

July 8, 1941.

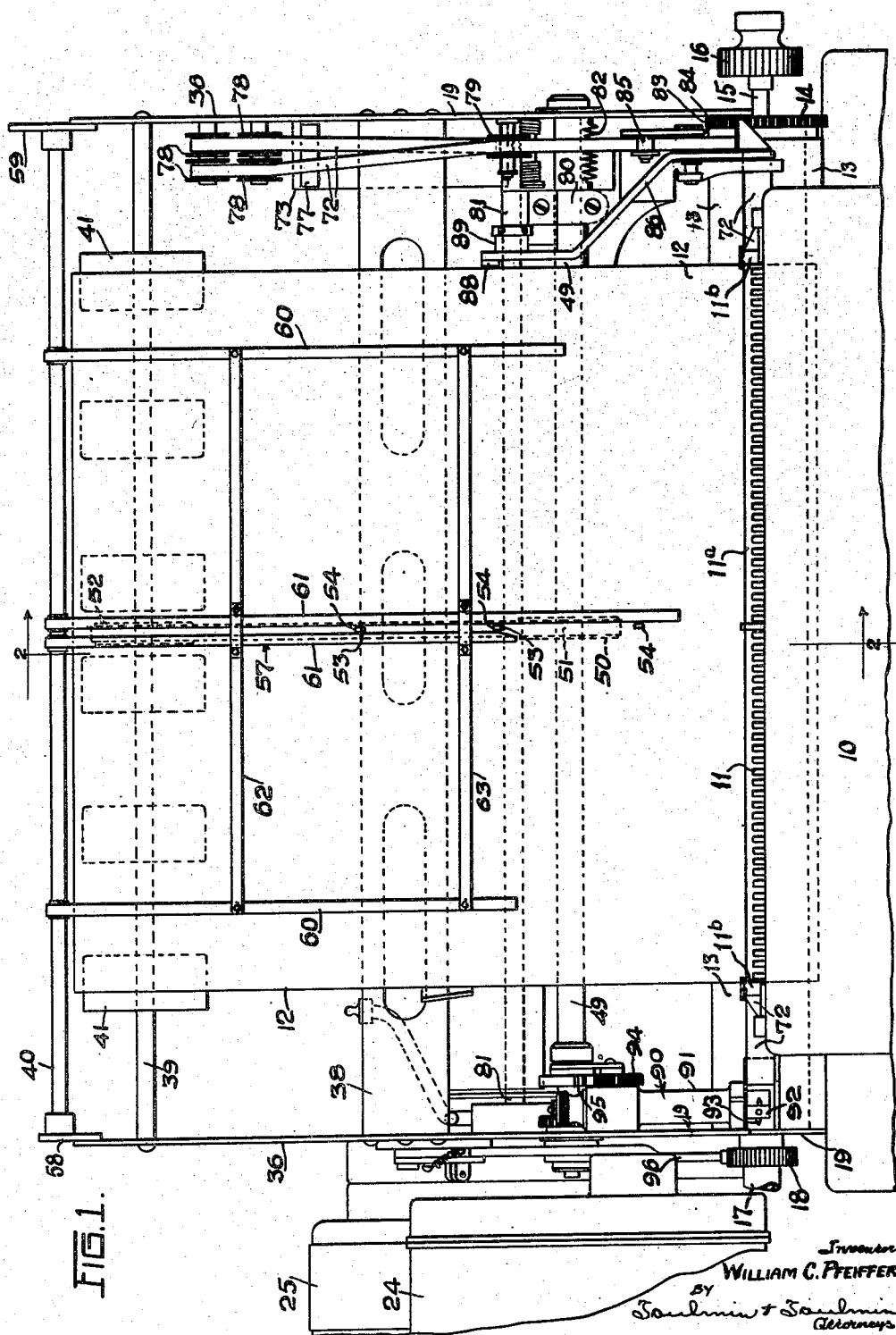
W. C. PFEIFFER

2,248,188

MANIFOLDING DEVICE

Filed March 2, 1939

2 Sheets-Sheet 1



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MANIFOLDING DEVICE

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2 Sheets-Sheet 2

FIG. 3.

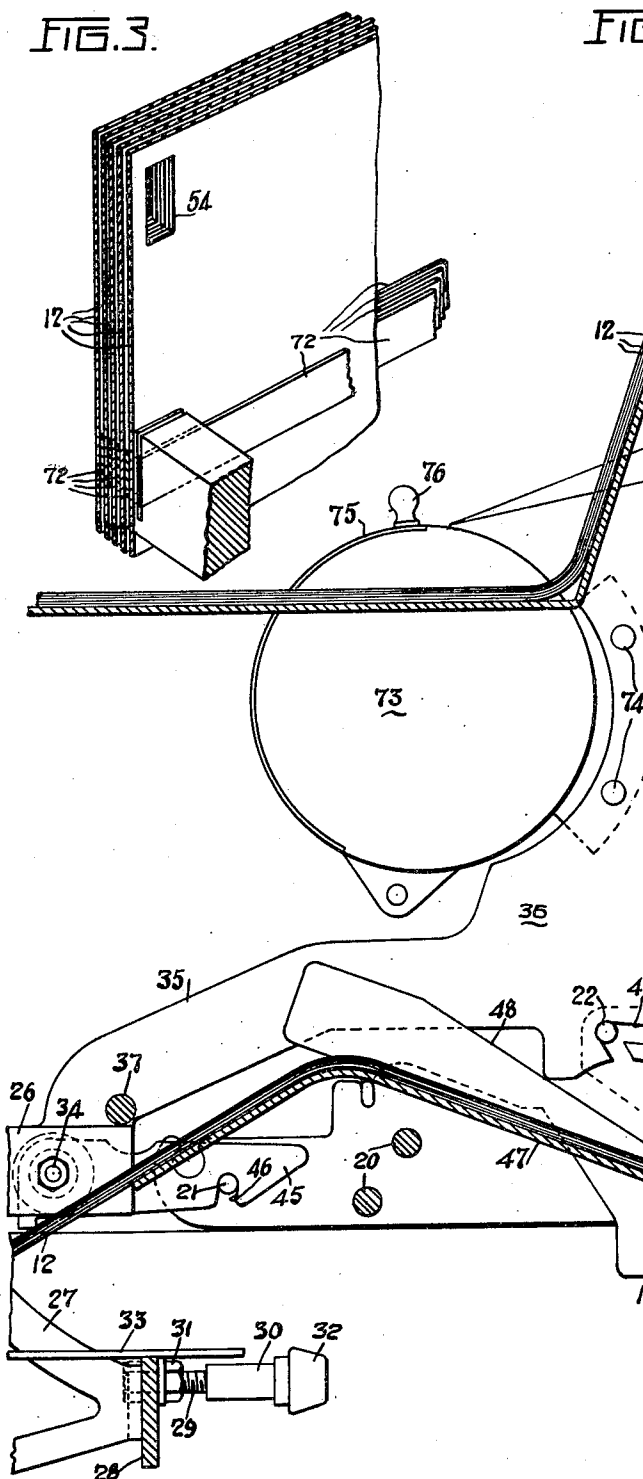
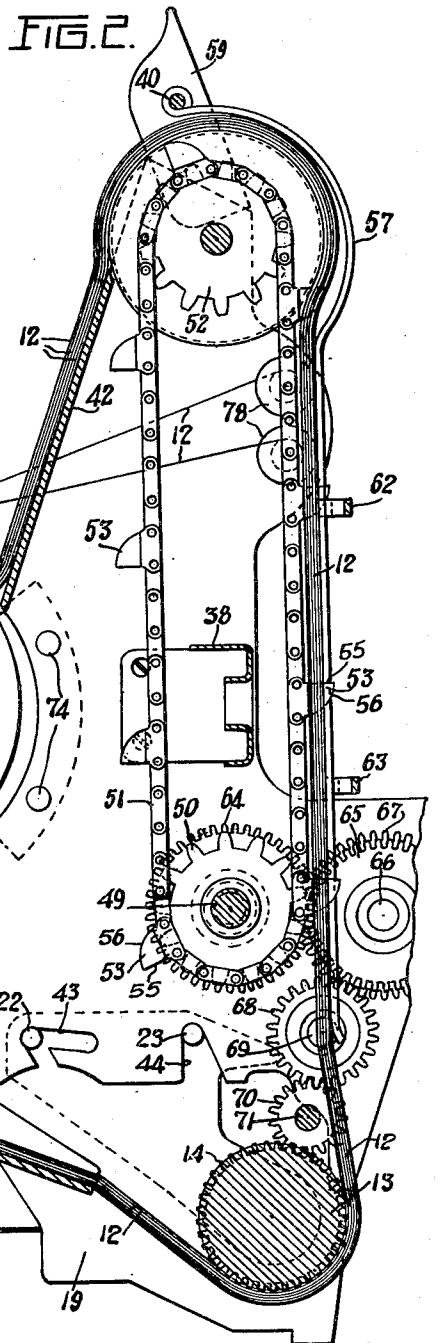


FIG. 2.



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UNITED STATES PATENT OFFICE

2,248,188

MANIFOLDING DEVICE

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Application March 2, 1939, Serial No. 259,395

7 Claims. (Cl. 271-2.1)

This invention relates to manifolding devices, and in particular, to attachments to printing or typing machines, these attachments being adapted to produce a multiple number of copies of the material being printed or typed.

One object of this invention is to provide a manifolding device adapted to be attached to a printing or typing machine, and provided with means for feeding a plurality of paper webs around the device and past the printing or typing position, this feeding means engaging the paper webs near the mid-portions thereof.

Another object is to provide a manifolding device, as set forth above, wherein the paper-feeding means engages a single row of apertures near the mid-portions of the paper webs.

Another object is to provide a manifolding device having a frame with paper web guides thereon, and with paper-feeding mechanism including elongated projections adapted to engage elongated apertures near the middle of the paper webs.

Another object is to provide a manifolding device, as set forth in the preceding object, wherein the elongated projections are attached to an endless chain at intervals therealong, this endless chain being driven by mechanism synchronized with the printing and spacing mechanism so as to feed the paper webs in close cooperation with the remainder of the mechanism.

Another object is to provide a manifolding device having a frame with paper guides at the top and bottom thereof, and a sprocket chain with elongated projections mounted near the middle of the frame so as to engage a single row of elongated apertures in the webs near the mid-portions thereof, an additional member being provided for urging and maintaining the paper webs in position upon the elongated projections.

Another object is to provide a manifolding device having paper web-feeding means engaging apertures in an untyped path near the center of the paper web, thereby giving an evenly applied feeding force which avoids the application of oblique pulls or thrusts to the paper webs, and likewise avoiding the tendency of the paper web to be pulled toward one side or the other of the frame, as is the case with devices having feeding mechanisms engaging the paper webs near the edges thereof.

In the drawings:

Figure 1 is a front elevation of one form of the manifolding device of this invention.

Figure 2 is a vertical section taken along the line 2-2 in Figure 1.

Figure 3 is an enlarged rear perspective sectional view through a plurality of paper webs, showing the elongated apertures therein and the carbon paper ribbons interleaved with said paper webs.

General arrangement

In general, the manifolding device of this invention is an attachment to be attached to a main typing or printing machine, such as a tabulating machine, typewriter or adding machine. Such a machine ordinarily has its own printing mechanism, including type and an inking ribbon, together with means for printing a single copy of a record or multiple copies by using carbon paper sheets interleaved between the multiple paper sheets or webs.

The manifolding device serves to carry and feed a plurality of paper webs, each web usually consisting of a series of printed paper forms separated from one another by weakening lines or perforations. The manifolding device of the present invention employs duplicating ribbons, such as carbon paper ribbons, interleaved between the paper webs and crossing the paper webs transversely at the printing position. Mechanism for feeding the paper webs and carbon ribbons is synchronized with the operation of the main printing machine so that it operates in cooperation with the line spacing or ejection spacing movement of the platen of the main machine, and may be driven from this platen.

Hitherto, such manifolding devices have utilized feeding mechanism which engages parallel rows of apertures in the paper webs, near the opposite edges thereof. Such mechanism, for example, has employed parallel sprocket chains carrying spaced feeding pins adapted to engage the spaced rows of apertures in the paper webs. It has been found, however, that unless these sprocket chains are exactly synchronized and are always maintained in a synchronized condition, oblique strains will be set up in the paper which will cause the paper webs to move toward one side or the other of the machine, thereby resulting in the printing being applied to an undesired portion of the paper web or out of alignment with the spaces where such typed matter is intended to be placed. This is particularly true where the paper web consists of a series of printed forms having definite spaces for receiving the typed information. It has further been found that even though the feeding pins on the two sprocket chains are accurately aligned at the beginning of operations,

nevertheless, in the course of time, by reason of wear, lost motion or slippage, one chain may get slightly ahead of the other and thereby cause these oblique strains and shifting of the paper webs.

In the manifolding device of the present invention the paper webs are advanced by a feeding mechanism which engages a path near the central portion of the paper webs. For this purpose the paper webs are provided with elongated apertures, preferably rectangular, the latter being engaged by correspondingly shaped feeding pins mounted at intervals along a single sprocket chain. The row of spaced elongated apertures preferably runs up the paper web, near the center thereof, but the benefits of the invention may be obtained in a somewhat lessened degree if the apertures and pins are moved slightly to one side of the center, as is necessitated in some printing machines where a gap in the printing mechanism occurs slightly to one side of the center thereof. The present machine also provides a contact structure which presses against the paper webs and maintains them in engagement with the feeding pins, near the center path of the webs where the feeding apertures are located. This contact structure may be moved away from the webs so as to facilitate the threading of the webs through the device.

Main printing machine construction

The main printing machine to which the manifolding device of the present invention is attached forms no part of the present invention, and may be a tabulating machine, an adding machine, a typewriter or any other suitable machine capable of printing a record. In the accompanying drawings the manifolding device of this invention is shown as used in conjunction with a tabulating and listing machine. The mechanism thereof is beyond the scope of the present disclosure, except as its parts cooperate with the mechanism of the manifolding device, such as the paper-feeding mechanism.

Referring to the drawings in detail, the main printing machine 10 (Figure 1) has type bar guides 11 engaging type bars (not shown) actuated by mechanism within the machine 10 for printing records upon the paper webs 12 by means of the fabric inking ribbon 11^a guided by the rollers 11^b. The main printing machine 10 is provided with a rotatable platen 13, on which is mounted a platen gear 14 carried on the platen shaft 15, having the knurled hand wheel 16 for manual rotation of the platen. The platen gear 14 is driven by gearing (not shown) contained within the main printing machine 10 and forming no part of the present invention. By reason of this mechanism the platen 13 is rotated at suitable times after a row of type has been printed so as to bring about a line spacing operation, or after a plurality of rows of type have been printed and a paper form completely filled out, thereby bringing about an ejection spacing operation. The platen 13 at its opposite end is carried by the platen shaft 17, which may be a continuation of the platen shaft 15 and which carries the platen ratchet wheel 18. The platen 13 is mounted in side plates 19 (Figure 2) having cross rods 20 and pins 21, 22 and 23. These pins serve for the attachment of the manifolding device of the present invention.

The main printing machine 10 is also provided with a side housing 24 and a motor 25 for driv-

ing the mechanism of the main printing machine. The mechanism in the housing 24 serves to actuate the platen ratchet wheel 18 for rotating the platen. It will be understood, however, that in the present invention the gripping rolls ordinarily provided beneath the platen 13 for holding the paper firmly in engagement with the platen are released so that the paper webs slide loosely around the platen 13 and are not affected by its rotation. Instead the feeding of the paper webs is accomplished entirely by mechanism within the manifolding device itself.

The manifolding device of the present invention is mounted upon a base frame, generally designated 26 (Figure 2), which forms no part of the present invention. This base frame 26 is also provided with forwardly projecting members 27 having a cross bar 28 extending therebetween and carrying the threaded rods 29 having the contact members 30 threaded thereon, and held in position by the locknuts 31. The contact members 30 are provided with heads 32, preferably of rubber or yielding material, so as to engage the main printing machine 10 without injuring it. Mounted upon the top of the cross bar 28 is a horizontal supporting plate 33. The base frame 26 is provided with pivot bolts 34, upon which are pivotally mounted the extensions 35 of the manifolding device side frame members 36. The extensions 35 are interconnected by the cross rod 37 (Figure 2). The side members 36 are interconnected by the cross bar 38, and also at the top by the cross rods 39 and 40. The cross rod 39 carries drums 41 serving to support the paper webs 12 as they pass over the top of the device into the receiving tray 42 (Figure 2).

The side frame members 36 are thus approximately L-shaped, together with their extensions 35, and along their lower edges are provided with slots 43 and 44 for engaging the pins 22 and 23 upon the main machine side plates 19. Similarly, the forward portions 45 of the base frame 26 are provided with slots 46 for engaging the similar pins 21. By this means the manifolding device of the present invention is securely attached to and aligned with the mechanism of the main printing machine 10. Extending between the side plates 19 of the main machine 10 is a bent paper guide plate 47 having upwardly bent sides 48 for guiding the paper webs 12 downwardly beneath the main machine platen 13.

Paper guiding and feeding mechanism

The frame side members 36 beneath the cross bar 38 rotatably support a cross shaft 49 having mounted thereon a sprocket 50 carrying a sprocket chain 51, the upper portion of which meshes with a sprocket 52 mounted upon the cross rod 39. The sprocket chain 51 and sprockets 50 and 52 are located approximately midway between the side frame members 36 and near the center line of the paper webs 12 (Figure 1). The sprocket chain 51 carries feeding pins 53 mounted at intervals therealong and serving to pass through and engage the edges of apertures 54 punched at spaced intervals near the center line of the paper webs 12. The apertures 54 are preferably elongated, for example, rectangular (Figure 3), and the feeding pins 53 preferably have elongated cross-sections to correspond with the apertures 54. The feeding pins 53 preferably have flat upper edges 55, but curved lower edges 56 for facilitating the entry of the pins 53 into the apertures 54.

In order to maintain the apertures 54 of the paper webs 12 in engagement with the feeding pins 53 there is provided a paper guide structure or bale, generally designated 57, and pivotally mounted upon the cross rod 40, which in turn, is attached to the side frame members 36 by the brackets 58 and 59 (Figure 1). The bale 57 is provided with spaced outer bars 60 and inner bars 61, interconnected by the upper and lower cross bars 62 and 63, respectively. The inner vertical bars 61 are spaced a sufficient distance to permit the passage of the feeding pins 53 therebetween. The paper webs 12 may be threaded through the device by swinging the bale or guide structure forward, pivoting it around the cross rod 40 and then replacing it after the feeding pins 53 have been caused to enter the paper web apertures 54.

The sprocket 50 is driven by the shaft 49, which for that purpose carries a gear 64 (Figure 2) meshing with a gear 65 mounted upon a shaft 66, which carries the gear 67 meshing with a gear 68 supported upon the shaft 69, and in turn, meshing with a pinion 70 mounted upon the shaft 71. The pinion 70 meshes with the platen gear 14. Consequently, when the platen 13 is rotated by the mechanism of the main printing machine 10 for a line spacing or ejection spacing operation, this motion is imparted by the gearing 70, 68, 67, 65 and 64 to the shaft 49, which in turn, rotates the sprocket 50 and causes the sprocket 51 and feeding pins 53 to advance the paper webs 12 by one or more line spaces. As previously stated, the gripping rolls ordinarily provided in cooperation with the main machine platen 13, are released while the manifold device of the present invention is used, so that the sprocket chains 51 and feeding pins 53 provide the entire feeding action.

When the typing has been completed upon one of the forms into which a paper web 12 is subdivided, the main platen 13 is rotated through several line spaces so as to eject the form from the printing position and to bring up another form into printing position. This multiple line-spacing action is transmitted through the gearing 14, 70, 68, 67, 65 and 64, the shaft 49 and sprocket 50 to the sprocket chain 51 and feeding pins 53, causing the pins 53 to carry the paper webs 12 upwardly by a much greater amount than a single line space, thereby bringing about an ejection-spacing operation.

Copying ribbon-dispensing, guiding and feeding mechanism

The multiple impressions are imprinted upon the paper webs 12 by means of duplicating ribbons 72, which in the present instance, consist of carbon paper ribbons which are employed only a single time, then being discarded. It will be understood, however, that the usual cloth ribbons employed a number of times may also be utilized. These ribbons 72 are interleaved and fed transversely between the different paper webs 12 at the printing position, so that they transmit the impression given to the front paper web 12 by the type bars 11, to the paper webs located behind the forward paper web 12.

The details of the mechanism by which the carbon ribbons 72 are supported and fed past the printing position form no part of the present invention, and a complete disclosure thereof is found in the copending application of William C. Pfeiffer, Ser. No. 258,014, filed February 23, 1939. For purposes of the present disclosure, it will

suffice to state that the ribbons 72 are contained upon spools (not shown), loosely mounted within the container 73 (Figure 2), which is secured as at 74 to the right-hand frame side member 36 and which is provided with a removable closure 75, operated by grasping the knob 76. The ribbons 72 emerge from a slot 77 in the ribbon container 73 and pass over guide rollers 78 before being united in a single course at the guide roller 79 (Figure 1). From the guide roller 79 the ribbons 72 enter the ribbon carriage 80, which is slidable laterally along the shafts 49 and 81, in the manner set forth in the above identified application.

The ribbon carriage 80 is urged to the right by springs, as at 82, and is provided with fixed and movable gripping jaws 83 and 84, respectively, the fixed jaw 83 having an angled edge around which the ribbon passes and emerges at right angles in a horizontal direction. A guide roller 85 on the ribbon carriage 80 serves to guide the ribbons 72 into the space between the gripping jaws 83 and 84. The movable gripping jaw 84 is mounted upon a lever 86, which is pivotally mounted upon the shaft 87 supported upon the ribbon carriage 80. The upper end of the lever 86 carries a cam follower 88, which engages a cam 89 upon the cross shaft 81. The rotation of the cross shaft 81 rotates the cam 89 so as to move the lever 86 in and out, to selectively grip or release the ribbons 72 in synchronism with the remainder of the ribbon-feeding apparatus.

At the extreme left-hand side of the machine is mounted the ribbon-feeding unit 90, consisting of a casing 91 having a shaft (not shown), terminating in a ribbon-feeding pin wheel 92 having sharp ribbon-feeding pins 93 thereon. The pin wheel 92 is driven by mechanism within the casing 91, through the instrumentality of the gear 94, (Figure 1) meshing with a gear 95 upon the shaft 49. The latter is rotated by periodic intervals in synchronism with the line-feeding and ejection-feeding mechanism of the main printing machine in such a manner that the front feeding pin wheel 92 rotates a predetermined amount for a line-spacing operation and a greater amount for an ejection-spacing operation. The mechanism by which this rotation is accomplished is disclosed in the above identified Pfeiffer copending application.

This mechanism includes a motor and a clutch (not shown) controlled by a contact lever 96 engaging the pawl of the ratchet wheel 18 (Figure 1), in a manner set forth in the above Pfeiffer application. When the ratchet pawl moves outwardly in response to the rotation of the ratchet wheel 18 by the platen shaft 17, the contact lever 96 likewise moves rearwardly and actuates the clutch which operatively connects the shaft 49 to the motor and rotates the shaft 49 by a predetermined amount and then halts it. When the pin wheel 92 is rotated in this manner it pulls the horizontal sections of the copying ribbons 72 a predetermined distance to the left. At this instant, however, the cam 89 has shifted the ribbon carriage lever 88 to cause the movable jaw 84 to grip the ribbons 72 against the fixed jaw 83. The pull upon the ribbons 72 by the pin wheel 92, therefore, pulls the ribbon carriage 80 bodily to the left along the shafts 49 and 81 and against the urge of the coil spring 82.

When the pin wheel 92 ceases its rotation, however, the cam 89 releases the lever 88 and the gripping jaws 83 and 84 separate and release the ribbons 72. The coil spring 82 then moves the

ribbon carriage 80 bodily to the right and a new length of ribbon 72 slides through the gripping jaws 83 and 84, and an additional length is accordingly withdrawn from the ribbon spools within the ribbon container 73. In this manner the ribbons are fed across the printing position by the rotation of the pin wheel 92, but additional lengths of ribbons are withdrawn upon the return stroke of the ribbon carriage 80 after the ribbon-feeding pin wheel 92 has ceased its feeding motion.

Operation

The operation of the various portions of the mechanism has been disclosed to some extent in connection with the construction of the individual units thereof, and a summary of the operation of the device as a whole is now given. In the operation of the manifolding device of this invention, assuming that the slots 43, 44 and 46 have been placed upon the pins 22, 23 and 21 so that the device is in an aligned position relatively to the main machine 10 and its type bars 11, the paper webs 12 are threaded through the device and around the main platen 13 of the machine, with their apertures 54 engaged by the feeding pins 53 upon the sprocket chain 51. The paper guide structure or bale 57, which has been pulled forward to permit this threading, is released and subsequently holds the paper webs 12 against the feeding mechanism.

The carbon copying ribbons are led from their spools out of the container 73, over the various guide rollers 78, 79 and 85, through the space between the gripping jaws 83 and 84 of the ribbon carriage and around the bevel end of the fixed gripping jaw 83, across the front of the device and interleaved between the various courses of the paper webs 12. Beyond the latter the copying ribbons are again united and pass around the ribbon-feeding pin wheel 92.

As the main machine is operated to type a line of characters upon the outer paper web 12 by means of its type bars 11, these impressions are transmitted to the paper webs underneath by means of the carbon paper copying ribbons 72. After the line has been typed the main machine 10 rotates the main platen 13 for a line-spacing operation. As the gripping rolls of the main platen have been released the main platen performs no feeding functions itself. Its rotation, however, is transmitted by the gearing 14, 70, 68, 67, 65 and 64, the shaft 49 and the sprocket 50 to the sprocket chain 51, which moves the sprocket chain pins 53 and the paper webs 12 upward for a single line space. The same action rotates the platen ratchet wheel 18 and causes the contact member 96 to actuate the clutch, thereby causing the shaft 49 to rotate and operate the ribbon-feeding pin wheel 92 as well as the ribbon carriage operating cam 89, which opens and closes the gripping jaws 83 and 84 of the ribbon carriage 80.

The copying ribbons 72 are consequently fed forward, and an additional length thereof withdrawn on the return stroke of the ribbon carriage 80, in the manner previously described. An additional line is then typed and this action continues until the typing upon the form has been completed. The main platen 13 is then rotated to bring about an ejection spacing motion, which is in effect a multiple line-spacing motion. This, in turn, rotates the shaft 49 and sprocket 50 by an increased amount so that the sprocket chain pins 53 cause the paper webs 12 to be transported upwardly so as to eject the typed form from the

printing position and to bring an untyped form into the printing position at its starting point.

When this ejection-spacing operation occurs, the copying ribbons 72 are advanced by a plurality of feeding distances, as described in connection with the construction thereof. This action reduces the tendency for the copying ribbons to adhere to the paper forms during their line-spacing or ejection-spacing motions. By this provision of a single sprocket chain with a single row of spaced feeding pins thereon, the feeding motion is imparted to the paper webs near the center line thereof. This causes the paper webs to be gripped in an evenly balanced manner and without the production of side thrusts or misalignments. The paper is more easily threaded in the machine because only a single row of feeding pins needs to be inserted in the apertures of the paper webs. The apertures 54 themselves are elongated and are of a considerable width so that a larger portion of the paper is gripped than is the case with the ordinary small apertures provided in previously used paper webs. In particular, the rectangular apertures 54, having horizontal upper edges, are engaged by the flat upper edges 55 of the feeding pins 53 in such a manner that the thrust thereof is distributed over the entire width of the flat edge of the aperture 54 rather than concentrated at the center of the upper edge of a round aperture, as in the prior art. Consequently, there is also less tendency for the apertures to become torn during the feeding action of the machine.

It will be understood that I desire to comprehend within this invention such modifications as come within the scope of the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a manifolding device for attachment to a record printing machine, a frame arranged to register with the printing mechanism of said machine, means on said frame for supporting and guiding a plurality of superimposed record sheets, said record sheets having a single longitudinal row of spaced apertures located at substantially the center line thereof, a pair of shafts spacedly mounted in said frame, a sprocket on each shaft, a sprocket chain meshing with said sprockets, a single row of longitudinally spaced feeding members connected to said sprocket chain and insertable in said apertures, and means for rotating one of said shafts, said apertures having their leading edges flat and said feeding members having flat leading edges engageable with the flat leading edges of said apertures, said members being substantially of the same width as said sprocket chain and forming with said chain the only moving support of said record sheets, the sheets being fed by engagement of said members in said sheet apertures only.

2. In a manifolding device for attachment to a record printing machine, a frame arranged to register with the printing mechanism of said machine, means on said frame for supporting and guiding a plurality of superimposed record sheets, said record sheets having a single longitudinal row of spaced apertures located at substantially the center line thereof, a pair of shafts spacedly mounted in said frame, a sprocket on each shaft, a sprocket chain meshing with said sprockets, a single row of longitudinally spaced feeding members connected to said sprocket chain and insertable in said apertures, and means for

rotating one of said shafts, said apertures having their leading edges flat and said feeding members having flat leading edges engageable with the flat leading edges of said apertures and having their trailing edges cut away rearwardly from said leading edges for facilitating the entry of said feeding members into said apertures, said members being substantially of the same width as said sprocket chain and forming with said chain the only moving support of said record sheets, the sheets being fed by engagement of said members in said sheet apertures only.

3. In a manifolding device for attachment to a record printing machine, a frame arranged to register with the printing mechanism of said machine, means on said frame for supporting and guiding a plurality of superimposed record sheets, said record sheets having a single longitudinal row of spaced apertures located at substantially the center line thereof, a pair of shafts spacedly mounted in said frame, a sprocket on each shaft, a sprocket chain meshing with said sprockets, a single row of longitudinally spaced feeding members connected to said sprocket chain and insertable in said apertures of substantially the same width as said sprocket chain, and means for rotating one of said shafts, said apertures being elongated in the direction of motion of said record sheets and said feeding members having elongated cross sections in the same direction.

4. In a manifolding attachment device for record printing mechanism, a frame for supporting and guiding a plurality of superimposed record sheets in registration with said printing mechanism, said record sheets having elongated apertures spacedly positioned along the center line of the sheets, said apertures along the superimposed sheets being in substantial registration, a sheet-feeding mechanism comprising an endless conveyor arranged to move in an elongated circular path so as to be in alignment with the apertures in said sheets, said conveyor means having a substantially vertical run having spaced projections thereon engageable in said aligned apertures for feeding said superimposed sheets as a unit on said vertical run into position to receive printing impressions, said projections being substantially of the same width as said conveyor means and forming with said conveyor means the only moving support of said record sheets, the sheets being fed by engagement of said projections in said sheet apertures only.

5. In a manifolding attachment device for record printing mechanism, a frame for supporting and guiding a plurality of superimposed record sheets in registration with said printing mechanism, said record sheets having elongated apertures spacedly positioned substantially along the

center line of said sheets, said apertures on the different superimposed sheets being in substantial registration, a sheet-feeding mechanism comprising a sprocket and endless chain, said chain having spaced elongated projections thereon engageable in said apertures and forming with said chain the sole means for supporting said sheets in a substantially vertical plane, and for moving said superimposed sheets into position to receive printing impressions, the said projections being substantially of the same width as said sprocket chain, the sheets being fed by engagement of said projections in said sheet apertures only.

6. In a manifolding attachment device for record printing mechanism, a frame for supporting and guiding a plurality of superimposed record sheets in registration with said printing mechanism, said record sheets having elongated apertures located at intervals at substantially the center line of said sheets, said apertures on the superimposed sheets being in substantial registration, a sheet-feeding mechanism comprising an endless member having a substantially vertical run and carrying spaced projections thereon engageable in said apertures, said projections on said feeding member having their leading edges flat and their trailing edges cut away, facilitating the entry thereof into said apertures, said projections being substantially of the same width as said endless member and forming with said member the sole moving support of said record sheets when said sheets are carried on said vertical run, the sheets being fed by engagement of said projections in said sheet apertures only.

7. In a manifolding attachment device for record printing mechanism, a frame supporting and guiding a plurality of superimposed record sheets in registration with said printing mechanism, said record sheets having aligned, spaced apertures located substantially along the center line of said sheets, a sheet-feeding mechanism comprising an endless chain having a substantially vertical run and arranged to move so as to be in alignment with said apertures, said endless chain having spaced sheet engaging members thereon which are adapted to be inserted in said apertures to move the superimposed sheets as a unit in a substantially vertical direction on said substantially vertical run and into position to receive printing impressions, said sheet-feeding mechanism being driven in synchronism with the printing mechanism, said projections being of substantially the same width as said chain and forming with said chain the sole moving support of said record sheets, the sheets being fed by engagement of said projections in said sheet apertures only.

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