E. H. BRODEN.

STAPLE DRIVING MECHANISM.

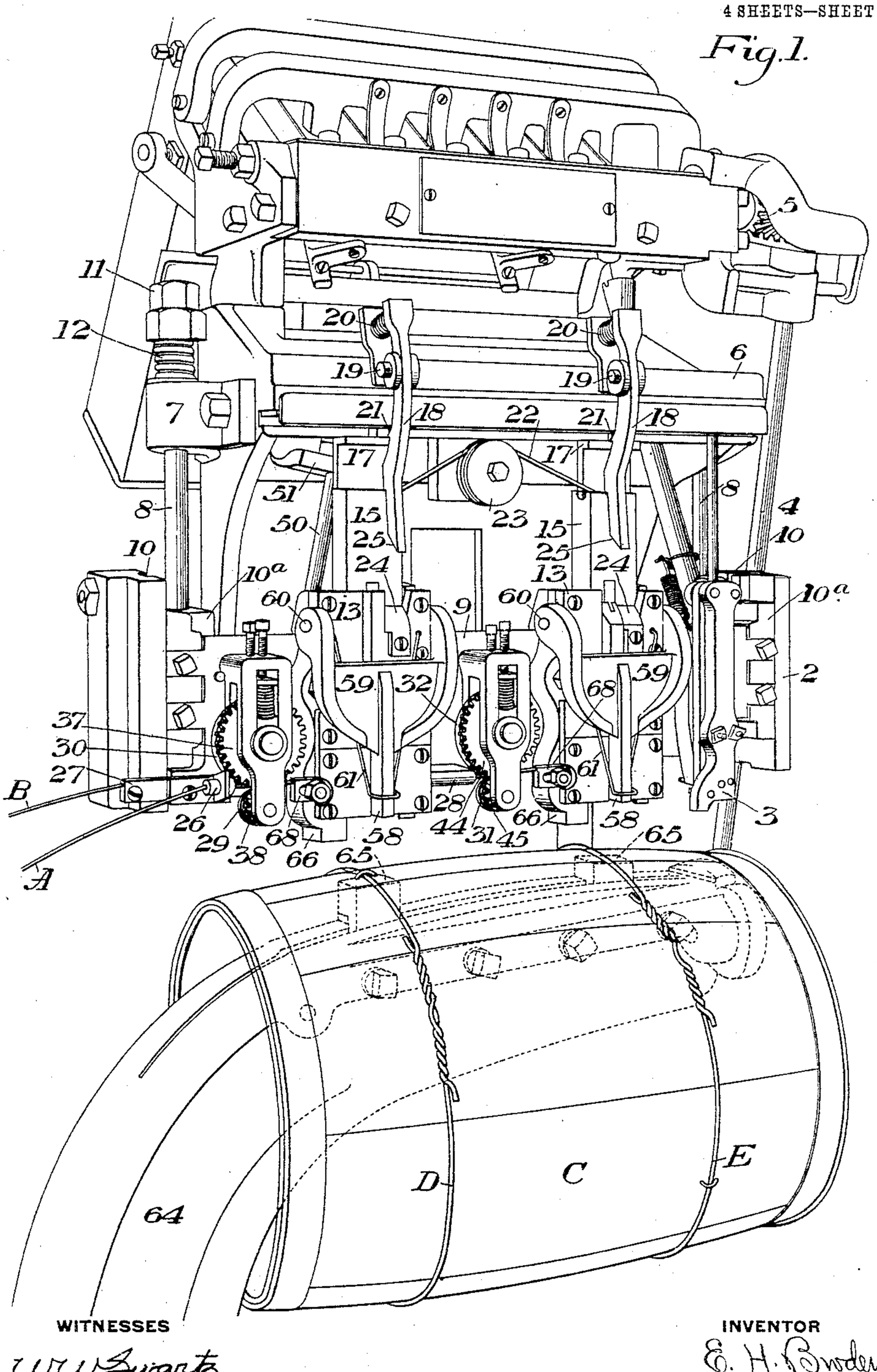
APPLICATION FILED AUG. 28, 1908.

963,988.

Patented July 12, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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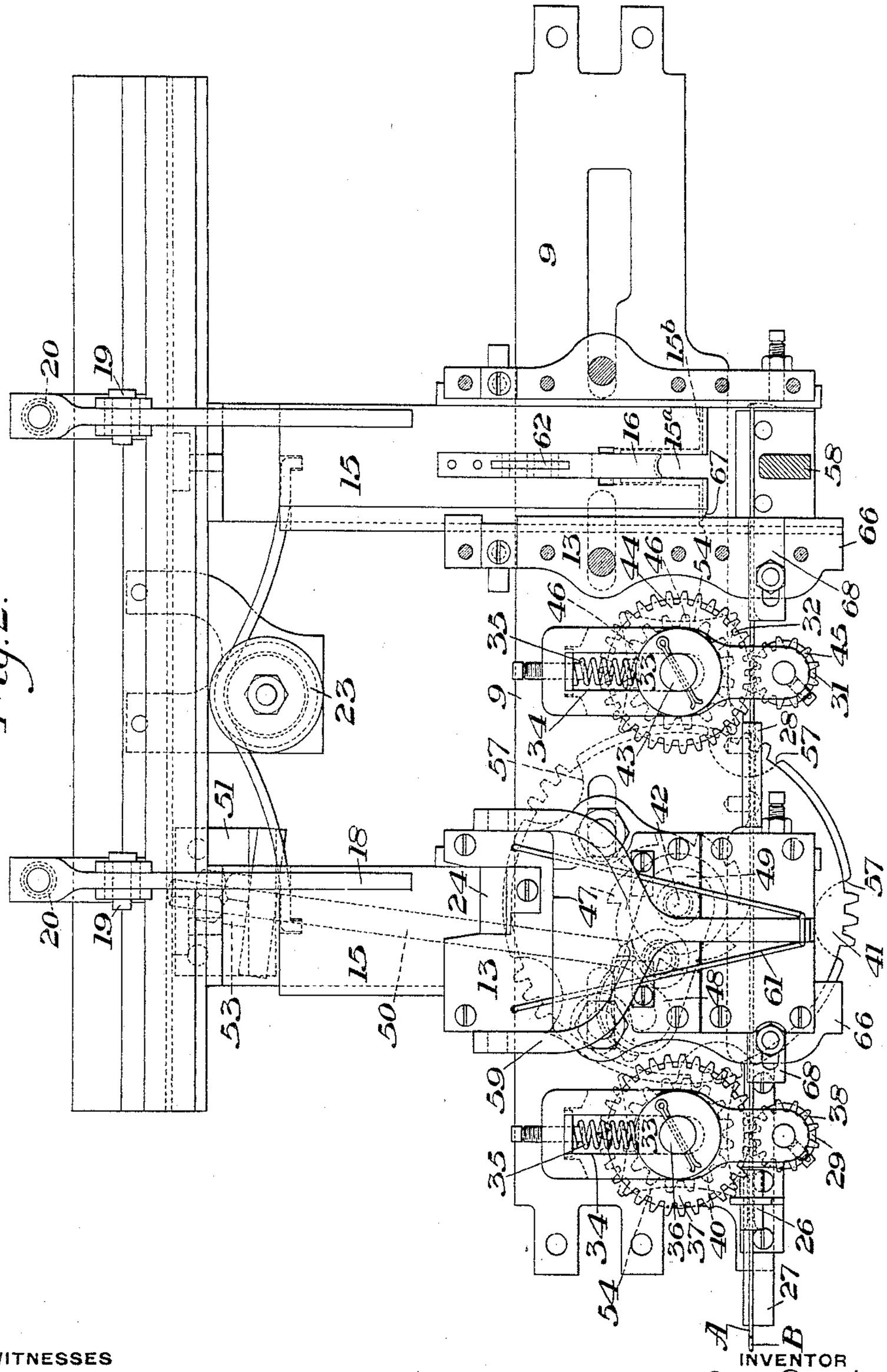
4 SHEETS—SHEET 2.

Fig. 2.



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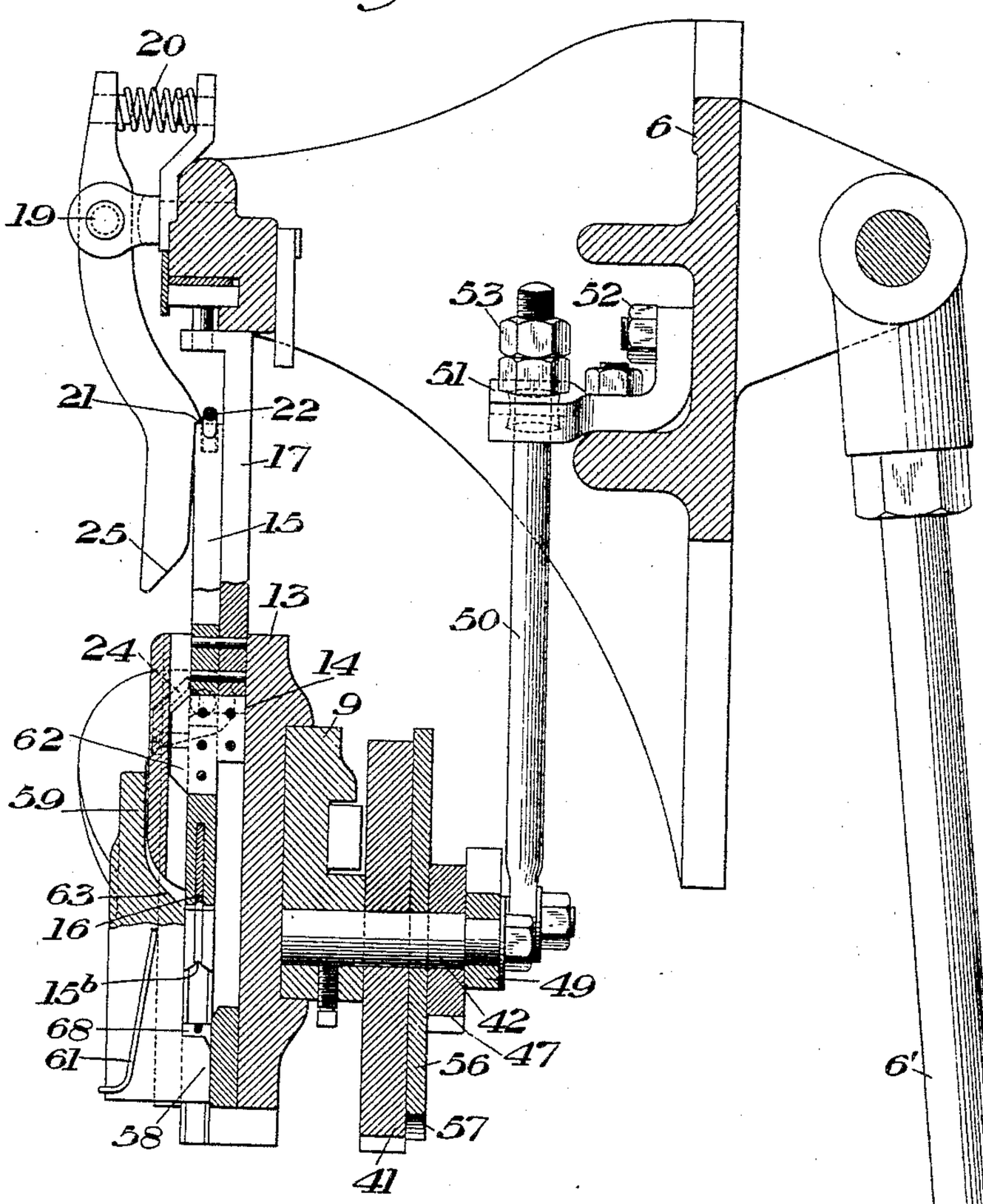
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

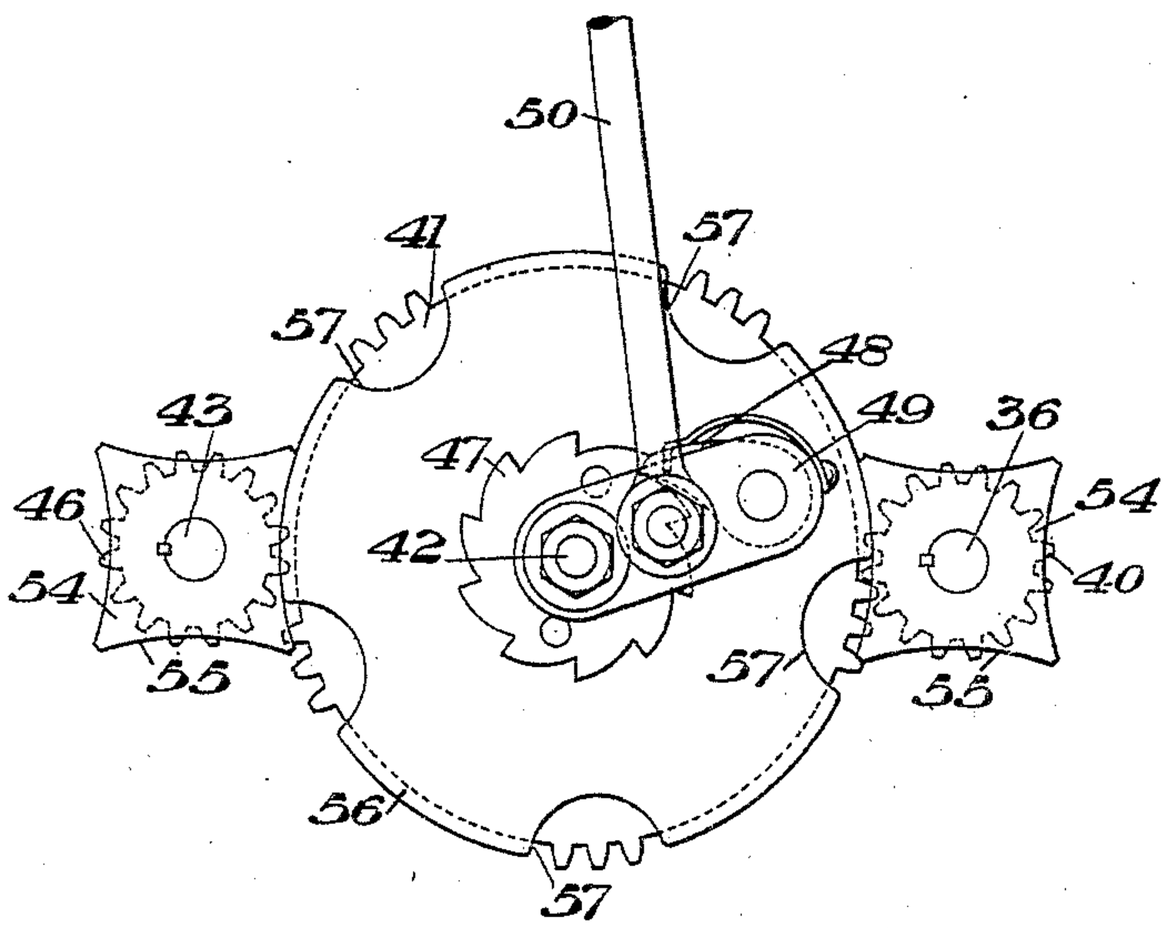
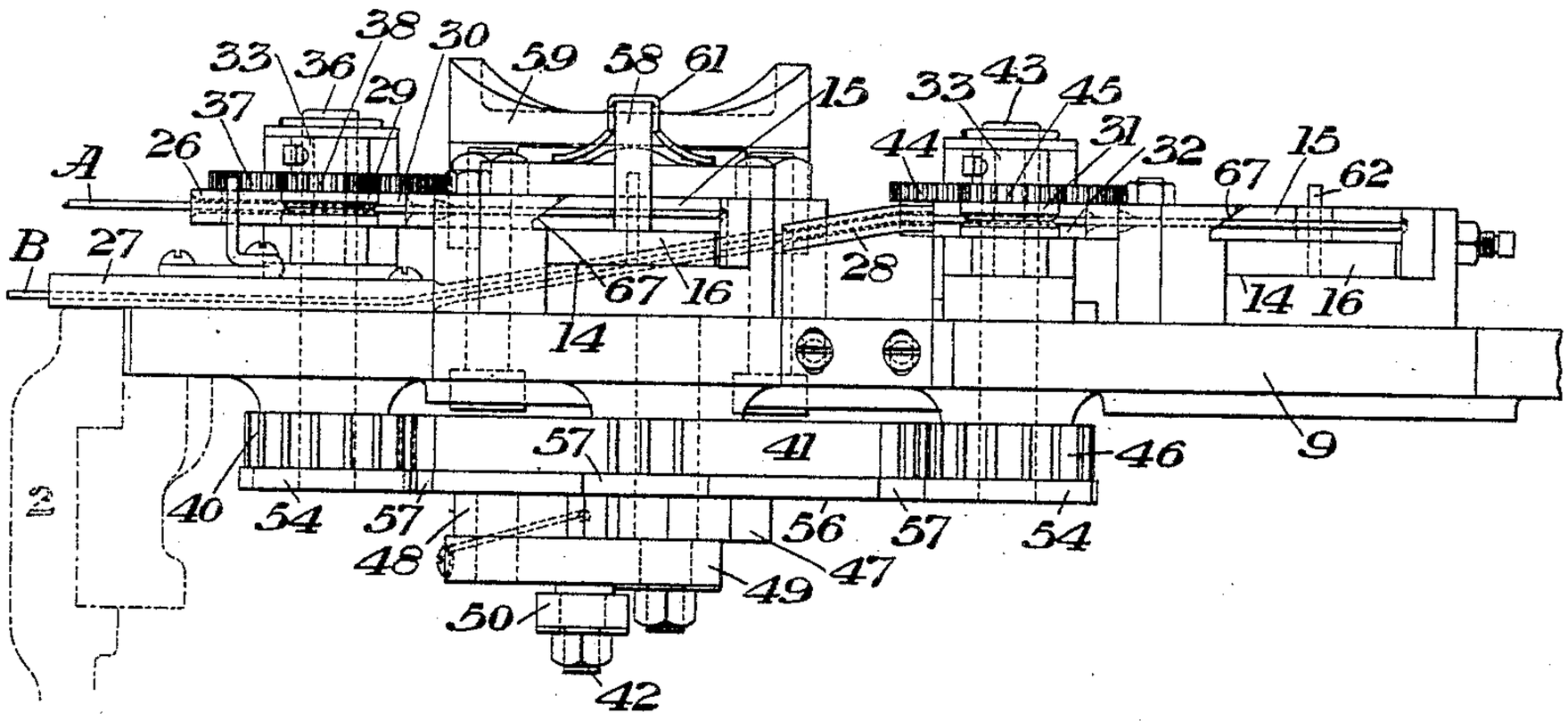


Fig. 5.



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UNITED STATES PATENT OFFICE.

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STAPLE-DRIVING MECHANISM.

963,988. Specification of Letters Patent. **Patented July 12, 1910.**

Application filed August 28, 1908. Serial No. 450,713.

To all whom it may concern:

Be it known that I, EDWIN HERBERT BRODEN, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Staple-Driving Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of staple driving mechanism embodying my invention; Fig. 2 is a front elevation of the same; Fig. 3 is a detail sectional view showing the driving head, the cross-head, and adjacent parts; Fig. 4 is a detail view of the driving gearing for the wire feeding rollers, and Fig. 5 is a bottom plan view.

My invention has relation to staple driving mechanism, and is designed to provide mechanism of this character by means of which staples may be rapidly formed and driven.

The particular embodiment of my invention illustrated in the accompanying drawings, has been more particularly designed for use in stapling hoops to kegs or barrels, and is of double form for stapling a hoop at each end of the keg or barrel.

The mechanism shown has also been particularly designed for use as an attachment to a nailing machine, such as the well-known Morgan nailing machine, but may obviously be mounted on its own frame, or it may be attached to other machines capable of giving it the required movements, as hereinafter described.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of parts without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to these drawings, the numeral 2 designates portions of the frame of a nailing machine, such as the Morgan nailing machine above referred to.

3 designates a nail driver, and 4 and 5 actuating connections therefor. Inasmuch as this nail driver and its actuating connections form no part of my invention, these parts will not be described in detail.

6 designates a driving head, which is provided with guides 7 at its ends, which are arranged to slide vertically on guide rods 8, which are secured at their lower ends to a cross-head 9. This cross-head 9 is mounted at its ends in guides 10 of the frame 2. The upper end of one or both of the rods 8 is provided with a nut 11, between which and the upper side of the guides 7 is interposed a coil spring 12, which is arranged to be compressed during the latter part of the upward movement of the driving head 6. The head 6 is shown as actuated by a pitman connection 6′.

Mounted on the cross-head 9 are the two housings 13, which are provided with vertically extending guide-ways 14. Mounted to reciprocate in each of these guide-ways is a former 15 and a staple driver 16, the latter having an actuating connection 17 with the driving head 6, as best shown in Fig. 3. The formers 15 have a movement in the guides 14 independently of the staple drivers, and are driven by means of the dogs 18 pivoted to the driving head 6 at 19. Springs 20 tend to hold these dogs in position to engage the upper end of the formers in the manner shown at 21 in Fig. 3. The two formers are connected by a transversely arranged spring 22, which has a central coil engaging a stud or projection 23 at the central portion of the driving head 6, the ends of the springs being seated in depressions in the upper edges of the formers. Carried by each of the housings 13 is an inclined cam plate 24, which is designed to be engaged by the beveled lower ends 25 of the dogs 18, at a definite point in the downward movement of the driving head, to thereby rock said dogs outwardly and disengage them from the formers.

The staple-forming wire A for stapling one of the two hoops is fed into the machine through suitable guides 26, and the wire B for forming the staples for the other hoop is fed in through the guides 27 and 28 (see Fig. 5). The wire A is fed into the machine by the action of a pair of feed rollers 29 and 30, while the wire B is fed by a similar pair of feed rollers 31 and 32. The upper roller of each of these pair of feed rollers is mounted in bearings 33, which are vertically movable in the guides 34, the two rollers of each pair being normally pressed toward each other into gripping engagement with the wires by means of the springs 35. On the shaft 36 of the feed roller 30 is a spur gear

wheel 37 which meshes with a toothed pinion 38 on the shaft of the lower feed roller 29. The shaft 36 also carries a pinion 40 designed to be engaged by the teeth of an intermittent gear wheel 41, which is journaled on a pin or stud 42 carried by the cross-head 9, this gear wheel 41 being between the two sets of feed rollers. The shaft 43 of the upper feed roller 32 has a gear wheel 44 which meshes with a pinion 45 on the shaft of the lower feed roller 31, and also carries a gear wheel 46 which is arranged to be engaged by the intermittent gear wheel 41 at the opposite side from its engagement with the gear wheel 37. The gear wheel 41 is actuated by a ratchet 47, and a spring-pressed pawl 48 mounted on the pawl carrier 49. This pawl carrier is connected to a rod 50, which extends upwardly and passes loosely through an eye 51, secured to the driving head 6 at 52, the upper end of the rod 50 having a head which may be formed by jam nuts 53.

In the particular embodiment of my invention shown, the two staple-forming and driving mechanisms are arranged to act alternately to form and drive staples so that the two hoops will not be fastened to the same staves. For this reason, the teeth of the intermittent gear wheel 41 are so arranged, as shown in Fig. 4, as to alternately engage the pinions 40 and 46, so that the pair of feed rollers for the wire A will be actuated, while the feed rollers for the wire B remain stationary, and vice versa. For the purpose of positively holding one pair of feed rollers stationary while the other pair is acting, I provide each of the pinions 40 and 46 with a guard 54, having each a plurality of concave faces 55, adapted to bear against the periphery of a plate 56, which rotates with the gear 41. This plate 56 adjacent to each of the teeth, has a cut-away portion 57, so as to permit the corners of the guard plates 54 to turn therein when the pinions 40 and 46 are rotated. It will be readily seen from Fig. 4 that the pinions 40 and 46 will be positively held against rotation until such times as the respective series of gear teeth on the wheel 41 come into engagement with these pinions, at which times the cut-away portions 57 will be in position to permit the guards 54 to rotate with the pinions. Each pair of feed rollers is, therefore, held stationary until the proper time for their movement to commence.

The guides 26, 27 and 28 are arranged to guide the wires A and B underneath the lower ends of the housings 13 in line with the reciprocating formers 15, the latter having the central vertical recesses 15[a] (see Fig. 2) and having their lower edges grooved as indicated at 15[b].

58 designates the formers or anvils, over which the staples are bent. Each of these anvils is carried by an arm 59 pivoted to the respective housings 13, at the point 60, so as to swing toward and away from the front of the housing. These arms 59 are normally held by springs 61 in the position shown in Fig. 2, and are swung outwardly from such positions to permit of the continued downward movement of the driving hammers by means of the cams 62 on said hammers, which engage the beveled surfaces 63 on the arms 59 (see Fig. 3).

The operation is as follows:—The keg or barrel C having the two wire hoops D and E, which are to be stapled thereto, is supported on an overhanging arm 64 such as shown in Fig. 1, and having the anvil projections 65 against which the staples are driven and clenched at the inside of the keg or barrel. When the driving head 6 commences its downward movement, the cross head 9 is first moved down until the stops 66 thereof come in contact with the barrel at points near the hoops D, E, which prevents further movement of said cross-head. During the further downward movement of the driving head, the formers 15 and staple-drivers 16 are moved downwardly through the housings 13, the former by means of the dogs 18, and the latter by the actuating connections 17. The lower end of the formers are provided with the beveled shearing edges 67, which coöperate with the relatively fixed shear blades 68 secured to the housings 13 so that, as the formers come in contact with the wires A and B, the end portions of said wires will be severed by beveled cuts to form the staple blanks. The continued downward movement of the driving head 6 and formers 15 will cause the staple blanks to be bent over the formers or anvils 58 into U-shape, the top portion of each staple being forced upwardly into the recess 15[a] in the former. After the staple has been thus cut and shaped, the engagement of the beveled ends 25 of the dogs 18 with the cam surfaces 24 causes the dogs 18 to be moved out of driving engagement with the formers, and the latter are now held against the staple by the action of the transverse spring 22. The hammers 16 continue their downward movement and drive the staples over the hoops, their inner ends coming in contact with the anvil 65 and clenching them at the inside of the keg or barrel. The driving head 6 now reverses its movement, and the formers and staple drivers are returned to their original positions ready for another operation. During the latter part of the upward movement of the driving head, the jam nuts 53 on the rod 50 are engaged by the eye 51, thereby actuating the ratchet and pawl device 47, 48, and thereby one pair of the wire feeding rollers, to feed forward a sufficient length of the wire A or B to form another staple. As above described,

in order that no two staples may be driven into the same stave, the two pairs of feed rolls are alternately actuated, but one staple being formed and driven at each stroke of the machine.

It will be seen from the foregoing that when the keg or barrel is in place on the support 64, the downward movement of the cross-head 9 will be stopped by the engagement of the stops 66 with the keg or barrel. When there is no keg or barrel on the machine, the cross-bar is stopped by the engagement of the slides 10ª, which work in the guide-ways 10, before described, with suitable stops on the frame 2.

The cross-head 9 is raised on the up-stroke of the driving head by the compression of the spring or springs 12. The driving hammers are positively actuated during the entire stroke by the connections 17, whereas the formers are actuated during a portion of the stroke only by means of the dogs 18, which are thrown out of engagement after the staple has been cut and formed, in the manner described. The formers or anvils 58 are thrown out of the way after the staple has been cut and formed by the cams 62 on the driving hammers as described, and upon the up-stroke of the machine are returned to their working position by means of the spring 61.

The machine described is simple in its construction and operation, and can be readily applied to the cross-head of a nailing machine; and provides means whereby the work of stapling may be rapidly effected, the staples being formed and driven in one operation.

It will be obvious that various changes may be made in the details of construction and arrangement. Thus, various mechanisms for feeding the staple-forming wires, actuated by the movement of the staple-forming and driving parts, may be employed; the staple-forming and driving parts may themselves be modified in form and arrangement, and various other detail changes may be made.

I claim:—

1. In staple driving mechanism, a reciprocating driving head, a reciprocating cross-head actuated by the movements of the driving head, wire feeding mechanism carried by the cross-head, actuating means for the wire feeding mechanism operated by the driving head, and staple forming and driving mechanisms working in guides carried by the cross-head and having actuating connections with the driving head; substantially as described.

2. In staple driving mechanism, a cross-head having wire feeding mechanism connected thereto, a reciprocating staple cutter and former mounted on the cross-head, a reciprocating staple driver also mounted on the cross-head, a reciprocating driving head, connections whereby the cross-head will be given a limited vertical movement on the down and up stroke of the driving head, means connected to the driving head for actuating the wire feeding mechanism, and actuating connections between the staple forming and driving devices and the driving head; substantially as described.

3. In staple driving mechanism, a vertically movable cross head, having wire feeding mechanism connected thereto, guides or housings secured thereto, staple forming and driving devices mounted in said housings, a veritically movable driving head, actuating connections between the driving head and the cross-head, actuating connections between the wire feeding mechanism and the driving head, and independent actuating connections between the driving head and the staple-forming and driving devices; substantially as described.

4. A staple forming mechanism comprising a vertically movable driving head, a vertically movable cross head mounted thereon, a staple cutter and former mounted for reciprocation in the cross head, an actuating device carried by the driving head and engaging the staple cutter and former, wire feeding mechanism, actuating means for the wire feeding mechanism operated by the driving head, a staple driver also actuated by the driving head, means carried by the cross head for disengaging the actuating devices for the staple cutter and former at a certain point in its downward movement, and means connected to the driving head for raising the cross head on its upward movement.

5. In staple driving mechanism, a cross-head having a guide or housing, a wire feeding device carried by the cross-head, a staple driver mounted to reciprocate in the housing, a staple cutter and former also mounted to reciprocate in said housing, a vertically movable driving head, actuating connections between the driving head and the wire feeding mechanism, independent actuating connections between the driving head and the staple driver and the staple cutter and former and other actuating connections between the driving head and the cross-head; substantially as described.

6. In mechanism of the character described, a vertically reciprocating cross-head, guides or housings carried thereby, staple-forming and driving mechanisms mounted in each of said housings, a driving head, actuating connections between the driving head and the cross-head, independent actuating connections between the driving head and the staple-forming and driving devices, and two wire feeding mechanisms carried by the cross head and arranged to be alternately operated by the

movement of the driving-head; substantially as described.

7. In staple forming and driving mechanism, a reciprocating cross-head, two wire feeding devices carried thereby, two housings secured to the cross-head, staple forming and driving devices arranged to reciprocate in said housings, a reciprocating drive head, actuating connections between the drive head and the cross-head, and also between the drive head and the staple forming and driving devices, and means for alternately feeding wire to the action of the two staple forming devices; substantially as described.

8. In staple driving mechanism, a vertically movable cross head, a wire feeding device carried thereby, a housing secured to the cross head, staple forming and driving devices working in said housing, a vertically reciprocating driving head for actuating said devices and the cross head and also the wire feeding device, and formers or anvils pivoted to the housing to coöperate with the staple forming devices, and means for moving said anvils into and out of working position; substantially as described.

9. In a staple forming mechanism of the character described, the combination of a reciprocating driving head, of a vertically movable cross head mounted thereon, of a staple former and wire feeding mechanism carried thereby, means connected to the driving head for actuating the wire feeding mechanism, a reciprocating staple driver and a pivoted former or anvil arranged to cooperate with the staple former and to be moved out of operative position by the movement of the driver; substantially as described.

10. In mechanism of the character described, the combination with a reciprocating cross-head having two sets of staple forming and driving mechanisms and a driving head, of an intermittent gear wheel carried by said cross-head, actuating connections for said gear wheel operated by the movement of the driving-head, and two sets of wire feeding devices arranged to be alternately operated by said gear wheel; substantially as described.

11. In mechanism of the character described, the combination with a reciprocating cross-head having two sets of staple forming and driving mechanisms and a drivind head, of an intermittent gear wheel carried by said cross-head, actuating connections for said gear wheel operated by the movement of the driving head, two sets of wire feeding devices arranged to be alternately operated by said gear wheel; and means for locking one set of wire feeding devices while the other set is in operation; substantially as described.

12. In mechanism of the character described, a reciprocating cross-head having vertical guide rods, a wire feeding device attached to the cross-head, a drive head having a sliding and also a lifting engagement with said guide rods, housings secured to the cross-head, staple forming and driving devices working in said housings, actuating connections between the driving head and the wire feeding mechanism, and independent actuating connections between the drive head and the staple forming and staple driving devices ;substantially as described.

13. In a staple driving mechanism, a cross-head having wire feeding mechanism connected thereto, a reciprocating staple cutter and former mounted on the cross-head, a reciprocating staple driver also mounted on the cross-head, a reciprocating driving head, connections whereby the cross-head will be given a limited vertical movement on the down and up stroke of the drivinghead, actuating connections between the staple forming and driving devices and the driving head, and means to feed wire to the staple former on the return stroke of the driving head; substantially as described.

14. In staple forming and driving mechanism, a reciprocating cross-head, two wire feeding devices carried thereby, two housings secured to the cross-head, staple forming and driving devices arranged to reciprocate in said housings, a reciprocating driving head, actuating connections between the drive head and the cross-head, and also between the drive head and staple forming and driving device, and means for alternately feeding wire to the two staple forming devices on the return stroke of the driving head; substantially as described.

15. In staple driving mechanism, a reciprocating driving head, a reciprocating cross head having two sets of staple forming and driving mechanisms, an intermittent gear wheel carried by the cross-head, means to reciprocate the driving head, and means connected to the driving head for reciprocating the cross-head, means connected to the driving head for actuating said gear wheel, and two sets of wire feeding devices arranged to be alternately operated by said gear wheel; substantially as described.

In testimony whereof, I have hereunto set my hand.

EDWIN HERBERT BRODEN.

Witnesses:

H. E. KENNEDY,

J. C. JAMISON.