Jan. 10, 1933. J. Q. SHERMAN ET AL 1,894,065

MANIFOLDING MACHINE

Filed Sept. 22, 1926 4 Sheets-Sheet 1

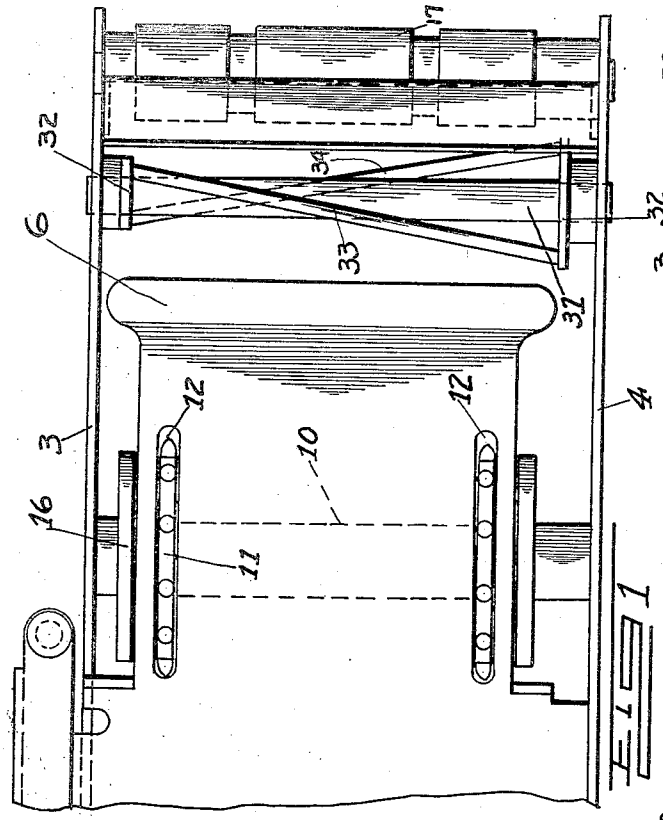


FIG. 1

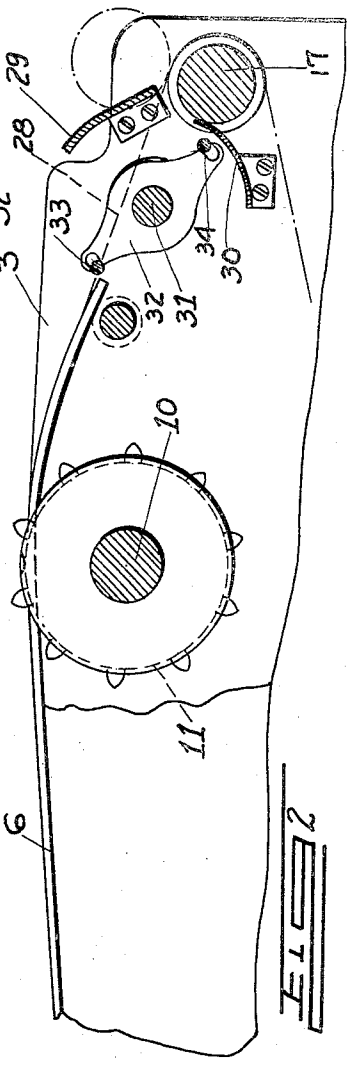
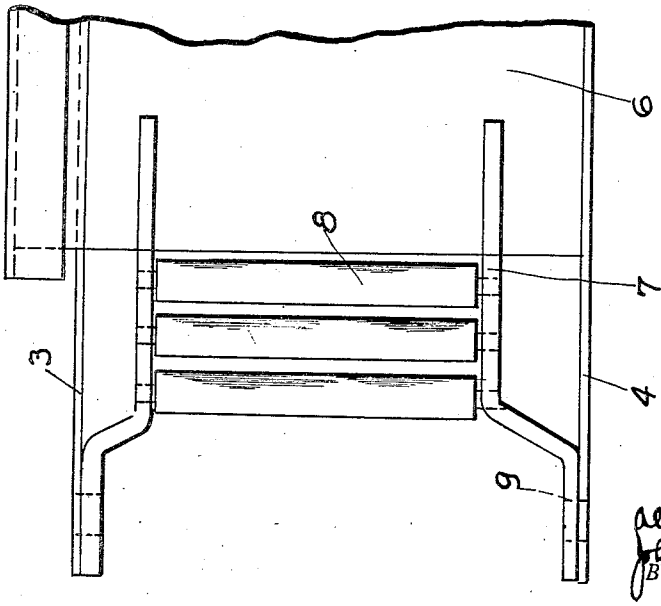


FIG. 2



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MANIFOLDING MACHINE

Filed Sept. 22, 1926 4 Sheets-Sheet 2

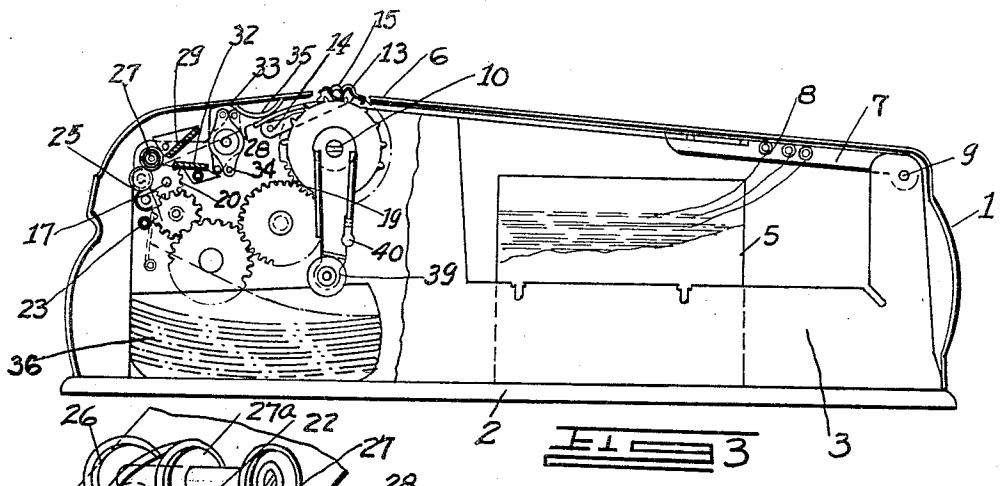


FIG 3

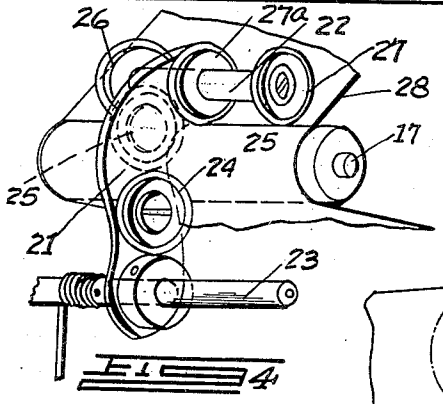


FIG 4

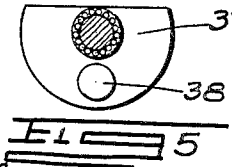


FIG 5

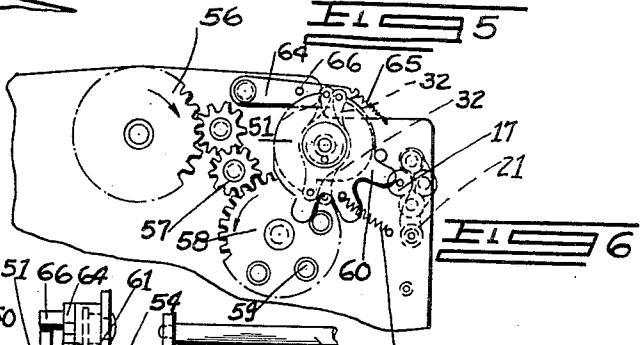


FIG 6

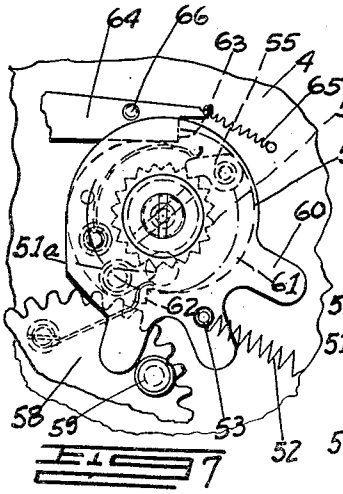


FIG 7

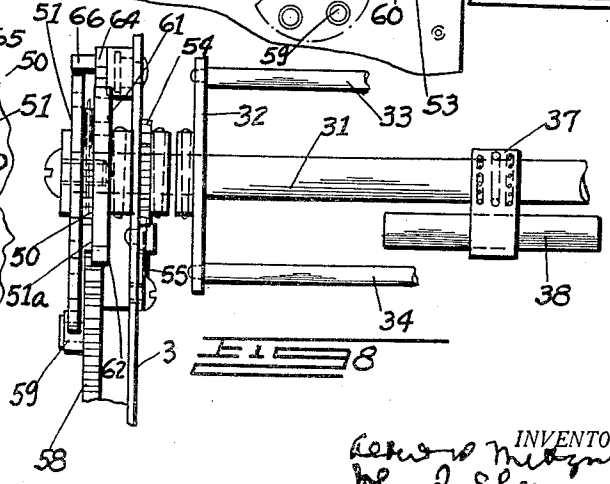


FIG 8

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MANIFOLDING MACHINE

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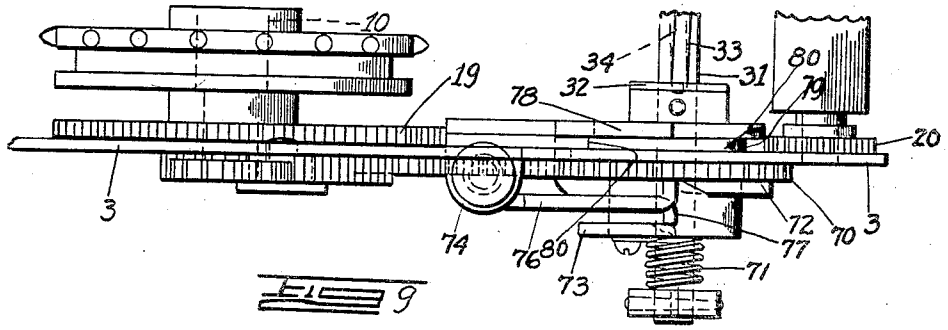


Fig. 9

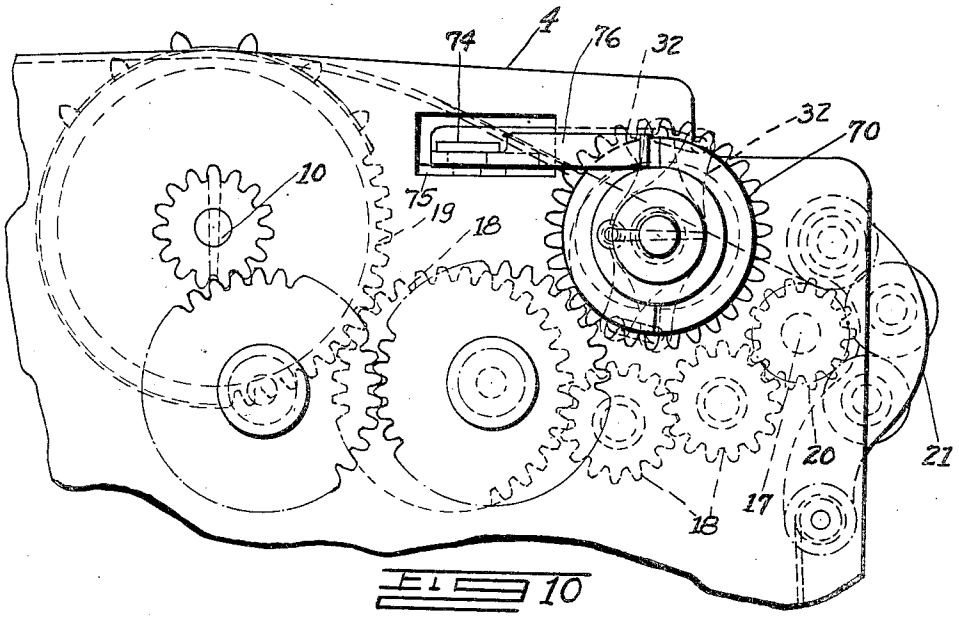


Fig. 10

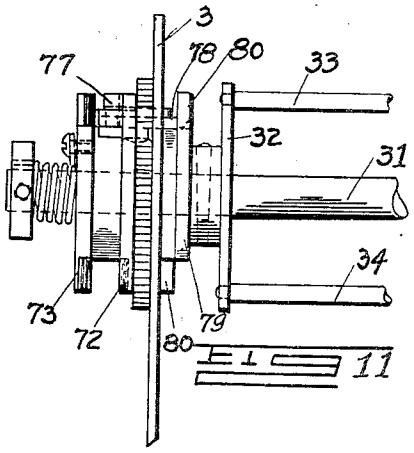


Fig. 11

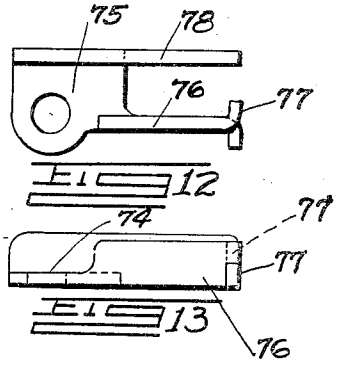


Fig. 12

Fig. 13

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MANIFOLDING MACHINE

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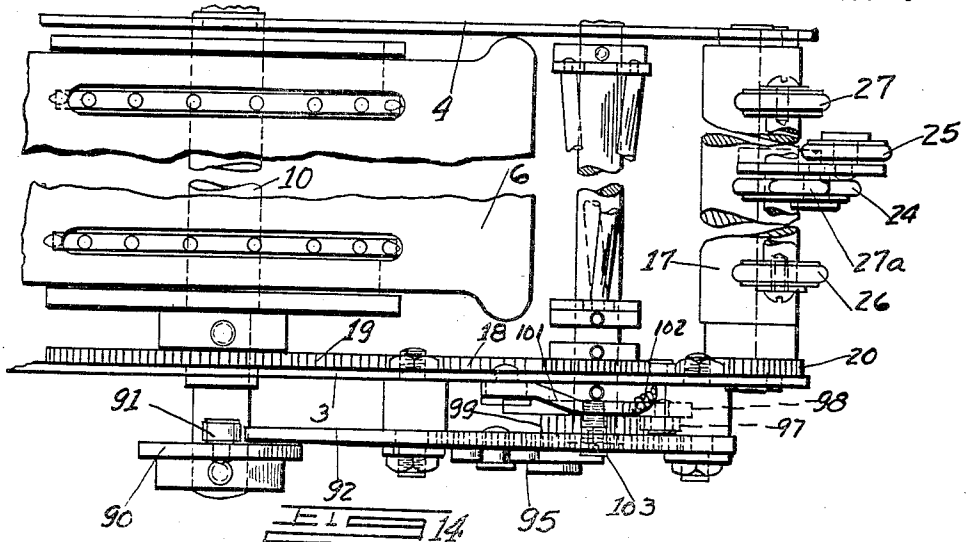


FIG 14

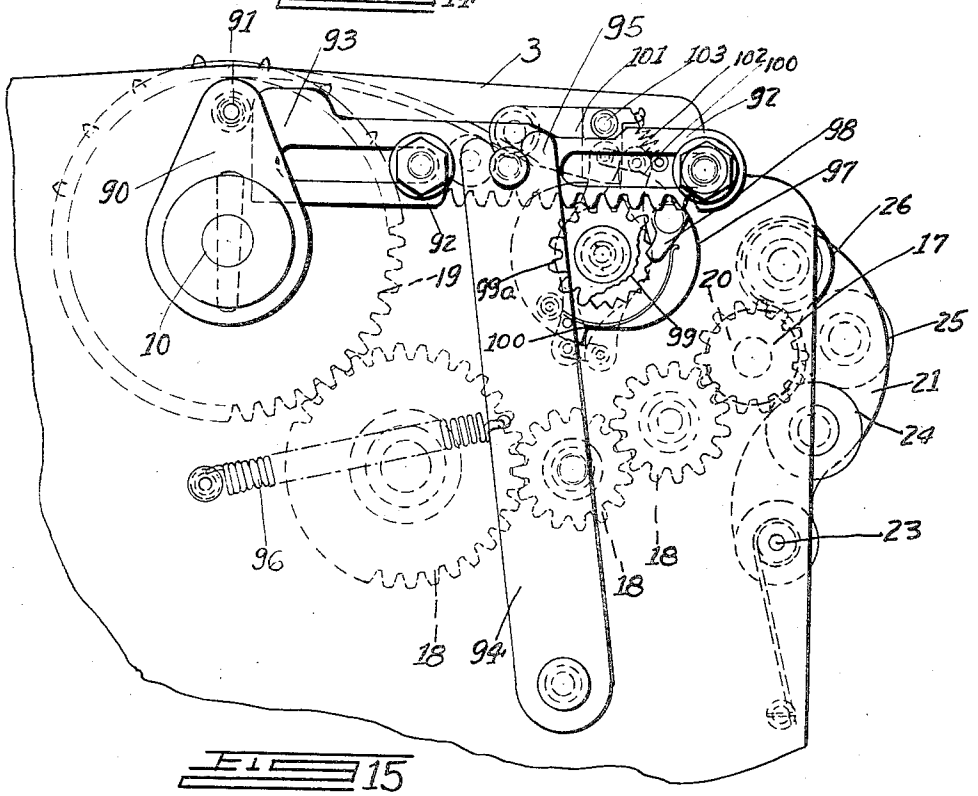


FIG 15

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Patented Jan. 10, 1933 1,894,065

UNITED STATES PATENT OFFICE

JOHN Q. SHERMAN AND ALBERT W. METZNER, OF DAYTON, OHIO, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE STANDARD REGISTER COMPANY

MANIFOLDING MACHINE

Application filed September 22, 1926. Serial No. 137,149.

Our invention relates to manifolding machines in which a record or secret copy is retained in the machine in the form of a complete manifold section bearing the notations made on each issued copy or copies.

The simplest form of manifolding machine is one in which from a storage bundle or roll, or a plurality of the same, a multiple of webs of paper are fed over a writing table, with carbon paper interleaved between the several webs. The webs are printed in forms which are to be filled in by the user of the machine and are collated so that like numbered forms in each web come beneath each other over the writing table with the lines of the forms in alignment with each other. The feeding mechanism serves to draw one set of forms of one form length at a time into position for making notations thereon, which are transferred by the carbon paper as the top web is written on, to those beneath it, and the feeding mechanism also issues the webs in a measured form length at a time. The operator tears off the issued forms, and where the machine retains a full sized record, the lowermost of the webs is fed into a compartment in the machine where it is stored for a complete record of all transactions entered on the manifolding webs.

In our specification we describe such a manifolding machine, but it will be understood that our invention relates to manifolding machines broadly in which a record slip is retained in the machine.

It is usual in machines for manifolding to have the several forms printed on the web separated from each other by perforations or weakened lines of cleavage so that the forms may be readily torn individually off from the web for use, and for making it easier to fold in bundles or packs. Our invention relates to means in connection with the retention of a record slip for breaking the record web, particularly where perforated in the record web, so as to store in the machine a pile of individually separated webs. The device can also be adapted to cut or sever the record web if desired.

The usual mode of storing a record requires the bookkeeper or other user who desires to consult or employ in any way the individual slips to separate them by hand, which is a tedious operation. Also it is sometimes desirable to find some individual slip in the record, and where the record is a continuous web, this is a very unhandy thing to do.

The formation of a record as a bundle of separated slips each one representing a complete transaction, is thus a labor saver in a number of ways, and to this saving of labor, our invention is addressed.

We accomplish our objects by that certain construction and arrangement of parts to be hereinafter more specifically pointed out and claimed.

In the drawings:

Figure 1 is a plan view of a machine showing the operation of our invention.

Figure 2 is a side elevation thereof, showing the same from the side.

Figure 3 is a more detail side elevation with the side frame of the machine broken away illustrating one mode of accomplishing our invention.

Figure 4 is a detail perspective of the guiding roll structure used with the record form feed device.

Figure 5 is a detail side elevation of the paper guide suspended from the record feed shaft.

Figure 6 is a detail side elevation showing the operating mechanism for the breaker arm device.

Figure 7 is a detail of the same parts as shown in Figure 6, on a larger scale, and omitting all but the toothed segment element and its directly connected parts.

Figure 8 is an elevation of the said operating mechanism, showing a portion of the breaker arm device.

Figure 9 is a detail plan view of another mode of operating the breaker arm device.

Figure 10 is a side elevation showing in detail the operating parts for this modification.

Figure 11 is a detail taken from the rear of the machine, as a rear elevation of the parts showing in plan in Figure 9.

Figure 12 is a plan view of the pawl element for the said modified operating mechanism.

Figure 13 is a side elevation thereof.

Figure 14 is a plan view showing a third modified mode of operating the breaker arm device.

Figure 15 is a side elevation of the said modified operating device of Figure 14.

Referring generally to the particular form of manifolding machine with relation to which we illustrate several modes of accomplishing our object of storing a separated record form bundle, we have illustrated a machine housed in a cabinet or enclosing shell generally indicated at 1. It will be understood that this cabinet is provided with a writing opening and a slot through which the issued forms are ejected by the paper feeding device. On the base 2 within the cabinet, the latter being removable therefrom, are the side frames 3 and 4 of the mechanism, between which frames is arranged some suitable mode of supplying paper webs for the machine. Thus there may be a tray 5 in which is supported a bundle formed of multiple paper webs folded back and forth and collated together.

Hinged to the rear ends of the side frames is the writing table which rests at its forward end on lugs struck in from the side frames. The table has a main body 6 with arms 7, between which are the idler rolls 8 for separating the webs of paper and keeping them apart, thus facilitating feeding thereof. These arms are pivoted to the side frames at 9.

The side frames journal the feed shaft 10 on which are pin wheels 11, the pins of which are cleared by slots 12 in the forward end of the writing table.

The forward end of the writing table depends after it passes the feeding point, and some sort of a pressure device is provided for holding the paper during the tearing off operation of the issued slips, which device is lifted during the feed operation. This mode of operation is in accord with the general principle of multiple paper feed wherein the webs are formed with marginal holes to be engaged by the pins of feeding pin wheels of the type illustrated. Such a pressure device is illustrated as the type having a lengthwise beaded cross plate 13, mouned on hinged arms 14, and having rolls 15, by means of which the said cross plate is lifted during the feeding operation. Springs keep the cross plate down during the tearing off operation. As a familiar type of mechanism for holding up the cross plate we provide for cams 16 on the feed shaft which lie just outside of the lateral edges of the writing table.

It should be understood that the mechanism so far described is well known in the art, and thus it will not require a specific illustration or description, and furthermore our invention will apply to other types of paper feed.

The record storage feed is illustrated in the several modifications as being mounted at the extreme forward end of the side frames, and is formed of a driven shaft 17, which is operated direct from the paper feed shaft by means of a train of gears mounted inside of the side frame 3, as illustrated generally at 18, which train includes a gear 19 on the feed shaft and a gear 20 on the record storage feed shaft 17. A pressure device is provided whereby the shaft 17 grips the record web fairly tightly, which as shown in the several modifications is formed of a carrier frame 21, on which is a cross bar 22, said frame being mounted on a spring pressed spindle 23, arranged between the side frames. The frame 21 has the rollers 24 and 25 thereon, and the cross bar has the rollers 26 and 27 thereon. The record web as illustrated at 28 passes over the foremost edge of the writing table, and passes between guide plates 29 and 30, to engagement between the feed shaft 17 and the rollers 26 and 27, on the carrier.

The breaker arm device is mounted between the front edge of the writing table when in its operating position, and the said record feed shaft. It is formed in the type of device shown of a driven spindle 31, on the two ends of which are cross plates 32, said plates arranged at slight angles to each other. The breaker arms proper, as illustrated at 33 and 34, extend in a slight spiral oppositely to each other from one cross plate to the other. The paper web passes between the arms and the shaft or spindle 31.

The operating devices are so controlled and timed that during each revolution of the feed handle of the device, which is used to operate the main feed shaft, the breaker arm structure is tensioned to operate by means of a spring structure and is then, during each feed, released to swing through a half circle so as to bring one of the breaker arms with a snap down against the paper web thus breaking a form away from the main body of the web preferably at a perforated or weakened line of cleavage thereof.

The timing is such that this breaking action takes place just as the record web has been moved far enough to bring its line of cleavage beyond the edge of the writing table.

The spiral twist of the breaker arms is such as to start the tearing off or breaking off action at one side of the web, rather than

applying an equal pressure clear across the web, since this makes the complete clean tearing off more certain.

A device is used to guide the free edge of the web from which the form has been broken away to the record feed device. In the illustrated structures this is provided by a finger or plate 35, located on the underside of the top of the cabinet.

The action of the record feed, which grips the advanced edge of the record web, when the breaking action takes place, is such as to feed the broken off form around the feed shaft and rearwardly into a suitable receptacle in the front end of the frame.

Such a receptacle is illustrated at 36, as a round bottomed box, into which the individual record form slips readily when delivered from the record feed device.

As an additional guide to prevent the free edge of the advancing record web from deflecting so as to miss the feed device, we preferably mount on the spindle of the breaker device. a gravity guide device in the form of a roller bearing supported plate 37, set over the spindle, and having a weight 38 mounted through its lower or depending portion. Any web of paper which has become curled so as to strike this guide device will be deflected toward the grip of the record feed structure.

As a mode of insuring a single operation sufficient to advance but one set of forms and break away and deliver into the record box a single manifolded record form slip, we have shown a handle 39 mounted on the feed shaft and having a stop formed by a spring plunger (not shown) in the side frame 4, which plunger must be depressed each time the handle is operated by means of a hinged flap 40 on the handle crank portion. This structure is a well known device in the manifolding art and does not require specific description.

Without reference, then, to the special ways of actuating the breaker device, the machine is supplied with paper in plural collated webs, which is passed over the idler rolls and across the writing table to a position of being engaged by the feed pins. The feed handle is released and given a complete rotation which is accompanied by a release of any tension on the paper so that it can be self adjusting on the feed pins, resulting in advancing a form length of paper of which say two webs are advanced for delivery and to be torn off. The lower web is threaded so as to pass down over the edge of the writing table to engagement with the record feed device. On the following feeding operation, the record web will be advanced during the period of feeding out the next set of forms, bringing the line of cleavage of the record web from its position near the tear off point of the machine, used for the delivered webs, in a forward direction toward the record feed shaft. By the time the line of cleavage has just cleared the edge of the writing table the one breaker arm is snapped down against the paper, breaking the first form length of the record web away from the advancing unbroken web. The continued operation of the feed handle to complete the issuing of the webs, feeds the severed form length of the record web down into the box, and the several guides direct the advancing cut edge of the record web into the grip of the record feed device, passing between the arms 33 and 34.

Before passing to a description of the several modes illustrated as some which may be used in accomplishing our invention, it should be noted that the machine will operate where there is no broken line or cleavage formed in the record web, if the advance edge of the writing table is made sharp to serve as a cutting or shearing edge, and sufficient power is applied to the breaker arm device. Also the exact structure of the breaker arm device is not essential since it could be modified in various ways with the same resulting action. The spiral or inclined relation of the breaker arms is a preferred structure facilitating the action of the machine.

The record feed device is not essentially of the exact form shown as some other mode of feeding and guiding could be employed with comparative effectiveness.

Referring now to the structure shown in Figures 3 to 8, it will be noted that the spindle of the breaker arm device has a ratchet wheel 50 mounted at its end outside of the side frame 4. A toothed segment plate 51 is set rotatably over the tip of the spindle, and has a pawl 51*a* on its inner side engaging the ratchet wheel. A spring 52 is connected to a stud 53 on the segment plate and fastened to the side frame. A ratchet 54 (Figure 8) is pinned to the spindle on the inside of the frame, and its pawl 55 is held on the frame to engage this ratchet, so that the spindle cannot advance with the rotation of the segment plate in one direction. However, when the segment plate moves in the other direction, this ratchet permits movement, said movement being imparted to the spindle by means of the pawl on the segment plate.

The feed shaft has a gear 56 thereon which rotates, through a gear train 57, the gear 58 on the side frame. This gear has a series, in this instance of three studs or rollers 59 on its face. The segment plate has a set of teeth 60 part way around its periphery which are engaged by the studs so that when the feed shaft is revolved the segment plate is revolved also.

The effect of revolving the plate is to tension the spring 52, while revolving the segment plate, but without moving the breaker arm device. When the last one of the rollers or studs on the gear 58 has passed the seg-

ment plate, it will snap back to its starting position, thus carrying the breaker arm device through a half of a revolution. The teeth on the plate and the studs or rollers on the gear are so arranged as to impart this one half of a revolution.

In order to provide a stop for the breaker arm device so that it will move through one half a revolution and not overrun the pawl and ratchet actuator, we equip the spindle thereof, between the side frame and the outer or driving ratchet with a cam plate 61, having two shoulders at 62 and 63. Mounted pivotally on the side frame so as to lie over the cam is a stop finger 64, which is held by a spring 65 in position of engagement with the cam. The finger has a pin thereon as at 66 which rests on the edge of the segment plate, said plate being so formed as to cam up the finger just as the release of the segment teeth is effected, but so as to permit it to fall against the cam in time to prevent more than a revolution from one of the shoulders 62, to the next shoulder 63. This provides for exactly one half a revolution of the breaker device.

Referring now to the next form of operation of the breaker arm device, we have shown in Figures 9 to 13, a gear 70 on the outer end of the spindle of the breaker arm device, which gear is loose thereon. A spiral spring 71 engages the end of the spindle, and is secured to this gear so that when the gear is revolved in one direction the spring is tensioned.

The gear has a hub, to which the spring is attached, on the periphery of which hub are two flanges 72 and 73, which flanges each extend over about one half of the periphery and are opposed to each other in location and have their ends tapered as indicated at Figure 9. A stop device is provided in the form of a plate 74, pivoted in a horizontal plane on a lip 75 turned out from the side frame of the machine. The plate has a tongue 76 which lies over the hub of the gear last mentioned and has an extended tip 77, which travels in a path on the hub controlled by the two flanges.

The flanges are so arranged as to force the tongue first to the right as pushed by the flange 72, and then to the left as pushed by the flange 73.

The portion of the plate inside of the side frame is formed as a stop finger 78 which engages a somewhat similar hub on the spindle of the breaker arm device on the inside of the side frame, with this difference, however. The hub or collar 79 on the spindle at this point has two half circle shoulders 80, which terminate in shoulders on the collar. One finger when in its left hand position engages the one shoulder, and when in its right hand position engages the other shoulder.

The result of this structure is that when the gear 70 is revolved through a train of gears marked generally as 18, from the feed shaft to said gear 70, the spring on the breaker arm spindle is tensioned, and the stop device is moved so that the moment it clears one of the flanges on the gear hub, the stop finger portion releases the spindle of the breaker arm device for one half a revolution. The spindle cannot turn more than one half a revolution because the movement of swinging the stop finger away from one shoulder brings it into position to engage the other one, which begins just half a revolution away.

The third form of operating device for the breaker arm device is shown in Figures 14 and 15. In this case the feed shaft of the manifolding machine is equipped with a disk 90, which carries a stud 91. Slidingly held on the side frame of the machine is a rack bar 92, whose rearward end is made wide as at 93, and lies in a position to be thrust over and then released, each time the feed shaft of the machine is revolved. As a convenient mode of providing a spring return for the rack bar, we mount a lever 94 on the side of the machine frame, and provide the lever with a fork 95 to engage a stud on the rack bar. This lever is pulled rearwardly of the machine by a spring 96.

The spindle of the breaker arm device is equipped with a disk 97 on which is a pawl 98. This pawl engages a ratchet wheel 99, loose on the spindle, and on the ratchet is a gear 99*a* in engagement with the rack bar so that when the rack bar is pulled rearwardly the ratchet will drive the pawl and revolve the spindle, but so that the pawl will slip during the movement of the rack imparted by the revolving stud on the feed shaft plate.

The spindle disk is formed as a cam having two shoulders as illustrated at 100, and an L-shaped stop finger 101 is pivoted on the side frame and pulled by the spring 102 so as to engage the shoulders on this cam, same being one half a revolution apart.

The finger has a stud 103 thereon which engages the top of the rack bar, the bar being so shaped as to lift the finger just as the rack bar has been thrust to the end of its forward path and is about to be released by the further revolution of the feed shaft stud.

As illustrated the breaker arm device is given one half revolution by the rack bar movement to place its spring under tension, followed by a release of the spindle of the device for movement by a lifting of the stop finger, whereupon the rack springs back to starting position, rotating the ratchet 99 in the way which will drive the pawl on the spindle plate.

Before the spindle can be driven more than a half revolution the stop finger will have been released by the movement of the rack bar so as to engage the other of the two shoulders on the stop cam of the breaker device spindle.

It is obvious that in general mode of operation these several modifications are alike, but that it is possible to accomplish the snapping half rotary motion of the breaker arm device in a series of different ways.. The mode of operation and mechanism which we prefer is shown in the first set of views and has been firstly described above.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:—

1. A device for severing a paper web by disruption thereof across a line of cleavage in manifolding machines, comprising means to hold the web under longitudinal tension, and interspaced bars between which the paper web is directed, and means for imparting a revolution to said bars to engage and apply a blow to the paper transverse its length.

2. A device for severing a paper web by disruption thereof across a line of cleavage in manifolding machines, comprising means to hold the web under longitudinal tension, and interspaced bars between which the paper web is directed, and means for imparting a revolution to said bars to engage and apply a blow to the paper transverse its length, and at an angle to the perpendicular transverse line thereof.

3. In a manifolding machine, a device for severing a paper web by disruption thereof across a line of cleavage, comprising a pair of bars revolubly mounted oppositely to each other on end plates so as to permit the web to pass between the bars, and means for imparting a half revolution at a time to said bars.

4. In a manifolding machine, a device for severing a paper web by disruption thereof across a line of cleavage, comprising a pair of bars revolubly mounted oppositely to each other on end plates so as to permit the web to pass between the bars, and means for imparting a half revolution at a time to said bars, said means comprising a tensioning device and a releasing device.

5. In a manifolding machine, a rotary paper severing element, and a paper feeding means, a spring conditioned by the paper feeding means, connections to operate the severing element, a stop for the paper severing element, and means operated by the paper feeding means for engaging said stop so as to release the severing element for operation.

6. In a manifolding machine, a rotary paper severing element, and a paper feeding means, a spring conditioned by the paper feeding means, connections to operate the severing element, a stop for the paper severing element, and means operated by the paper feeding means for engaging said stop so as to release the severing element for operation, said last named means and stop being so arranged that the stop releases the severing element for single operations only.

7. In a manifolding machine, a paper severing element and a paper feeding means, a spring conditioned by the paper feeding means, connections to operate the severing element, said severing element arranged to accomplish its function by a movement of one half a revolution, a pair of stops for the severing element, and means operated by the paper feeding means for engaging said stops to release the severing element for operation, said means being arranged to move into path for engaging one of the stops upon movement to release the other.

8. In a manifolding machine having a paper feeding means for manifold notation of a paper web, a paper support located beyond the feeding means from the area of supply of paper, retentively engaging means receiving the paper beyond said paper support from said feeding means, and means engaging the paper, intermediate of said support and said retentively engaging means, by impact progressively from one edge of said paper to the opposite edge of said paper, to sever said paper.

9. In a manifolding machine having a paper feeding means for manifold notation of a paper web, means to retentively engage the paper located beyond the feeding means from the area of supply of paper, and means for severing the paper comprising a bar located to make contact with the paper intermediate of said feeding means and said retentively engaging means, and comprising means for imparting a sudden and rapid action to said bar whereby said bar breaks the paper by impact.

10. In a manifolding machine having a paper feeding means for manifold notation of a paper web and having an edge transverse to and past said feeding means in the direction of paper feeding, means past said edge in said direction to retentively engage said paper, means for severing the paper comprising a bar located to make contact with the paper intermediate of said edge and said retentively engaging means and disposed to engage the paper progressively from one edge of the paper to the other, and means operated incident to and in time with the operation of the paper feed for imparting sudden and rapid action to the bar to break the paper at a predetermined line of cleavage.

11. In a manifolding machine, feeding means to feed a plurality of webs one above the other, means to divert a web outside the machine and to divert another web inside the machine, guide members inside the machine between which the latter web is guided, additional feeding means, inside the machine, in position to receive the latter web from said guide members, and to hold said web ex-

tended from said guide members and the first mentioned feeding means to said additional feeding means, and means to strike said extended web suddenly, with impact, to break the web.

12. A device for severing a paper web comprising means for tensioning the web, an element having an edge extending across one side of the web, and an element mounted to pass said edge from the opposite side of the web, extending along said edge in its passage, and severing the web by stretching it across said edge with a breaking or tearing action as distinguished from a shearing or cutting action.

13. A device for severing a paper web comprising means for tensioning the web, an element having an edge extending across one side of the web, and an element mounted to pass said edge from the opposite side of the web, extending along said edge in its passage and inclined to said edge in the direction of its passage, and severing the web by stretching it across said edge progressively therealong with a breaking or tearing action as distinguished from a shearing or cutting action.

14. In a manifolding machine having paper webs and feeding means for the webs, a device for severing at least one of said webs comprising means for tensioning the web, an element having an edge extending across one side of the web, an element mounted to pass said edge from the opposite side of the web, extending along said edge in its passage, severing the web by stretching it across said edge with a breaking or tearing action as distinguished from a shearing or cutting action, and means for causing said passage of said element, set for action and then released for action, incident to the operation of said feeding means.

15. In a manifolding machine having paper webs and feeding means for said webs, a device for severing at least one of said webs comprising means for tensioning the web, an element having an edge extending across one side of said web, an element mounted to rotate past said edge from the opposite side of the web, extending along said edge in its passage, severing the web by stretching it across said edge with a breaking or tearing action as distinguished from a shearing or cutting action, and means for rotating said element, set for action and then released for action, incident to the operation of said feeding means.

16. In a manifolding machine having paper webs and feeding means for said webs, a device for severing at least one of said webs comprising means for tensioning the web, an element having an edge extending across one side of the web, elements coaxially and diametrically oppositely mounted for rotation, each to pass said edge from the opposite side of the web, in a half of its revolution, extending along said edge in its passage, severing the web by stretching it across said edge with a breaking or tearing action as distinguished from a shearing or cutting action, and means for causing the half revolutions of said elements, set for action and released for action, incident to the operation of said feeding means.

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