Oct. 25, 1932. R. A. LAKE 1,884,760

MECHANISM FOR FEEDING AND ALIGNING MULTIPLE PRINTED FORMS

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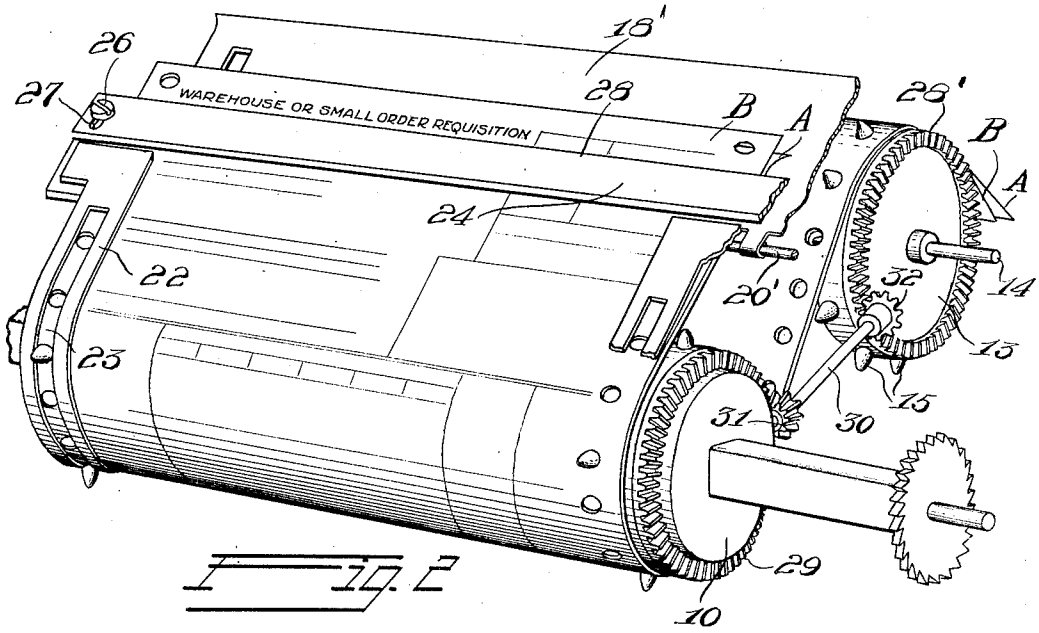


FIG. 2

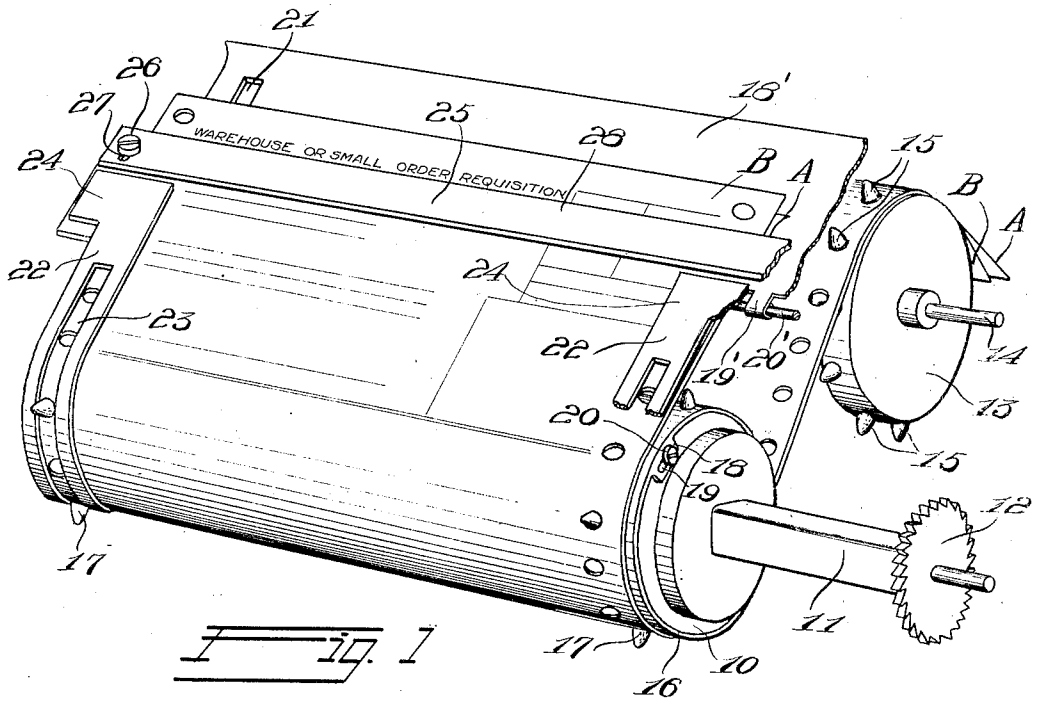


FIG. 1

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UNITED STATES PATENT OFFICE

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MECHANISM FOR FEEDING AND ALIGNING MULTIPLE PRINTED FORM

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This invention relates to a method and mechanism for feeding and aligning a plurality of copies of printed forms so that they may be fed in superposed relation accurately aligned over the platen of a machine, such as a telegraph printer or an ordinary typewriter. The invention is particularly designed for use in connection with a telegraph printer such as is disclosed in Patent #1,665,594, granted to H. L. Krum on April 10, 1928.

In the operation of a telegraph printer using a plurality of printed forms arranged in superposed relation separated by duplicating means, such as one-time carbon paper for example, it is essential that the superposed leaves containing the printed forms be held in accurately aligned relation to each other so that the entries on the superposed forms may be made at their proper places on the forms even though the operation of the printer be continued without attention from an operator for a long period of time. In printing telegraph machines, absolute accuracy in the positioning of the printing forms is necessary because an operator is not always available to make any adjustments in the relative positions of the several sheets if such become necessary, so that if errors occur in aligning the sheets such errors become cumulative. This invention aims to provide a sheet feeding and aligning mechanism that can be relied upon to position the superposed sheets on the platen with accuracy without requiring attention and without injury to the sheets, so that cumulative errors are avoided.

It has heretofore been proposed to utilize feeding and aligning means for multiple printing forms arranged in superposed relation in which pins or fingers entering perforations in the forms are relied upon to position the forms in proper superposed relation. Generally, the constructions heretofore proposed have simply aimed to align the sheets as they are fed by the platen to the position at which the printing takes place. When the sheets reach this position on the platen they are generally under some tension and subjected to pressures, causing the superposed sheets with the duplicating means interposed therebetween to lie snugly in contact with each other so that it is relatively difficult to move the sheets one with respect to the other. As a consequence, the operation of the fingers or pins in the perforations in the paper, if they are out of alignment, frequently fails to bring the sheets into alignment, but the pins or fingers on the other hand simply tear or mar the edges of the perforations of the unaligned sheets permitting the superposed posed sheets to be fed over the platen with the printing forms thereon out of proper registry. Errors in registry thus caused become cumulative unless manual adjustment is made of the sheets.

A primary object of this invention is to provide a method and mechanism that will avoid the objections just referred to by aligning the superposed sheets before they are subjected to any means that will tend to place the sheets under substantial tension or to cause them to firmly adhere one to the other frictionally or otherwise.

A further object of the invention is to provide a method and mechanism for aligning superposed printing forms in which the alignment between the sheets is brought about before said sheets are fed to the printing platen and in which means are provided cooperating with the printing platen to accurately maintain the alignment brought about before the sheets reach the printing platen in their movement through the machine.

A further object of the invention is to provide an improved mechanism for feeding and aligning multiple copies of printed or similar forms in which the aligning mechanism associated with the printing platen is arranged to permit the superposed sheets to engage the platen evenly and without interference caused by the aligning pins or fingers entering the perforations in the sheets.

A still further object of the invention is to provide a mechanism for feeding and aligning multiple copies of printed forms so arranged that the forms are fed to a cylindrical platen at an acute angle with respect to a horizontal plane tangent to the platen

at its lowest point, so that the sheets will engage a substantial portion of the platen and may be positioned by relatively widely spaced aligning pins, as the sheets are caused to move over said portion of the printing platen toward the printing position.

A still further object of the invention is to provide a mechanism for feeding and aligning multiple copies of printing forms including a cylindrical platen provided with a plurality of relatively long aligning fingers or pins designed to enter perforations in the superposed sheets in which curved guides are provided disposed parallel to a substantial portion of the cylindrical surface of the platen and arranged to engage the sheets at opposite sides of the perforations therein to prevent the sheets from moving endwise of the pins or fingers as said sheets are carried around the platen by the rotation thereof.

A still further object of the invention is to provide a mechanism for feeding and aligning multiple copies of printing forms in which sheet aligning means are provided separate from aligning means on the platen and in which said first named sheet aligning means is operatively connected for unitary movement with the platen.

Further objects of the invention will appear as a description thereof proceeds with references to the accompanying drawing in which:

Figure 1 is a diagrammatic perspective view showing one form of the invention.

Figure 2 is a similar view showing a modification thereof.

Like reference characters indicate like parts throughout the several views.

In the form of the invention shown in Figure 1, the numeral 10 indicates the platen of a telegraph printer or similar machine. As indicated on said figure the platen is preferably cylindrical in form, and is slidably supported on a shaft 11 that is angular in cross section and carries adjacent one end thereof a ratchet 12 secured thereto for rotation therewith as a unit. A suitable carriage may be provided to receive the platen 10, such as illustrated and described in the patent referred to above. As also disclosed in said patent said carriage is caused to move endwise of the shaft 11 carrying with it the platen 10. The shaft 11 and the platen is caused to rotate intermittently by suitable mechanism cooperating with the ratchet wheel 12 in any suitable manner, such as disclosed in the above patent, for example. The mechanism just referred to constitutes no part of the present invention but said invention resides in the means to be described for feeding superposed aligned printing forms to a platen 10 and for maintaining the alignment on the platen.

The improved mechanism of this invention includes sheet aligning means in the form of wheels 13 mounted for free rotation with respect to and adapted to have endwise movement on a shaft 14 suitably supported in the frame of the machine. The wheels 13, only one of which is shown in Figure 1, are supported by the carriage in which the platen 10 is mounted so that said wheels move laterally with the platen 10. The wheels 13 are provided with a plurality of pins or fingers 15 tapered as shown in the drawing, and arranged at regularly spaced intervals around the periphery of said wheels. Said pins or fingers are intended to primarily properly align the superposed sheets in a manner hereafter more particularly pointed out.

In order that the alignment of the sheets brought about by the fingers or pins 15 of the wheels 13 may be maintained as the superposed sheets move over the printing platen said platen is provided adjacent each end thereof with a ring 16, each carrying a plurality of pins or fingers 17 spaced around the circumferenence thereof in wider spaced apart relation than the pins or fingers 15 before referred to. The rings 16 may be set in recesses in the platen 10 and are so mounted that they may be adjusted circumferentially of the platen. In order to facilitate such adjustment and to hold said rings in adjusted position, each of said rings is provided with an ear 18 preferably extending radially over the end of the platen 10. The ear of each of said rings is provided with an arcuate slot 19 designed to receive the shank of a holding screw 20, the head of which engages the outer surface of said ear so that when said head is brought into firm engagement with said surface of the ear by adjusting the screw 20 the ring will be held in the desired position with respect to the platen. The adjustment just referred to is provided so that the ring 16 may be adjusted to bring any point of the printing form on the aligned sheets in accurate position with respect to the typing position of the machine with which the invention is to be used.

In order to cause the superposed sheets to be guided over the wheels 13 before referred to, a guide 18′ provided with tongues 19′ the ends of which are bent around a shaft 20′ suitably supported in a carriage of the machine is provided. Said guide is provided adjacent each edge thereof with slots 21 arranged to successively receive the pins 15 as the wheels 13 are caused to rotate by the movement of the superposed sheets initiated by the rotation of the shaft 11. The guide 18′ is spaced slightly above the sheets so that said sheet can move freely beneath it. The portions thereof adjacent slots 21 serve to move the sheet toward the base of the pins or fingers 15 and to maintain said sheets on

said fingers as the fingers move through the slots 21.

The carriage is also provided with curved guides 22 disposed adjacent each end of the platen 10. Said guides have their curved portion extending throughout a substantial portion of the circumference of the platen and are relatively closely spaced from said platen so as to provide only sufficient space to permit the superposed sheets to move freely between said portions and the platen as the platen is rotated about its axis. Each of the curved guides 22 is provided with a slot 23 extending throughout its curved portion and slightly into the straight securing portion 24, said slots being designed to successively receive the pins or fingers 17 during the rotation of the platen. It will be observed that said slots are of a width not greatly exceeding the greatest diameter of the pins or fingers 17 so that the portions of the curved guides 22 constituting the sides of said slots contact with the sheets moving over the platen closely adjacent to the base of said pins causing the sheets to be brought in contact if, for any reason, the sheets should fail to lie snugly and smoothly against the platen and each other.

The carriage may also be provided with an adjustable cutting bar 25 secured to the carriage by screws 26, the shanks of which pass through transverse slots 27 in the cutting bar. By releasing the screw 26 the cutting bar may be adjusted to bring the cutting edge 28 thereof into accurate position with respect to any part of the printed form included on the superposed sheets. The cutting bar is utilized to sever the printed or typewritten forms from unprinted or partially printed forms remaining in the machine.

In Figure 2, a modification of the invention is shown in which the feed wheels 13 are positively driven in timed relation with the platen 10. In order to accomplish this result the wheels 13 are keyed to the shaft 14 that is journalled in any suitable manner in the carriage of the machine. One of the wheels 13 is provided with gear teeth 28′, preferably by securing to an edge of said wheel a ring gear as shown in this figure. One end of platen 10 is also provided with a ring gear 29. A countershaft 30 suitably journalled in the carriage of the machine has gears 31 and 32 secured to its opposite ends. Said gears mesh respectively, with the ring gears 29 and 28′, whereby the wheels 13 and the platen 10 are caused to rotate positively in synchronism. It will be understood that the paper may be applied to the wheels 13 in this form of the invention so that an amount of slack exists between the aligning wheels and the platen. In the arrangement shown in this figure said slack is maintained by the positive connection between the aligning wheels and the printing platen. If desired, the gears 29, 31, 32, and 28′ may be so related that considerable play is permitted between the aligning wheel 13 and the platen 10. This will provide a desirable jogging effect during each feeding movement of the platen that facilitates the settling of the superposed sheets in properly aligned relation on the pins or fingers.

The mechanism just described in operation, is intended to align and feed a multiplicity of printed forms and it is desired to feed the forms to the typing position in exact registry with each other so that when duplicating paper or material is used between the several sheets, identical entries may be made in the correct position on each of the superposed forms. In the drawing only two superposed sheets are illustrated, designated by the letters A and B. Said sheets may be taken from rolls or individually from stacks of prefolded sheets in zigzag or other form containing the desired forms or the several sheets of printed forms may be superposed and folded together in zigzag or other form with the perforations thereof in approximate alignment. The sheets are drawn from the top of such a stack of folded and approximately aligned forms.

Whatever the source of the sheets A and B, said source is located at a point so that said sheets in passing over the aligning wheels 13 will contact with a substantial portion of the periphery thereof. This result is secured by feeding the sheets from a point substantially below the highest point in the periphery of the aligning wheels 13, so that said aligning wheels draw the sheets upwardly from the packs or rolls. As said sheets are drawn upwardly from the packs or rolls they are under no substantial tension but they are permitted to hang loosely from the wheels 13 prior to the engagement of the perforations therein with the first aligning pin or finger 15 of said wheels. In view of the fact just referred to the freely hanging sheets have no substantial tendency to adhere to each other, frictionally or otherwise, as the first aligning finger or pin enters the approximately aligned perforations of the sheets. On the other hand, the air tends to separate the suspended sheets.

As a result the slight shifting of one sheet relative to the other to bring about an exact registry is readily accomplished as the sheets pass over the aligning wheels.

It will be observed that axes of the shafts 14 and 11 are disposed approximately in the same horizontal plane. As a result of this arrangement the sheets fed to the aligning wheels 13 pass over the tops of said wheels around a substantial portion of the periphery thereof and engage the platen 10 at a substantial acute angle with respect to a horizontal plane tangent to the platen at its lowest point. The sheets, accordingly, also engage a substantial portion of the periphery

of the platen and the accurate alignment secured by the aligning wheels 13 may be readily maintained by the pins or fingers 17 engaging the perforations in the aligned sheets at intervals throughout the portions thereof that contact with the platen. It will be observed that the fingers on the platen 10 are spaced more widely apart so that pins will not enter all of the perforations of the sheets. This arrangement permits the use of relatively long pins, so that a multiplicity of sheets can be handled in the mechanism without substantial interference with the feeding of the sheets due to the fact that the tips of the pins move on an arcuate path of substantially greater diameter than the path of movement of the supporting surface of the platen. If one of the relatively long pins should bind against the rear edge of the perforation in entering it such binding would have a tendency to raise the paper away from the platen at that point and if another pin engages in the next adjacent hole the magnitude of the binding on the edge of the hole would be increased. However, as no pin engages in the next adjacent hole, any binding that might result, due to the path of travel of the tip of the relatively long pin will not misalign the sheets because the paper is permitted by the absence of such adjacent pin to settle down on the pin into close contact with the platen and any error will not be cumulative.

The pins 17 of the platen maintain the alignment of the superposed sheets brought about by the aligning wheels 13 and the pins 15 carried thereby and the curved guides 22 serve to smoothly guide the sheets around the platen and prevent substantial movement of the sheets endwise of the pins. The sheets pass underneath the cutting bar 25 and may be removed when desired. The guide plate 18′ causes the superposed sheets to settle on the pins of wheels 13, exerting a yielding but firm pressure on the sheets that do not lie in contact with the periphery of said wheels causing them to settle in properly aligned position on the pins 15 as the paper passes around the tops of the aligning wheels 13. When it is desired that the aligning wheels shall be positively driven in approximate timed relation to the movement of the platen the arrangement disclosed in Figure 2 is used. This arrangement operates in the same manner as just described with reference particularly to Figure 1, except that the perforated sheets are not relied upon to rotate the aligning wheels.

In both of the arrangements described it will be observed that the sheets are accurately aligned by the aligning wheels before the paper is subjected to any tension tending to cause the sheets to adhere to each other and while the several sheets are fed to the aligning wheels in such a way that they have a natural tendency to separate rather than to adhere to each other. In this way the exact registry or alignment of the sheets is easily brought about before they are fed to the printing platen. Furthermore, in the arrangement disclosed the printing platen is provided with means for maintaining the exact registry brought about by the aligning rolls without introducing factors that might disturb such registry and at the same time positively and evenly feeding the sheets over the platen. In this way manifold copies of printed forms may be typed with great accuracy and with a minimum of care on the part of operatives.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What I claim as new and desire to secure by U. S. Letters Patent is:

1. A printing machine feeding and aligning mechanism for a plurality of superposed forms having feeding perforations adjacent their edges, comprising rotary aligning means provided with pins to enter successive perforations in said forms to bring the perforations therein into registry, a platen separate from said means and including rings carrying pins and mounted for adjustment circumferentially of said platen so that the pins may be brought into proper position with respect to some point on the aligned forms.

2. In combination with the platen of a printing machine, of a ring carrying a plurality of equally spaced pins, and means to operatively connect said ring and said platen, said means permitting the circumferential adjustment of said ring and the pins carried thereby with respect to said platen.

3. In combination, a platen of a printing machine, a ring carrying a plurality of equally spaced feeding pins, said ring being provided with a lug overlapping the end of said platen and provided with an elongated slot, and securing means extending through said slot to maintain said ring in adjusted position on said platen.

In testimony whereof I affix my signature.

ROSS A. LAKE.