April 2, 1957 R. BROWN 2,787,211

SHEET FEEDING DEVICES FOR HECTOGRAPHIC DUPLICATING MACHINES

Filed Oct. 9, 1953 3 Sheets-Sheet 1

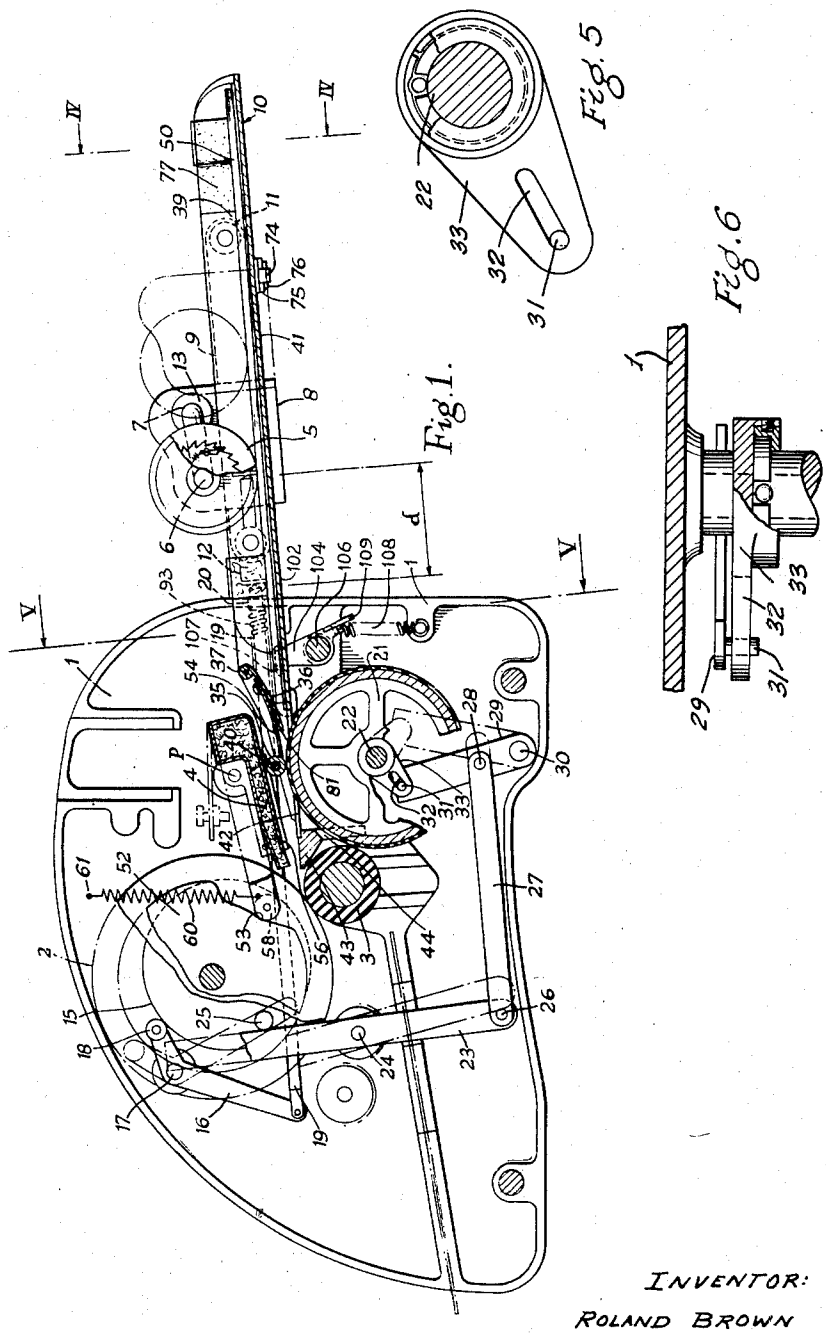

Fig. 1.

Fig. 5

Fig. 6

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Fig. 2.

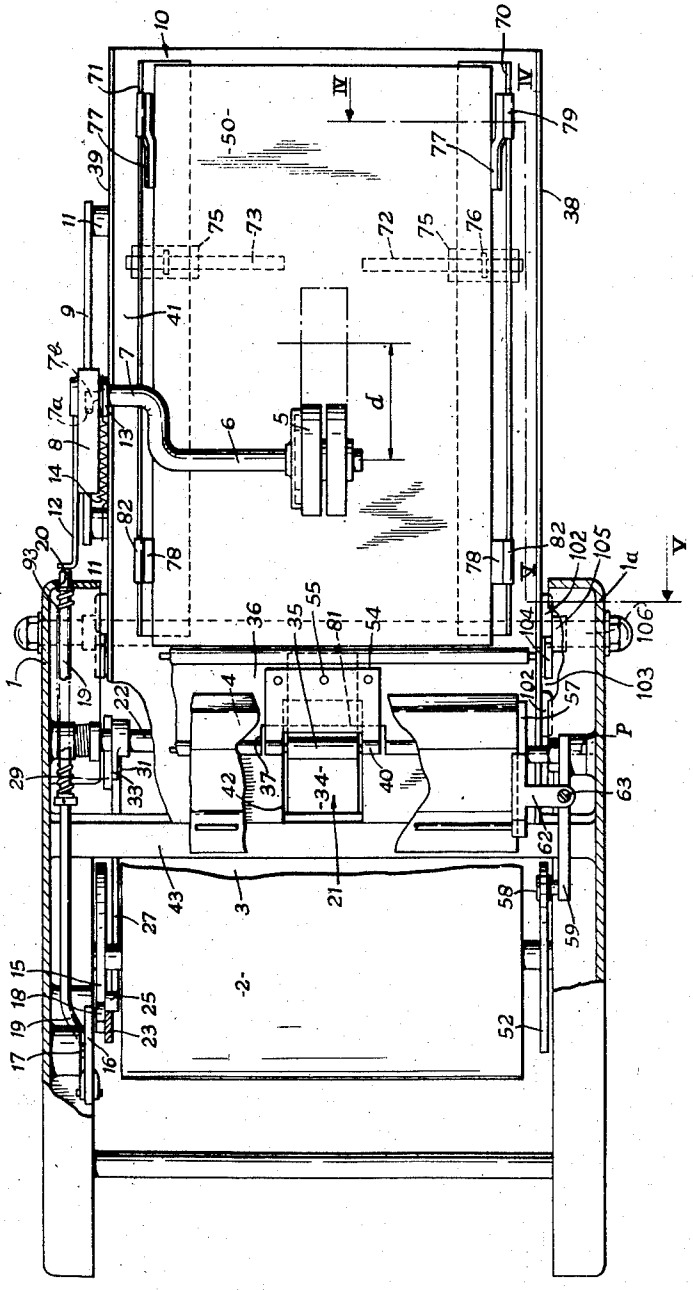

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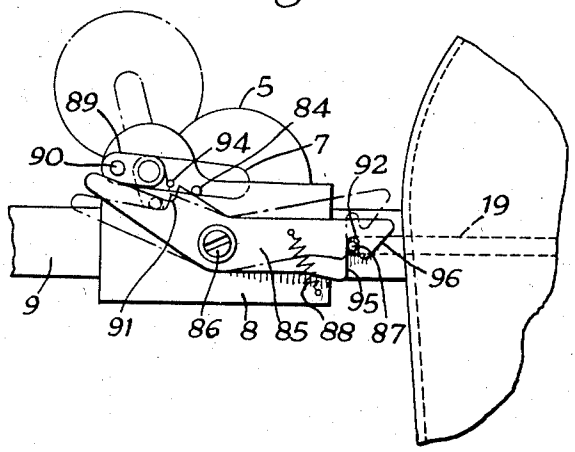
Fig. 3.



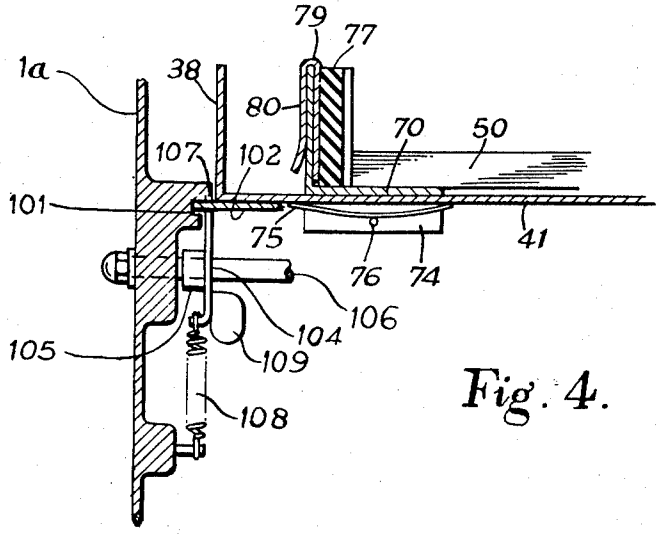


Fig. 4.

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United States Patent Office 2,787,211 Patented Apr. 2, 1957

2,787,211

SHEET FEEDING DEVICES FOR HECTOGRAPHIC DUPLICATING MACHINES

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Application October 9, 1953, Serial No. 385,210

Claims priority, application Great Britain April 23, 1953

11 Claims. (Cl. 101—132.5)

The invention relates to sheet feeding devices, and is concerned more particularly with sheet feeding mechanism for rotary duplicating machines.

In rotary duplicating machines of the spirit type, in which copies are taken from a hectographic master sheet wrapped round a rotary drum, the copy sheets must be fed singly to the bight between the printing couple, comprising the drum and a counter-pressure roller, after being moistened with a volatile solvent for the hectographic ink. Machines of this type are either designed for hand feeding of the sheets, or are provided with automatic feeding mechanism whereby the sheets are fed singly from a stack to the bight between the drum and the counter-pressure roller at the correct instant by means operated in timed relation with the rotary drum. Such sheet feeding mechanism is often relatively complicated and therefore expensive to install and service and may account for a considerable proportion of the total cost of the machine.

An object of the present invention is to provide sheet feeding mechanism for rotary duplicating machines, including hectographic machines, of comparatively simple construction, having a minimum number of parts and having the advantages of simplicity in construction and installation.

A further object of the invention is to provide, in a hectographic duplicating machine employing direct damping of the copy sheets by a damping pad, novel sheet feeding mechanism positioned at the delivery end of a feed tray for the copy sheets and intermittently driven from the printing drum.

A further object of the invention is to provide, in a rotary duplicating or the like machine, automatic sheet feeding mechanism comprising two sheet feeding devices in tandem, the first feeding means having a quickly releasable or non-positive coupling to the driving means so that the automatic feed can be de-coupled without loss of time so that the machine may be adapted for manual feed or automatic feed as desired without the removal or interchange of working parts.

According to the invention, in a hectographic duplicating machine having damping pad means for direct moistening of the copy sheets, sheet feeding mechanism includes means for aligning the side edges of copy sheets and a rotary feeding couple positioned next before the damping pad means in the line of feed of the sheets from a stack to the printing couple and having frictional contact with the sheet over a central zone of small width with respect to the printing drum, the upper feeding element of said couple being an idler roller of small diameter having bearings therefor supported in the delivery end of the feed tray and the lower feeding element being a wheel of larger diameter than the idler roller and having a shaft journalled in the machine frame, and means including a one-way clutch coupling the wheel shaft of the drum for intermittently driving said feeding couple in timed relation with the drum so that one forward feeding stroke is performed for each complete revolution of the drum.

According to a further feature of the invention sheet feeding mechanism comprises a first sheet feeding means reciprocated in timed relation with the movements of rotary drum for advancing sheets singly from a stack towards the printing couple, and a second sheet feeding means situated between the first feeding means and the printing couple for guiding and further advancing the sheet towards the printing couple, the said latter sheet feeding means being situated before the copy sheet damping means so that damping is commenced after the sheet has been advanced by both of said sheet feeding means.

The second sheet feeding means also fulfills the function of obtaining correct register of the copy sheets with respect to the damping pad and the printing couple, and for this purpose the timing of the feed strokes of the first and second feeding means is such that the leading edge of each copy sheet is first registered between the rotary members of the second feeding means and at the correct distance from the printing couple before being further advanced by the said second feeding means.

Preferably also the motions of the damping means and of the sheet feeding means next before the printing couple are relatively timed such that damping of the copy sheet is effected just after the leading edge of the sheet has been gripped in the printing couple.

Preferably, the sheet feeding mechanism comprises frictional sheet feeding means reciprocated in timed relation with the rotary drum, and mounted on a removable feed tray which retains and aligns the stack of copy sheets. In one form of the invention the tray is removable from the machine without the uncoupling of any driving means between the printing drum and the said feeding means, whilst in another form a quickly releasable coupling is fitted allowing for automatic or hand feed of the copy sheets from the stack as desired. Furthermore, the sheet feed mechanism comprises also a rotary feeding couple positioned between the said frictional sheet feed means and the rotary printing couple in the line of movement of the sheets, the feeding couple consisting of a rotary feeding member intermittently driven in timed relationship with the rotary drum, and a co-operating non-driven roller, the said non-driven roller being mounted on the feed tray so as to be removable therewith when the tray or table is bodily removed from the machine.

The said rotary feeding member and its co-operating non-driven or counter-pressure feed roller may be of comparatively small width in relation to the width of the copy sheet, provided that the rotary feeding couple is centrally placed in the line of feed. Accordingly the said rotary feeding member is in the form of a wheel whose periphery is covered with rubber or other material for providing a frictional grip on the copy sheet. To provide additional guidance for the copy sheet apart from the traction of the rotary feeding couple acting symmetrically along the line of feed, adjustable guide blocks are preferably arranged at each side of the feed tray to guide the side edges of the sheet. The wheel may be of large diameter in relation to that of the non-driven roller without making the feed mechanism unduly heavy, as would be the case with a feed roller extending the full width of the machine. Also the comparatively large diameter of the wheel makes possible the use of a convenient and simple type of linkage between the wheel shaft and the drum shaft for the intermittent drive as will be described below.

In a preferred arrangement as applied to hectographic duplicating machines having a damping pad extending across the operative width of the printing couple for applying a solvent across the entire width of the copy sheet beginning at a given determined distance from the leading edge of the sheet hereinafter termed the undamped margin, the said damping pad is arranged to be pivoted about an

axis parallel to that of the drum so as to be brought into and out of contact with the top surface of the copy sheet at the appropriate times in the printing cycle, and sheet feeding mechanism is arranged for feeding sheets singly from a stack past the damping pad into the bight of the printing couple, the said damping pad and the sheet feeding mechanism being operated in timed relationship with the movements of the rotary drum, such that each copy sheet is gripped by the printing couple before the damping pad is brought into operation to contact the copy sheet.

An example of sheet feeding mechanism according to the invention will now be described in more detail with reference to the accompanying diagrammatic drawings, wherein:

Figure 1 indicates a section transverse to the drum axis of a rotary hectographic duplicating machine, and

Figure 2 shows a plan view of the machine showing the feed tray and such other parts of the machine as are necessary for an understanding of the invention.

Figure 3 is a sketch illustrating a releasable coupling which may be employed to obtain the automatic drive to the frictional sheet feeding means reciprocated in the feed tray;

Figure 4 is a detail view on an enlarged scale, being partly a section on the plane IV—IV of Fig. 1 to show a sliding guide for paper width adjustment, a spring clip device for the guide and a paper grip mounted on the guide and partly a section on the plane V—V of Fig. 1.

Figures 5 and 6 are respectively an axial section and a plan on an enlarged scale illustrating diagrammatically a ball clutch which may be used in the driving mechanism.

Referring now to the drawings, **1** indicates the right-hand side frame of the machine and **1***a* the left-hand side frame, the front or feeding end of the machine being at the right-hand side of the drawing. This side frame comprises a casing having various integral bearing bushes cast therein to receive the bearings of the various moving parts of the machine, of which only those comprising the present invention will be referred to. **2** indicates the periphery of the rotary drum rotatable clockwise about the axis at O, whilst **3** indicates the counter-pressure roller extending the full width of the drum and forming therewith the printing couple. The drum is provided with a movable clip for retaining a printing master wrapped round the periphery thereof (not shown). The details of the arrangement of the printing couple and the clip and the operating means therefor are well known in such machines and will not be referred to herein.

A damping pad **4** for moistening the copy sheet extends forwardly to within a short distance of the printing couple, and is mounted for pivoting movement about a horizontal axis P by cam means which will be referred to more fully hereinafter.

A removable feed tray **10** extends from the front of the machine and is provided with means, which will be described later, for holding a stack of sheets **50**.

The sheet feeding means provided by the invention for advancing the copy sheets to the printing couple **2, 3** comprise the following parts. A wheel **21**, of small width compared with the drum, is secured centrally of a shaft **22** carried in bearings in the side frames of the machine, and is intermittently driven as follows. A lever **23** is pivoted on a fixed stud in the side frame **1** of the machine at **24** so that its upper end bears against a cam roller **25** carried on the left hand face of the eccentric cam **15**. The lower end of the lever **23** is pivoted at **26** to a link **27**, which is itself pivoted at **28** to another lever **29** pivoted about a stud **30** secured to the side frame **1**. The upper end of the lever **29** carries a pin **31** movable in a slot **32** in a lever **33**, which is coupled to the shaft **22** of the wheel **21** through any appropriate known type of one-way clutch, for example a ball or roller clutch, so that only counter-clockwise motion is transmitted to the wheel, the lever **33** being decoupled from the shaft whilst moving in the clockwise direction. A detail of a suitable type of ball clutch is shown diagrammatically in Figures 5 and 6, wherein a ball **120** is located in a cage formed by a loose split ring **121**. A flanged ring **122** is keyed to the boss **123** of lever **33** by screw **125** and is radiused at **124** to allow the ball to rotate and to run on the shaft **22** when the lever **33** is turned counter-clockwise. When the lever is turned in the opposite direction the ball wedges between the shaft and the flat portion **126** of the flange which is split at **127**.

The periphery of the wheel **21** carries a tyre **34** of rubber or similar material capable of affording a frictional grip on the paper, and co-operates with a non-driven feed roller **35** carried in the feed tray **10** to form a feeding couple. The feed tray has a funnel shaped discharge end formed by an apron **36** of thin sheet metal extending transversely between the upturned sides **38** and **39** of the tray and fixed thereto by suitable means such as screws or bolts. A gap **37** is cut in the front edge of the apron, and the roller **35** is carried in bearings **40** in a spring plate **54** secured in cantilever fashion to the apron **36** by means of rivets **55**. This arrangement allows the roller to rest with a light pressure on the periphery of the wheel **21** when the tray is in the position shown in the drawing. The bottom **41** of the tray is slotted at **42** to allow the wheel **21** to project therethrough and to make contact with the roller **35**. The fixed pad surface bar **43** which extends between the side frames is also slotted at **44** over a similar width to accommodate the periphery of the wheel **21**. The assembly of the feed tray **10** complete with the reciprocating friction roller **5** and the non-driven feed roller **35** is received in suitable guides in the side frames of the machine, and the forward edge of the tray rests on the pad surface crossbar **43** which serves as a stationary paper guide as shown in Figure 1.

Means for obtaining the damping of the copy sheet in timed relation with the drum motion are as follows:

The damping pad **4** is housed in known manner in a pad frame assembly **56** which is mounted for pivotal movement about axis P and whose front end is downwardly biased by springs (not shown) anchored to the machine frame and to the pad frame assembly.

A cam disc **52** secured to the left-hand side of the drum shaft co-operates with a cam roller **58** secured to a lever **59**, freely pivoted about the axis P and upwardly biased by a spring **60** anchored to the frame at **61**.

The left-hand end **57** of the pad frame has a lug **62** (Fig. 2) carrying an adjusting screw **63**, the end of which bears downwardly against the lever **59** under the tension of the pad frame springs, but the tension of spring **60** predominates to keep the pad frame normally in the raised position. Such adjusting screw provides for adjustment of the position of the pad frame with respect to lever **59** and, therefore, of the timing of the pad frame motion as will be clear from the description which follows. Copy sheets may be fed singly by hand to the feeding couple **21, 35** which transfers them to the printing couple in a manner to be described later. It is preferable, however, to have automatic feed from the stack **50**, and, for this purpose, the following mechanism is provided.

The tray **10** carries an automatically operated frictional sheet feeding means comprising a friction feed roller **5** mounted at the end **6** of a cranked shaft **7**, which is supported for free pivoting movement about its axis on a sliding carriage **8**. For this purpose the shaft **7** is provided with a pin **7***a* entering a bayonet slot **7***b* in a bushing **13** so that the shaft **7** and roller **5** are easily removable as a unit. The carriage **8** is movable along a guide rail **9** rigidly secured to the right hand side of the removable feed tray **10** by means of studs **11**. The friction feed roller is coupled to the end **6** of the cranked shaft through any appropriate known form of one way clutch, which in the present example is preferably a ratchet clutch, so that the feed roller is free to rotate only in the clockwise direction. The feed roller **5** and clutch are not shown in

detail in the drawing. The friction feed roller **5**, may consist of any convenient number of rubber discs mounted on a bushing which may be slipped over the shaft **6** and coupled to a clutch already mounted on the shaft **6**. The coupling between the roller assembly **5** and the clutch may consist of a pin on the clutch engaging a hole in the friction feed roller assembly. A striker bar **12** is also secured to the carriage **8**, and the complete assembly of carriage, cranked shaft, friction rollers and striker bar, is urged into the rest position shown in the drawing by means of a spring **14** anchored between a part of the carriage **8** and the fixed stud **11**.

The friction roller feed mechanism above described is actuated by cam mechanism which is operated in timed relation with the drum and which consists of the following parts. A plain eccentric cam **15** is secured to the right-hand end of the drum shaft between the end of the drum and the side frame **1**. A bell crank **16** is pivoted on a fixed stud in the side frame at **17**, and carries a cam roller **18** arranged to ride on the periphery of the cam **15**. The lower end of the bell crank **16** is pivoted to a push bar **19** which extends through a guide slot **20** in the front of the end frame **1**, and, in the rest position of the machine shown in Figures 1 and 2, projects a short distance through said slot contact with the bent end of the striker bar **12** attached to the friction roller assembly above described.

The following means are provided for holding a stack of sheets in the tray whilst allowing for automatic single feed.

A pair of sliding paper guides **70, 71** are adjustable to take varying widths of paper. For this purpose slots **72, 73** are provided in the tray bottom **41**, and each guide has a block **74** extending through the slot and through a slotted leaf spring **75**, which is flexed against the tray bottom by means of pin **76** driven through the block **74**. The friction of the spring **75** is sufficient to hold the paper guide in any adjusted position.

Friction pads **77** are provided for holding the sides of the stack of paper **50** towards the rear end so that only one sheet at a time will be picked off by the friction feed roller **5**. Smotth faced guide blocks **78** are provided for guiding the single sheets laterally from the stack, these blocks being placed towards the front end of the paper guides **70, 71**.

As shown in Fig. 4 each friction pad **77** is a rubber strip secured to a sheet metal clip **79** which is bent slightly inward to give the required resilience and which has a tongue **80** whereby it may firmly grip the upstanding edge of the sliding guide **70** or **71**.

Each guide block **78** is similarly carried on a metal clip **82**, but in this case the block is of smooth faced material, such as plastic, in order that the block shall guide, but not retard, the sheets in their movement from the stack.

The operation of the machine is as follows:

The stack of copy paper **50** is placed in the tray, and is laterally stabilized by the friction pads **77** and by the guide blocks **78**, whilst the leading edge of the stack is to the rear of the point of contact of roller **35** with the wheel **21** by a distance slightly less than the feed stroke *d* of friction feed roller **5**. The friction feed roller **5** rests on the top sheet of the stack approximately centrally thereof. From the rest position of the drum as indicated in the drawing, the drum and the cams rotate in the clockwise direction, whereby bell-crank **16** rotates, during one half of a drum revolution, into the position shown in chain lines, so that the push bar **19** moves the carriage **8** and friction roller assembly in the reverse direction for a distance *d* indicated in Figure 1. In the remainder of the drum revolution bell-crank **16**, push rod **19**, and the friction feed roller **5** advance to complete the forward stroke under the tension of return spring **14**, during which time the friction feed roller **5** is locked to the cranked shaft **6**, and feeds the top sheet of copy paper forwardly under the funnel shaped discharge end of the tray **10** and between the feeding couple constituted by the wheel **21** and the roller **35**. At this instant the wheel **21** is stationary. The edge **81** of the gap **37** in the apron assists in guiding the leading edge of the sheet between the wheel and roller. During the first quarter of a further revolution of the drum, the linkage consisting of lever **23**, link **27**, lever **29** and lever **33** is actuated by the cam roller **25** to rotate the wheel **21** about 90 degrees in the anti-clockwise direction. During this phase of the cycle, the first sheet of copy paper is fed forwardly by the feeding couple constituted by the wheel **21** and the roller **35** towards the bight between the drum **2** and the counter-pressure roller **3**, whilst at the same time the friction feed roller **5** carried by the tray has performed part of another reverse movement over the next sheet of the stack, preparatory to a further forward movement to feed the second sheet. The timing of the cams is arranged so that there is a minimum delay between delivery of the sheet from the stack to the feeding couple **21, 35** and the commencement of the drive to the said feeding couple to advance the sheet to the printing couple. When the leading edge of the first copy sheet has been gripped between the drum **2** and the counter-pressure roller **3**, the damper operating cam disc **52** depresses the cam roller **58** and lever **59** against the tension of spring **60**, thus allowing the damping pad assembly to move downwardly about the axis P, whereby the front lower edge of the damping pad is pressed against the copy sheet. Under such conditions damping of the top surface of the copy sheet is commenced beginning from an undamped margin corresponding to the distance between the front edge of the damping pad, when depressed, and the bight of the printing couple. Further revolution of the drum completes the feeding of the copy sheet through the printing couple to obtain the impression from the master, whilst the second copy sheet has, in the meantime, been fed between the feeding couple constituted by the wheel **21** and roller **35** by the forward stroke of the friction feed roller **5**. The dwell portion **53** of the damper operating cam **52** is shaped to give the required delay in the damper operation with respect to the forward displacement of the copy sheet by the feeding couple **21, 35**, and further adjustment of this timing is possible by means of the adjusting screw **63**.

The return motion of the carriage, and of the push rod **19** is effected by spring **14**. Although a single return spring may suffice it is preferred to fit also a separate return spring for the push rod, this being shown at **93** (Fig. 2) in the form of a compression spring retained between the side frame **1** and a collar fixed to the rod **19**.

In the sheet-feeding mechanism above described, the tray **10** with the friction feeding device may be removed bodily at any time since there is no positive coupling between the push rod **19** and the frictional feeding roller **5**.

As an alternative arrangement Fig. 3 shows a releasable positive coupling between the rod **19** and the friction feed roller assembly.

The carriage **8** is slidably mounted on the rail **9**, as in the above described construction, but, in place of the striker-bar **12**, of Figs. 1 and 2, a latch lever **85** is pivoted on the carriage at **86** and cooperates with a pin **87** on the rod **19** to form a quickly releasable coupling.

A trip lever **89** is secured to the end of the axle of the cranked lever **7** extending through the carriage **8**, and carries a pin **90** adapted to cooperate with a notch **91** in the latch lever **85**. As shown, in the coupled position, the latch lever **85** is downwardly biased by a spring **88** so that a slot **92** engages the pin **87**. Automatic feed of the sheets may therefore be performed in the same way as in the Fig. 1 construction, so long as the latch is engaged on the pin **87**.

When hand feeding is desired instead of automatic feeding, the roller **5** is swung counter-clockwise into the

chain line position, whereby the pin **90** rides into the notch **91** and trips the latch lever, causing the slot **92** to release the pin **87**. The mechanism is held in this position by the weight of the roller **5** retaining the trip lever **89** against a stop **94**.

The pin **87** is clear of the mouth of the slot but not of the lip **95**, so that if the drum is now rotated, the push rod will strike the lip **95** and push the carriage to the left along the rail **9** and out of the feeding zone.

If automatic feed is to be resumed, the roller is swung clockwise on to the stack of sheets and the carriage is pushed forward by hand, whereby the inclined nose **96** of the latch lever rides over the pin **87**, allowing the slot and pin to engage. During this motion the top sheet is fed forward by the friction roller **5**, and automatic feed is taken up from this point without interruption.

Any suitable means may be employed for guiding and retaining the feed tray **10** in the machine. A preferred device is indicated in the drawings. Referring to Figs. 1, 2 and 4, grooves **101** are provided in each side frame **1** and **1***a* to receive guide plates **102** secured to the bottom of the tray at each side thereof. The laterally projecting edges of the guide plates are separated by a gap **103** through which projects the end of a finger **104** so as to enter a small recess **107** in the respective side frame. Each finger has a bush **105** whereby it is freely mounted on a fixed tie rod **106**, and a spring **108** normally retains the finger in position to lock the tray in the grooves. To remove the tray, the fingers are lifted by means of their lugs **109** so as to remove the clip ends from the gaps **103**, when the tray can be withdrawn.

The machine and the automatic sheet feeding mechanism above described represents only one example of the invention, to which obvious additions or modifications may be made whilst retaining the benefits of the invention. For example the machine will normally be fitted with a receiving tray at the rear side of the printing couple to receive the printed copy sheets. To conserve space such receiving tray may be of the telescopic type. Further, the details of the sliding carriage 8 may be suitably varied; for example the flat guide rail **9** may be replaced by a round section guide rail carrying an alternative form of return spring for the carriage, such spring being anchored to the right hand end of the guide rail and abutting against the end of the carriage. When employing such a round guide rail a further lateral guide member may be necessary to balance the cranked shaft **6** and friction roller **5** and to prevent undue pressure on the stack.

I claim:

1. In a rotary hectographic copying machine having a printing drum and a co-operating counter-pressure roller together forming a printing couple and a damping pad held in a damping pad frame situated immediately before the printing couple for direct damping of the copy sheets; means for feeding copy sheets singly to the printing couple in timed relation with the rotation of the printing drum comprising a friction feeding couple of relatively small width compared with the width of the drum, said couple being situated underneath the damping pad frame and consisting of a driven feed wheel and a freely rotatable roller of smaller diameter than the feed wheel co-operating therewith, and means including a one-way clutch and an oscillating lever for intermittently rotating the feed wheel through part of a revolution to feed the copy sheet forward to the line of contact of the drum and the counter-pressure roller.

2. In a rotary hectographic copying machine having a printing drum and a co-operating counter-pressure roller together forming a printing couple; means for feeding copy sheets singly to the printing couple for each drum revolution comprising a friction feeding couple having frictional contact with the copy sheet over a central zone of small width compared with the width of the drum, said couple consisting of a driven feed wheel and a co-operating freely rotatable roller of smaller diameter than the feed wheel, means including a one-way clutch and an oscillating lever for intermittently rotating the feed wheel through part of a revolution to feed the copy sheet forward to the drum, and means for resiliently pressing upon the copy sheet and applying volatile spirit thereto after the completion of said forward feeding stroke of the feeding couple comprising a movable damping pad and pad frame situated above the feeding couple and a support situated below the pad frame and immediately before the printing couple, and cam means actuated by the drum to lower the pad frame and pad to hold the copy sheet down on the said support during further forward motion of the copy sheet through the printing couple.

3. In a rotary hectographic copying machine having a printing drum and a co-operating counter-pressure roller together forming a printing couple and a damping pad held in a damping pad frame situated immediately before the printing couple for direct damping of the copy sheets; means for feeding copy sheets singly to the printing couple in timed relation with the rotation of the printing drum comprising a friction feeding couple of relatively small width compared with the width of the drum, said couple being situated underneath the damping pad frame and consisting of a driven feed wheel and a freely rotatable roller of smaller diameter than the feed wheel co-operating therewith, and means including a one-way clutch and an oscillating lever for intermittently rotating the feed wheel through part of a revolution to feed the copy sheet forward to the line of contact of the drum and the counter-pressure roller, said one-way clutch and oscillating lever bringing the feed wheel to rest and then allowing the feed wheel to rotate freely in the same direction through a further portion of a revolution under the traction of the copy sheet whilst the copy sheet is passing through the printing couple.

4. In a rotary hectographic copying machine having a printing drum and a co-operating counter-pressure roller together forming a printing couple and a damping pad for direct damping of copy sheets fed to said printing couple, the combination of a feed tray having means for aligning the side edges of a stack of sheets and sheet feeding means situated next before the damping pad in the line of feed to the printing couple comprising a rotary feeding couple having frictional contact with the sheet over a central zone of small width with respect to the printing drum and comprising a frictional feeding wheel having a shaft supported in the machine frame, an idler roller of smaller diameter resting on the wheel and disposed at the forward end of the feed tray, bearings for said idler feed roller carried in a cantilever plate suspended from the feed tray and means coupling the wheel shaft to the drum for intermittently driving the feeding couple in timed relation with the drum so that one forward feeding stroke is performed for each complete revolution of the drum.

5. A machine as claimed in claim 4 including further automatic sheet feeding means operating in tandem with said rotary feeding elements and comprising a shaft supported by the feed tray, a friction feed roller carried on said shaft to rest upon a stack of sheets in said tray, and means for intermittently driving said roller in timed relation with the drum to feed sheets singly from the stack to the line of contact of said rotary feeding elements.

6. A machine as claimed in claim 5 wherein the friction feed roller shaft is secured to a sliding carriage which is reciprocated by actuating means driven from the drum shaft, and the friction feed roller is coupled to the said shaft through a one-way clutch.

7. A machine as claimed in claim 6 wherein the actuating means for the sliding carriage comprises a push rod and an operating cam driven from the drum shaft, the said push rod operating upon the sliding carriage to make

the idle stroke of the friction feed roller whilst the feed stroke is performed by a return spring.

8. A machine as claimed in claim 7 wherein the actuating means is coupled to the sliding carriage by a quickly releasable pin and slot coupling.

9. A machine according to claim 8 wherein the shaft of the friction feed roller is pivotable to lift the friction feed roller bodily from the stack and simultaneously to release the pin and slot coupling.

10. A machine according to claim 9 wherein a slotted lever is carried by the sliding carriage and engages a pin on the push rod and is lifted from the said pin by the pivoting of the feed roller shaft and is thereby positioned to be struck by the next succeeding stroke of the push rod, whereby the carriage is removed from the operative position.

11. In a rotary hectographic copying machine of the kind having a printing drum and a co-operating counter-pressure roller together forming a printing couple and direct damping of the copy sheets by a damping pad, the combination of a feed tray having means for guiding and aligning the edges of a stack of sheets whilst being fed singly to the printing couple automatic sheet feeding means for advancing copy sheets singly from the stack to the printing couple comprising a first sheet feeding means intermittently driven in timed relation with the printing drum for advancing a sheet from the stack towards the printing couple, and a second sheet feeding means operating in tandem with the first sheet feeding means for further advancing the sheet towards the printing couple, the second sheet feeding means being situated next before the damping pad in the line of feed to the printing couple so that damping of the copy sheets is commenced after the copy sheet has been advanced by both of the said sheet feeding means and said second sheet feeding means comprising a friction feed wheel, means including a one-way clutch for intermittently driving said wheel in timed relation with the drum shaft and an idler roller of relatively small diameter resting upon said friction feed wheel, said wheel and roller co-operating during a forward feeding stroke to grip the copy sheet over a feeding zone of small width with respect to the width of the drum and to feed the leading edge of the copy sheet forward through a distance slightly greater than the distance between the line of contact of the wheel and roller and the line of contact of the printing couple, said clutch then allowing the wheel and roller to be freely rotated by the traction of the copy sheet drawn therethrough by the printing couple.

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