is a detail view in plan, showing the one-way clutch mechanism of the binder. Fig. 5 is a detail showing the coöperating half clutch members of the one-way clutch. Fig. 6 is a section taken approximately on the line x^6 x^6 of Fig. 4. Fig. 7 is a diagrammatic view showing the relative lengths of the cranks on the binder shaft and on the needle shaft. Fig. 8 is a detail in section, taken on the line x^8 x^8 of Fig. 4. Fig. 9 is a detail in section taken on the line x^9 x^9 of Fig. 2. Fig. 10 is a section taken on the line x^{10} x^{10} of Fig. 2, some parts being broken away; and Fig. 11 is a skeleton plan view, showing the relative arrangement of the needle and tripper shafts.

As illustrated in the drawings, the binder frame is made as a part of the harvester frame, and of the parts thereof for the purposes of this case it is desirable to note the long parallel platform bars 1, to the left hand ends of which, as viewed in Fig. 1, are rigidly secured approximately rectangular supplemental bearing frames 2, which parts 1 and 2 are preferably constructed of angle iron. The binder deck 3 extends between and is suitably supported by the supplemental frame bars 2 and is provided with the usual slot 4 for the passage therethrough of the binder needle. The grain is elevated from the harvester platform to the binder deck 3 by a pair of coöperating elevator canvases or belts 5 and 6 mounted and operating in the usual way. As shown, one of the rollers for supporting and driving the canvas 5 is provided with a sprocket 7 and one of the rollers for guiding and driving the belt 6 is provided with a sprocket 8.

The needle 9, as is customary, is secured to one end of a needle shaft 10 and works through the slot 4 in the binder deck 3, being normally held with its point below the said deck. This needle shaft 10 is mounted in bearings 11 secured to bearing brackets 12 which, in turn, are rigidly connected to the framework made up of the heretofore noted parts 1 and 2. The needle shaft 10 projects from the needle toward the left with respect to Fig. 2, and at its projecting end is provided with a crank 13. The tripper head 14 is, as is customary, located in the vertical plane of the needle for proper coöperation therewith in the binding action, and it is, as shown, secured to one end of a rock shaft 15 that projects therefrom toward the right with respect to Fig. 2, and is provided at its right hand end with a radially projecting lock arm 16. Normally, the free end of this lock arm 16 is engaged and held up by a bevel hook 17 carried by the lower end of a lock bolt or bar 18. The lower end of this lock bolt 18 is mounted to slide and to move edgewise through a guide bracket 19 shown as formed as part of a bearing 20 that is rigidly secured to one of the frame bars 2. A guide rod 21 is rigidly secured at its lower end to the bearing 20 and on the upper end thereof is slidably mounted a bearing sleeve 22 that is rigidly secured to the intermediate portion of the lock bolt 18. A stop, shown as afforded by nuts 23 on the upper end of the guide bolt 21 (see particularly Fig. 8) limits the upward movement of the sleeve 22 and, hence, of the lock bolt 18. A coiled spring 24 on the rod 21 reacts against the sleeve 22

and against an adjustable nut 25 on said rod and yieldingly maintains the lock bolt 18 in its uppermost position, shown in Figs. 1 and 8. At its upper end, the lock bolt 18 is provided with a curved clutch releasing cam 26, the construction and operation of which will be hereinafter more fully described.

When the lock bolt 18 is moved downward by an outward movement of the tripping head 14 and downward movement of the lock arm 16, the bevel hook 17 at the end of said lock bar will be thrown against a releasing abutment or cam projection 27 on the adjacent frame bar 2 and will thereby be moved edgewise out of engagement with the free end of said lock arm 16. When the lock arm 16 is thus released it drops onto the upper free end of a so-called intercepting stop, shown as in the form of a spring arm 28, the lower end of which is secured to the adjacent frame bar 2, and the upper end of which is bent laterally for engagement with the free end of said arm 16.

The binder shaft 29 is mounted in suitable bearings 30 on the frame bars 2, and at its left hand end, as shown in Fig. 2, is provided with a crank 31 that is connected by a crank rod 32 to the needle shaft crank 13. The crank 31 is relatively short as compared with the crank 13, so that under a complete rotary movement of the crank 31, the crank 13 and, hence, the needle, will be given oscillatory movements through considerably less than 180 degrees. A pair of bundle discharging arms 33 are secured to and carried by the intermediate portion of the binder shaft 29, and secured to said shaft between said arms is the usual segmental knotter actuating cam 34. The knotter, which is preferably of standard construction, is not shown in the drawings, but is preferably mounted in the usual way above a breast plate 35 of usual form and arrangement.

Loosely mounted on the right hand end of the binder shaft 29, as shown in Fig. 2, is a constantly driven sprocket 36 which is provided with a half clutch 37. This half clutch 37 coöperates with a half clutch 38 that is keyed for rotation with but is free to slide upon the binder shaft 29. The half clutch 38 is yieldingly pressed toward the half clutch 37 by a coiled spring 39 that reacts against the same and against a stop collar 40 on the extreme right hand end of said shaft 29. The sliding half clutch 38 is provided with a radially projecting stop pin 41 and with a laterally projecting cam lug 42. Slidably mounted in a suitable guide bracket 43 of which stop collar 40 forms a part, and secured to one of the frame bars 2 is a clutch tripping device in the form of a short slide 44 having a projecting cam lug 45. The crooked or cam end 26 of the lock bolt 18 works through a suitable passage 44[a] in the sliding stop 44. Also, the said cam end 26 works between the guide bracket 43 and a guide pin 43[a] which is secured to and projects from said bracket (see Figs. 1, 4 and 6).

Directing attention now particularly to Figs. 2 and 10, it will be noted that the needle carries a forwardly projecting arm 46, the free end of which is bent downward and laterally to form a base of reaction for a coiled spring 47. The upper end of this coiled spring 47 presses against the laterally bent end of a supplemental arm 48 that is pivotally connected to the arm 46 at 48[a]. The spring 47 best tends to keep the supplemental arm 48 pressed upward against a lug 14[a] on one side of the tripping head 14, and thus yieldingly holds the latter in its normal position, shown in Figs. 1 and 10.

The free end of the laterally movable intercepting stop 28 is connected by a wire or other flexible connection 49 to a cam actuated arm 50 which, as shown in Fig. 9, is pivoted to a projection 51 of one of the frame bars 2. This wire 49 runs over a guide sheave 52 mounted in the said frame bar 2. The lever 50 is subject to a cam or tappet 53 carried by the binder shaft 29.

Extending transversely of the machine at the front of the binder shaft and mounted in suitable bearings on the upper portions of the frame bars 2, is a packer driving crank shaft 54, and at its right hand end with respect to Fig. 2 and as shown in Fig. 1, is provided with a sprocket 55. Rising from the intermediate upper portion of the frame bars 2 and rigidly secured thereto is a pair of frame extensions 56, the upper portions of which rigidly support a transverse rod 57. On this rod 57 are mounted oscillatory guides 58 that are spaced apart by sleeves or pipe sections 59 placed on said rod 57. The packer arms 60 are mounted at their intermediate portions on the cranks of the shaft 54, and at their upper ends they are mounted to slide through the oscillatory guides 58. At their lower ends, the packer arms 60 are preferably forked, as shown in Fig. 2. The packer arms 60 are mounted in pairs on the crank shaft 54, in such a manner that two arms, one on each side of the needle, pack in unison, thus giving an even broadside motion to the grain to and against the head 14.

The driving connections, in so far as they relate to this invention, are as follows: The numeral 61 indicates a sprocket chain that runs over sprockets 62 and 63 suitably mounted on the platform section of the machine. The sprocket 62 will usually be driven from the bull wheel or traction wheel (not shown) of the machine in the customary way. The sprocket 63 carries a smaller sprocket 64. A sprocket chain 65 runs over the sprockets 64, 8, 7, 55 and 36 already noted and, as shown, also over sprockets 66 and 67 suitably mounted on the platform of the machine.

When the machine is in action, the grain delivered onto the binder deck 3 by the elevator belts 5 and 6 will be engaged by the packer arms 60 and forced against the tripping head 14. When the pressure against the tripping head 14 becomes great enough to overcome the tension of the spring 24 and also a slight tension exerted by the spring 47, said tripping head will be forced outward and its lock arm 16 will be forced downward, thereby moving the lock bolt 18 downward until its bevel lock hook 17 is pressed against the tripping abutment 27 and released from said arm 16, as already described. Normally, the stop pin 41 and cam lug 42 of the sliding half-clutch 38 are engaged, respectively, with the slide 44 and lug 45 thereof, so that said half clutch is held against rotation and out of engagement with the half clutch 37 of the constantly driven sprocket 36, as shown in Figs. 4 and 6. When, however, the lock bolt 18 is moved downward as just stated, the slide 44 is moved rearward and the said half clutch 38 is released and by its spring 39 is forced into engagement with said half clutch 37, thereby coupling the binder shaft 29 to the said driven sprocket 36. As soon, however, as the lock bolt 18 is released from the lock lever 16 by the abutment 27, the spring 24 will throw the said lock bolt 18 back to its normal position and the said bolt will force the slide 44 again forward into its normal position shown in Fig. 5, so that just before the binder shaft 29 completes its rotation, the cam lug 42 by engagement with the stop lug 45 of the slide 44 will force the half clutch 38 out of engagement with the constantly running half clutch 37, and as soon as this separation of the clutch members is completed the stop pin 41, by engagement with the slide 44, will positively stop further rotation of the said binder shaft. While the binder shaft is making its complete rotation the needle is thrown upward, the knot is tied, the needle is returned to normal positions and the tied bundle is discharged by the discharge arms.

When the lock arm 16 is released from the lock bolt 18 as above described, it falls onto the intercepting stop 28 so that the tripping head is held in a position but little farther outward than shown in Fig. 1, in which position it coöperates with the needle to compress the bundle while it is being tied. At the time in the rotation of the binder shaft immediately after the knot has been tied, the cam or tappet 53 comes into engagement with the arm 50 and raises the same, thereby drawing the intercepting stop 28 inward and permitting the tripping head 14 to be moved below the plane of the binder deck 3 at a time when the discharge arms 33 are forcing the bound bundle out of the binder. When the needle is returned to its normal position below the binder deck, the spring pressed supplemental arm 48 engages the tripping head 14 and forces the same back to its normal position, under which movement the lock arm 16 cams itself past and into a position above the intercepting stop 28.

The spring 47 interposed between the arm 46 and supplemental arm 48 carried by the needle permits the initial movement of the packet head 14 required to trip the driving clutch mechanism into action while the needle remains stationary in its normal position, and it serves under return movement of the needle from its operative to its normal to insure the complete movement of said packer to its normal position.

It is evident that by adjustments of the nut 25 on the guide bolt 21 the tension of the spring 24 may be increased or diminished. Hence the pressure of the grain against the trip head necessary to trip the needle into action is controlled. By this means the size and compactness of the bundles may be altered as desired.

What I claim is.

1. In a grain binder, the combination with a needle, packers and means for discharging the bound bundles, of binder driving means, a one revolution clutch for causing said driving means to intermittently operate said needle and bundle discharging means with properly timed actions, a pivoted tripping head having a projecting lock arm, a spring pressed lock bolt normally engaging said lock arm and holding said tripping head in normal position, means whereby a movement of said lock bolt throws said clutch into action, and means for releasing the said lock bolt from said lock arm after said clutch has been thrown into action by initial movement of said tripping head, substantially as described.

2. In a grain binder, the combination with a needle, packers, a binder shaft, and a discharge arm and knotter actuating means carried by said shaft, of coöperating half clutches on said shaft, one of which is loose and is continuously driven, and the other of which is rotatable with said shaft, a pivoted tripping head, a sliding clutch stop for separating the clutch members at the completion of each rotation of said binder shaft, a spring pressed bolt arranged to be moved by said tripping head, and when moved to cause said clutch stop to render said clutch operative, substantially as described.

3. In a grain binder, the combination with a needle, packers and binder shaft, said shaft having a bundle discharge arm, a continuously driven wheel loosely mounted on said shaft and provided with a half clutch, a cooperating spring pressed half clutch slidably mounted on said shaft, said sliding half clutch having a laterally projecting cam lug 42 and stop 41, a sliding stop 44 engageable with said stop 41 and having a lug 45 engage-

able with said cam lug 42, to throw said sliding half clutch out of engagement with said continuously driven half clutch, to intercept the movement of the same and said binder shaft, a tripping head and connections whereby initial movement of said tripping head moves said sliding stop into an inoperative position, substantially as described.

4. In a grain binder, the combination with a needle, packers, a pivoted tripping head and a binder shaft, which binder shaft is provided with a bundle discharging arm and means for actuating a knotter, of a continuously driven wheel, a one revolution clutch for intermittently connecting said wheel to said binder shaft, a lock arm movable with said tripping head, a spring pressed lock bolt normally holding said lock arm and having a cam acting end serving, when moved, to render said clutch operative, a tripping abutment operating to release said lock bolt from said lock arm under initial movement of said tripping head, an intercepting stop operative on said lock arm to intercept the movement of the same and said tripping head, and a connection operated from said binder shaft for withdrawing said intercepting stop from said lock arm, to thereby permit further movement of said tripping head during the bundle discharging action, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

AMANDUS M. HEMBERG.

Witnesses:
H. D. KILGORE,
M. E. RONEY.