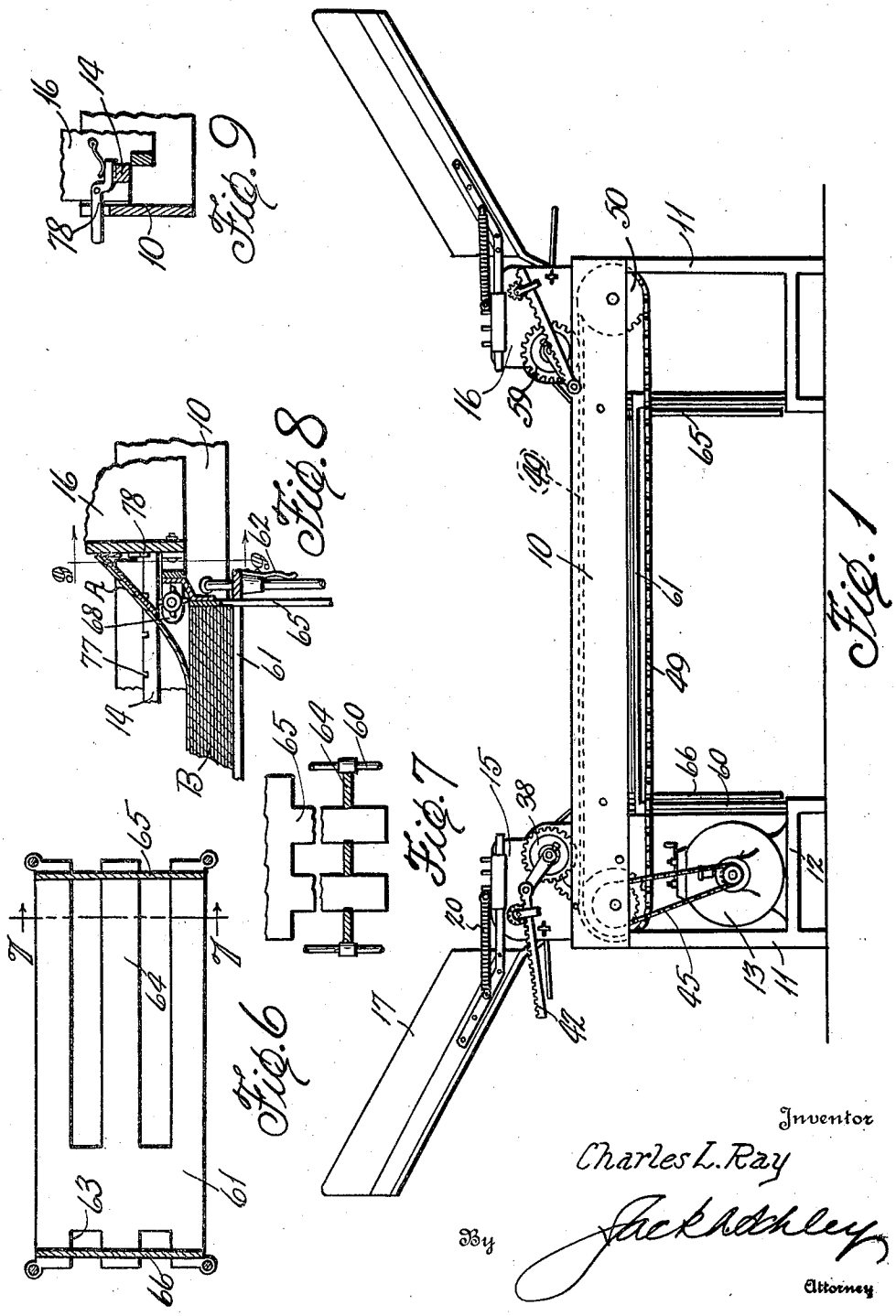
Nov. 11, 1924. 1,514,929

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MACHINE FOR GATHERING MULTIPLE SHEETS

Filed July 10, 1922 3 Sheets-Sheet 1



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MACHINE FOR GATHERING MULTIPLE SHEETS

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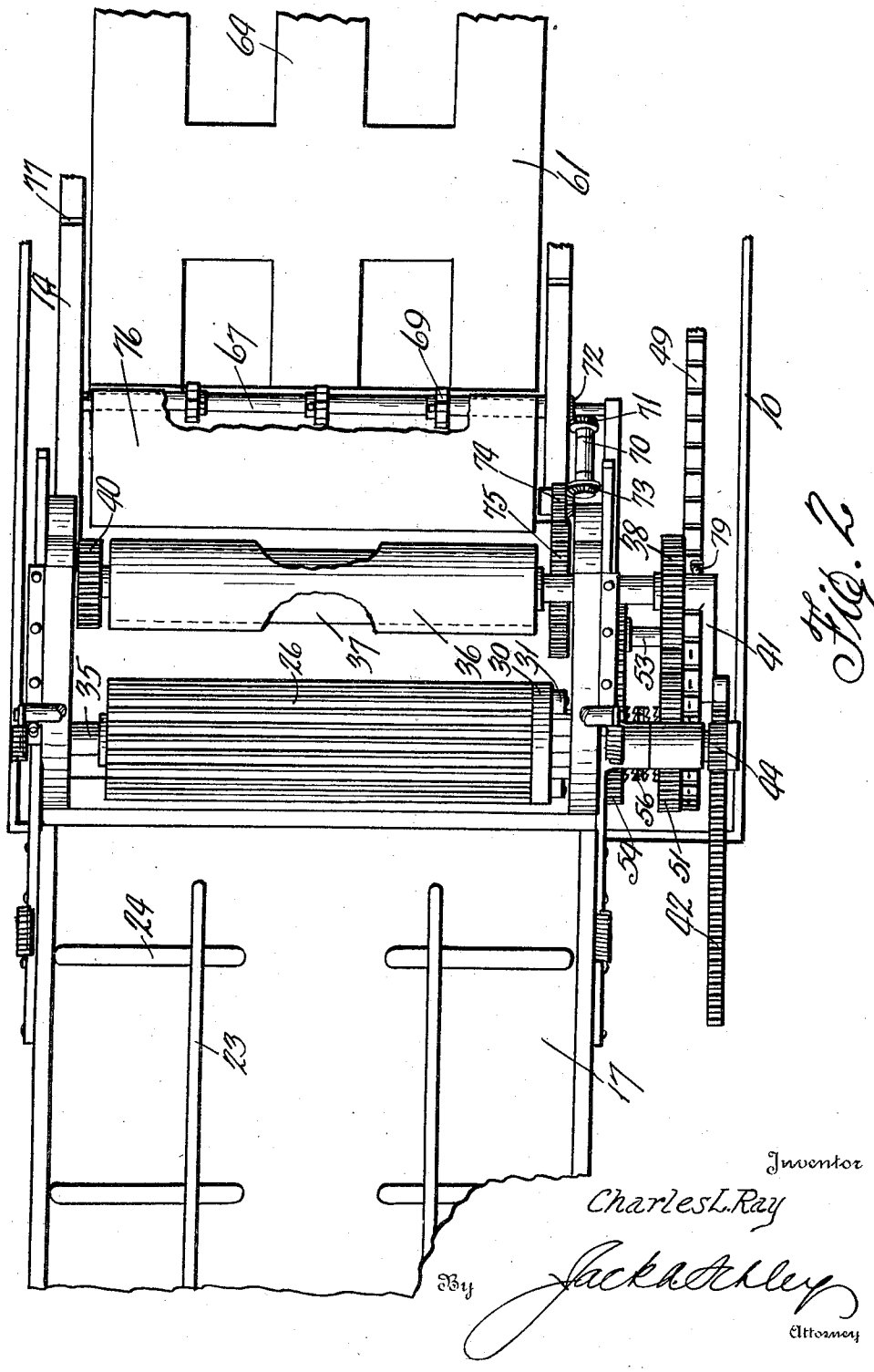


Fig. 2.

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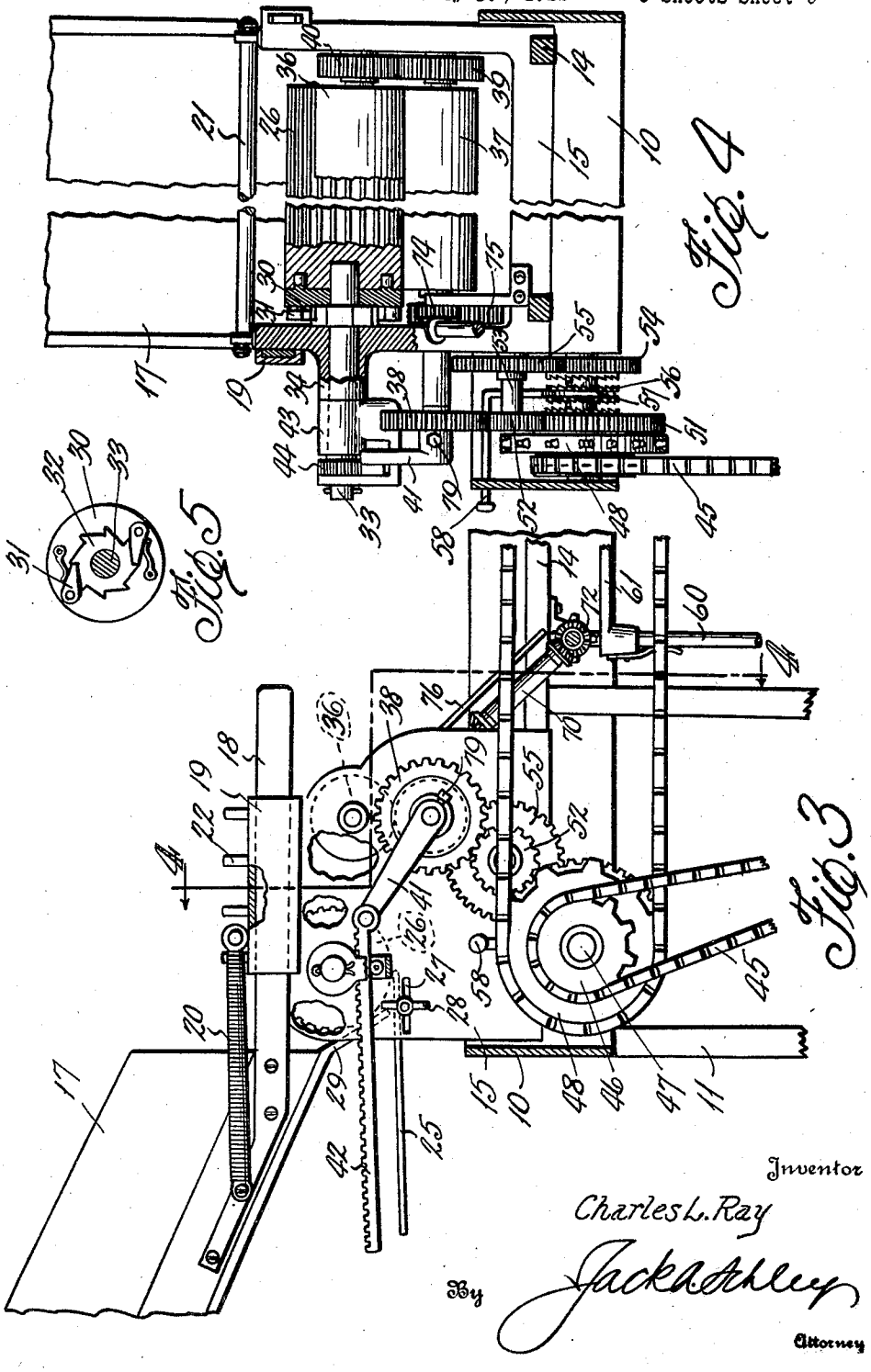


Fig. 4

Fig. 5

Fig. 3

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UNITED STATES PATENT OFFICE.

CHARLES L. RAY, OF DALLAS, TEXAS.

MACHINE FOR GATHERING MULTIPLE SHEETS.

Application filed July 10, 1922. Serial No. 573,944.

To all whom it may concern:

Be it known that I, CHARLES L. RAY, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Machines for Gathering Multiple Sheets, of which the following is a specification.

This invention relates to new and useful improvements in machines for gathering multiple sheets.

The object of the invention is to provide a machine adapted to feed printed sheets from a plurality of stacks in regular sequence and gather the same into a common stack in pre-determined order. One of the primary objects is to provide a machine for assembling multiple printed forms such as original, duplicate and triplicate, which are used for making manifold copies.

In carrying out the invention I provide a machine including a pair of oppositely disposed paper feeds, each adapted to deliver a sheet at regular intervals onto a common stacker elevator, whereby the sheets are gathered in the proper order into one stack; together with transmission mechanism whereby the speed of one feed may be increased so as to deliver two sheets to every single sheet delivered by the opposite feed, when it is desired to gather an uneven number of different forms, as for instance, original, duplicate and triplicate.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown and wherein:

Fig. 1 is a side elevation of a machine constructed in accordance with my invention,

Fig. 2 is an enlarged plan view of the main feed mechanism,

Fig. 3 is a side elevation of the same,

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3,

Fig. 5 is a detail of the feed roller ratchet,

Fig. 6 is a detail showing the stacker elevator in plan,

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6, showing the adjustable end guide,

Fig. 8 is a detail partly in section showing the manner in which the sheets are delivered onto the stacker elevator, and

Fig. 9 is a sectional detail taken on the line 9—9 of Fig. 8 showing one of the latches.

In the drawings the numeral 10 designates a rectangular frame including standards 11 at each end. A horizontal support 12 extends inwardly of the machine from each pair of standards and mounted on one of said supports is an electric motor 13. A pair of longitudinal guide rails 14 extend within the frame 10 and mounted thereon at one end is a stationary carriage 15, while an adjustable carriage 16 is slidable on the other end of said rails. Mounted in the carriage 15 is the mechanism constituting a main paper feed, while the mechanism supported by the carriage 16 constitutes a secondary feed. The two feeds are identical, with the exception of the driving means, therefore it is only necessary to show and describe the construction of one feed. The stationary or main feed is driven by means of gears, while the secondary feed is driven by a sprocket whereby its position on the guide rails 14 may be adjusted with respect to the length of the sheets being gathered.

Each feed is provided with a magazine 17 for holding a stack of paper, said magazine being supported by a pair of parallel bars 18 having one end fixed to the side of the magazine and which are slidable in guideways 19 provided on the sides of the carriage, as will be seen in Figs. 3 and 4. A pair of coiled springs 20 have one end secured to the side of the magazine while the other end of each is fastened to a transverse adjusting rod 21. A plurality of pins 22 are mounted on each side of the top of the carriage, and the rod 21 is adapted to be engaged behind said pins whereby the tension of the springs 20 may be adjusted. As is shown in Fig. 2 the magazine may be provided with paper guides 23 which may be adjusted laterally in slots 24 to conform to the width of the sheet. The magazine has an inclined lip 29 which is located immediately behind a feed-roller 26. A feed-plate 25 extends outwardly of the machine under said magazine, its inner end projecting under the feed-roller 26. Each side of the feed-plate is provided with a trunnion which extends thru a slot 27 in the sides of the carriage and receives

a wing-nut 28, whereby said plate may be adjusted in different positions depending upon the weight of the paper in the stack.

The feed-roller 26 is preferably made of corrugated rubber or other like material which will adhere to the sheet contacting therewith and remove the same from the stack. A plate 30 is secured to one end of said roller and carries a pair of spring pressed pawls 31 which engage the teeth of a ratchet-wheel 32 mounted on a shaft 33, the inner end of which extends axially into a socket in said roller, as is best shown in Figures 4 and 5. The ratchet 32 is disposed between said plate and the inner wall of the carriage, the outer end of said shaft extending thru a bearing 34, provided in said carriage. The opposite end of the feed-roller is supported by means of a spindle 35 which is journaled in a suitable bearing in the carriage, as is best shown in Fig. 2. An upper ejector roller 36 is mounted forwardly of said feed-roller and journaled in suitable bearings in the sides of the carriage. A similar roller 37 is located immediately under the roller 36 so as to contact with the under side thereof. One end of the arbor of the roller 37 extends thru the side of the carriage and a gear 38 is mounted thereon. The other end of the arbor of said roller 37 carries a gear 39 which meshes with a similar gear 40 mounted on the arbor of the upper ejector roller 36, whereby motion is imparted to the last named roller when the roller 37 is driven. Mounted outwardly of the gear 38 on the arbor of the roller 37 is a crank-arm 41 pivoted to the outer end of which is a rack-bar 42 adapted to be reciprocated by the movement of said arm. The said rack-bar is supported in a substantially U-shaped hanger 43 carried by the outer end of the shaft 33. A pinion 44 is mounted on said shaft within said hanger and is driven by said rack-bar. On the outward stroke of said bar the shaft 33 is disconnected with the feed-roller 26, while it will be seen that on the inward stroke of said bar the shaft 33 is driven in an opposite direction whereby the pawls 31 engage the ratchet teeth of the wheel 32 and cause said feed roller to be revolved with said shaft.

Motion is imparted to the mechanism of both feeds from the motor 13 by means of a belt 45 which drives a sprocket pinion 46 mounted on a shaft 47. A sprocket wheel 48 is also mounted on the shaft 47 and drives a chain 49 which in turn drives a similar sprocket wheel 50 mounted in the opposite end of the frame 10. A gear 51 is mounted on the shaft 47 inwardly of the sprocket wheel 48 and meshes with a pinion 52 on the outer end of the stub shaft 53, which pinion is in mesh with the gear 38 and adapted to drive the same. A pinion 54 is mounted on the shaft 47 opposite to the gear 51, and meshes with a gear 55 mounted on the stub shaft 53 inwardly of the pinion 52. The said gear 51 and pinion 54 are loose on said shaft 47 and each is provided with a clutch hub, as is clearly shown in Figure 4. A clutch member 56 is disposed between said gear and pinion and is keyed to said shaft. The said member has a circumferential groove engaging in which is a yoke 57 provided with an angular handle 58 extending thru the side of the frame. The parts just described constitute the transmission of the main feed, and by shifting the member 56 into the hub of the pinion 54 the main feed mechanism is driven at the same speed as that of the secondary feed, which speed is used for assembling sheets of an even number of different forms as for example original and duplicate printed sheets. By engaging the member 56 with the hub of the gear 51 increased motion is imparted to the gear 38 which causes the rollers of the main feed to deliver two sheets to every single sheet delivered by the secondary feed. This high speed is used for assembling sheets of three different printed forms such as original, duplicate and triplicate forms.

The secondary feed has only one speed, and motion is imparted to the ejector rollers and the rack bar 42 by means of a sprocket wheel 59 which is used in place of a gear 38 as is shown in the main feed. The said sprocket is mounted on the elongated end of the arbor of the lower ejector roller 37 (the same as in the gear 38) and is driven by the chain 49; as is clearly shown in Fig. 1.

At the inner corners of the horizontal support 12 vertical guide posts 60 extend to the frame 10 and slidable thereon is a stacker elevator 61, as is best shown in Fig. 6. At the beginning of an operation said elevator is slid to its uppermost position on said posts 61, and is held in such position by the frictional engagement of a spring clip 62 at each corner with the adjacent post, as is clearly shown in Figs. 3 and 8. The paper is delivered from the ejector rollers onto the said elevator, and as the sheets are stacked thereon said elevator is forced downward, as will be hereinafter more fully described. The elevator has a plurality of slots 63 at one end, and is also slotted at the other end to form a plurality of elongated fingers 64. An end guide 65 depends from the carriage 16 and is formed of a plurality of fingers which engage between the fingers 64 of the stacker elevator. It will be seen that the intersecting fingers permit the said guide to be adjusted laterally with respect to the length of the sheets, which adjustment is effected simultaneously with the adjustment of the position of the secondary feed. Said fingers also permit the stacker elevator to be raised and lowered on the posts 60. At the other end of said elevator a similar

guide 66 depends from the carriage 15 and the fingers of said guide are received in the slots 63. The guide 66 is stationary and the slots 63 co-act with the intersecting fingers at the other end of the elevator in permitting the latter to be raised and lowered.

The mechanism of each feed includes a transverse shaft 67 located under the guide rails 14 and in alinement with the adjacent end guide. One end of said shaft is journaled in a suitable bearing in the carriage while the other end is supported in a bearing bracket 68, secured to said carriage, as is shown in Figs. 2 and 8. Mounted on said shaft is a plurality of star wheels 69, and the shaft is driven by means of an inclined shaft 70 which has a beveled gear 71 on its lower end meshing with a similar gear 72 on said shaft 67. On the upper end of the shaft 70 is a beveled gear 73 in mesh with the beveled face of a pinion 74 which is also provided with spur gear teeth which are in mesh with a gear 75 mounted on the arbor of the lower ejector roller 37 between the end of said roller and the inner wall of the carriage. When motion is imparted to the ejector rollers, the gear 75 drives the pinion 74 which in turn drives the inclined shaft 70, whereby motion is imparted to the shaft 67 and the star wheels 69 are revolved. The sheets are guided from the ejector rollers to the stacker elevator by means of a slide 76, the lower end of which terminates over the star wheels 69, as shown in Figs. 2, and 3 and 8.

A series of adjustment notches 77 are provided in each guide rail 14, and a latch 78, is mounted on each side of the sliding carriage 16, as is shown in Figs. 8 and 9. By means of said notches and latches, the said carriage may be locked in the desired position on the said rails. The crank arm 41 of each feed is secured to the arbor of the lower ejector roller by means of a set screw 79, whereby said arm is adjustable.

In operation when it is desired to gather original and duplicate printed sheets, one of the sheets is placed lengthwise on the stacker elevator 61 so that one end of the sheet touches the stationary end guide 66. The secondary carriage 16 is then slid inwardly until the adjustable end guide 65 touches the said sheet. The said carriage is then slid outwardly so that the latches 78 may be engaged in the nearest notches 77, thereby locking the secondary feed in position. The rod 21 is removed from engagement with the pins 22 and the magazine 17 of the main feed slid outwardly. A stack of duplicate sheets is then placed with the lower end of the paper resting on the feed plate 25. The magazine is then slid inwardly so that the stack is engaged between the lip 29 and the feed roller 26, and the rod 21 is engaged over a pair of the adjustment pins 22. This places the coiled springs 20 under tension, causing the magazine to be held against the paper, the upper end of the stack laying back into said magazine.

A stack of original sheets is placed in the magazine of the secondary feed in exactly the same manner, and the crank arm 41 is adjusted so that the rack bar 42 of the main feed is in position to begin its inward stroke which revolves the feed roller 26. The crank arm of the secondary feed is adjusted so that the rack bar thereof is in position to begin its outward or idling stroke, all of which is clearly shown in Fig. 1. The clutch member 56 is engaged in the hub of the pinion 54, so as to drive the main feed at the normal speed. By energizing the motor the operation of the machine is started, and the first sheet is delivered by the main feed. The feed roller 26 removes the top sheet from the stack and passes it to the ejector rollers 36 and 37. From the ejector rollers the sheet is guided by the slide 76 onto the stacker elevator. As the rack bar of the main feed is making its outward stroke, a sheet is delivered by the secondary feed in precisely the same manner as the first sheet, and this alternating operation is continued until the different sheets have been gathered into one stack.

In Fig. 8 a sheet of paper A is shown passing down the slide 76, and when the same has settled in a horizontal position on the stack B, the ends of said sheet are engaged by the teeth of the revolving star wheels 69 which carry the edges of the sheet under said star wheels so as to lay flat upon the other sheets of said stack. As the edges of the sheets are carried under, the operation gradually forces the stack and elevator downwardly, the frictional engagement of the clips 62 with the posts 60 being such as to permit of said downward movement. When the original and duplicate sheets have been interleaved into one stack the said stack is removed from the elevator, as is obvious.

When it is desired to gather sheets of three different forms such as original, duplicate and triplicate, the first operation consists in placing the duplicate sheets in the main feed and the triplicates in the secondary feed and interleaving said sheets in the manner described above. It will be seen that by this operation the sheets will be gathered in the alternate order of triplicate and duplicate. Now, by placing a stack of the interleaved triplicate and duplicate sheets in the main feed magazine and a stack of original sheets in the secondary, and engageing the clutch member 56 with the hub of the gear 51 so as to drive the main feed at high speed, the said feed will deliver a triplicate sheet and then a duplicate onto the stacker

elevator, which latter sheet will be followed by an original from the secondary feed. It is pointed out that the main feed, when in high gear, is driven twice as fast as the secondary, thereby delivering two sheets to every single sheet delivered by the secondary feed and gathering the sheets in the proper order.

It is obvious that sheets of four different forms may be gathered by the machine, the first operation consisting in interleaving the duplicate and quadruplicate sheets and then by a similar operation gathering the triplicate and original sheets. By placing the stack compiled alternately of quadruplicate and original sheets in the main feed magazine, and the stack consisting of triplicate and original sheets in the secondary magazine, it will be seen that the main feed will deliver a quadruplicate sheet, followed by a triplicate from the secondary feed, then a duplicate from the main feed and an original from the secondary, and so on.

It is pointed out that by means of the different speeds in the transmission mechanism of the main feed, sheets of an odd or even number of different forms may be readily gathered by the machine.

It is to be understood that the construction shown and described is merely exemplificatory, and the various changes in the size, shape and arrangement of the different parts, as well as modifications, may be made without departing from the spirit of the invention.

What I claim is:

1. In a gathering machine, a frame member, a stationary paper feed carried by the said member, a slidable paper feed carried by the member and disposed oppositely to the first named feed, and a stacker elevator carried by the frame member below and between the said feeds.

2. In a gathering machine, a rectangular frame member, guide rails extending longitudinally within said member, a stationary paper feed mounted at one end of said guide rails, a secondary paper feed disposed oppositely to the stationary feed and slidable on said rails, whereby its position may be adjusted with respect to the said stationary feed, and common means onto which the sheets are delivered and stacked.

3. In a gathering machine, a rectangular frame member, guide rails extending longitudinally within said member, a stationary paper feed mounted at one end of said guide rails, a secondary paper feed disposed oppositely to the stationary feed and slidable in said rails, whereby its position may be adjusted with respect to the said stationary feed, and a stacker elevator slidable on guide posts, said elevator located below and between the said feeds in position to receive the sheets delivered thereby.

4. In a gathering machine, a rectangular frame member, guide rails extending longitudinally within said member, a stationary paper feed mounted at one end of said guide rails, a secondary paper feed disposed oppositely to the stationary feed and slidable on said rails, whereby its position may be adjusted with respect to the said stationary feed, a stacker elevator slidably mounted, a stationary vertical guide at one end of the said elevator, and a similar guide at the other end adjustable longitudinally of the machine with the secondary paper feed.

In testimony whereof I affix my signature.

CHARLES L. RAY.