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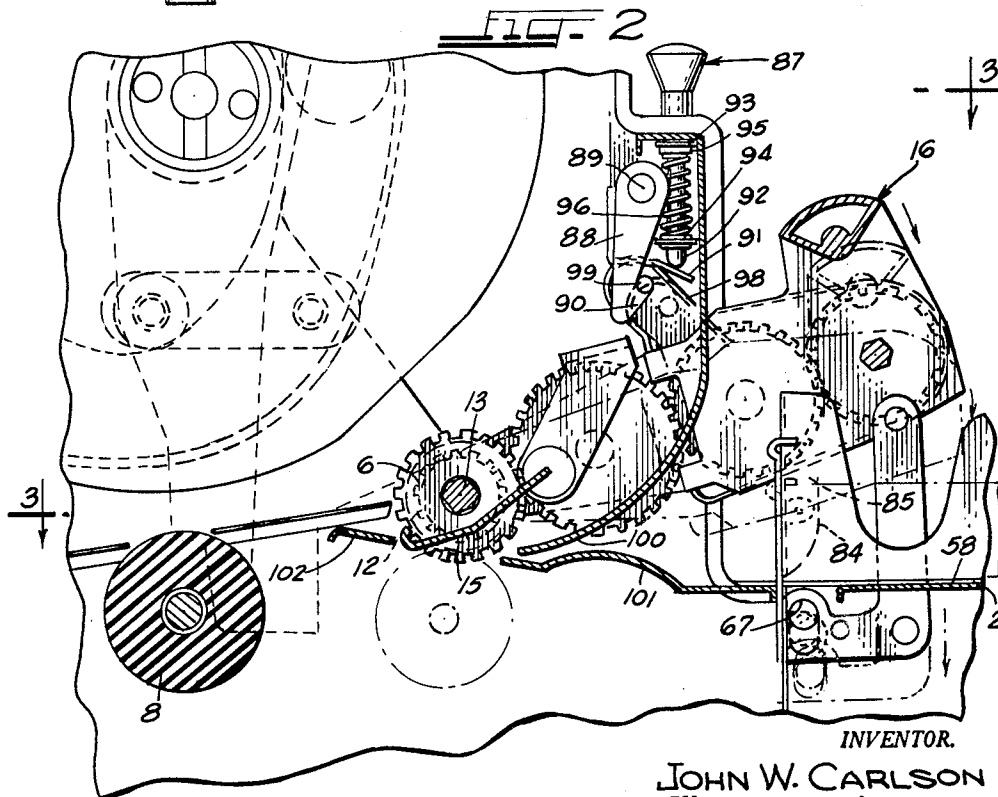
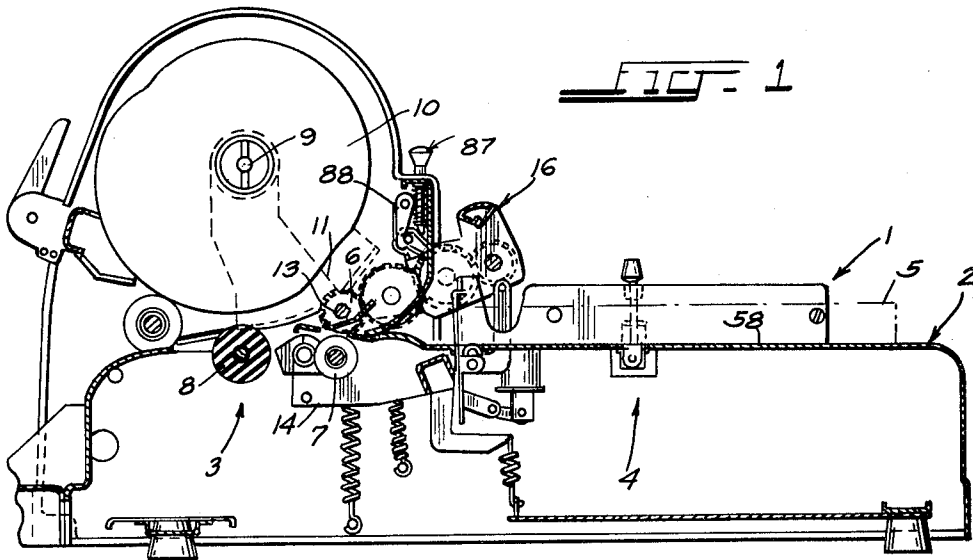
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3,195,884

DUPLICATING MACHINES

Filed April 18, 1962

2 Sheets-Sheet 1



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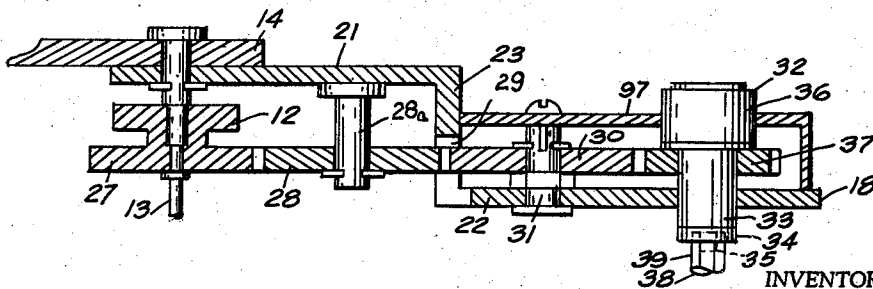
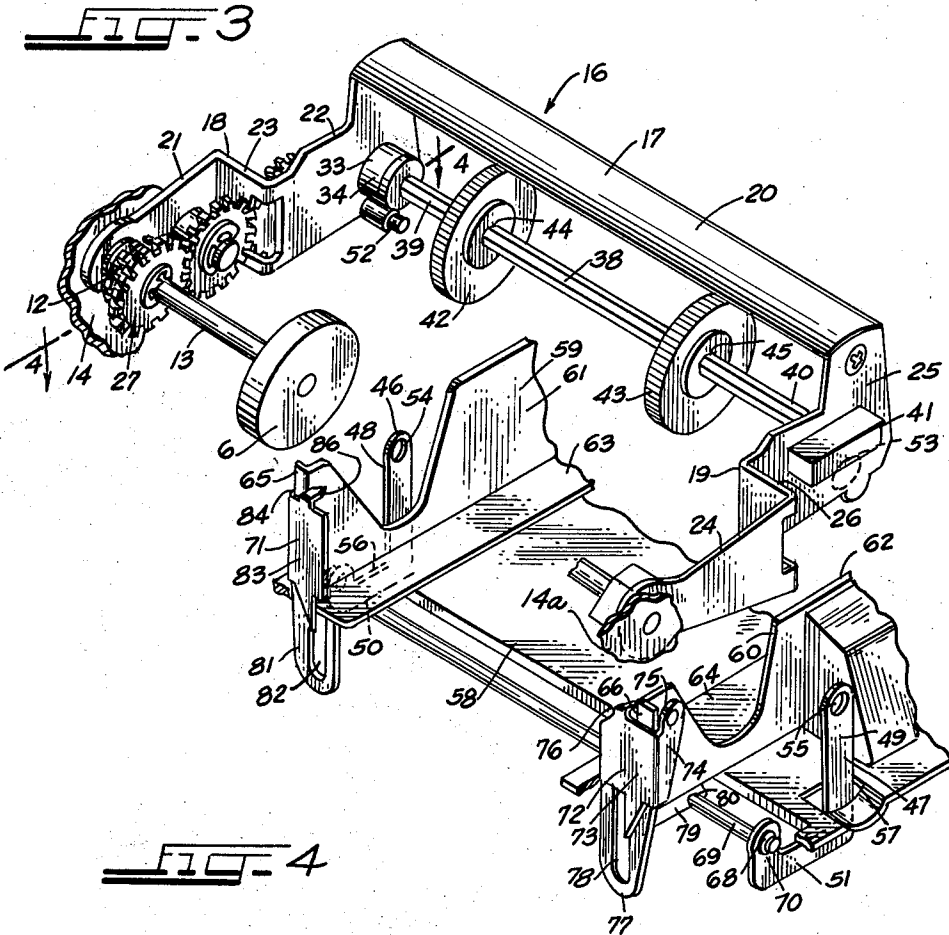
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DUPLICATING MACHINES

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8 Claims. (Cl. 271—10)

This invention relates to duplicating machines and, more particularly, to feeding mechanisms which are particularly well adapted for feeding sheets of paper to the printing mechanism in a duplicating machine.

It is a primary object of the present invention to afford a novel feeding mechanism for automatically feeding sheets of paper seriatim from a stack of such sheets.

Feeding mechanisms for feeding sheets of paper in duplicating machines, and the like, have been heretofore known in the art, however, such feeding mechanisms as have been heretofore known in the art have commonly had several inherent disadvantages, such as, for example, not being automatically operable; embodying reciprocating parts which tended to cause vibration and were noisy in operation; tending to streak the paper being fed by the mechanism; being relatively large and cumbersome in size; not being reliable and efficient in operation; being difficult to load with a new supply of paper to be fed by the mechanism; or being expensive to manufacture, and the like. It is an important object of the present invention to overcome such disadvantages.

Another object of the present invention is to afford a novel feeding mechanism of the aforementioned type which may be driven from an oscillating shaft in a novel and expeditious manner.

Another object is to avoid sliding contact between the feeding mechanism and the sheets being fed thereby.

Yet another object is to afford a novel feeding mechanism for feeding sheets of paper in a novel and expeditious manner, seriatim, from the top of a stack of such sheets into the printing mechanism of a duplicating machine, and the like.

A further object is to afford a novel feeding mechanism of the aforementioned type wherein the parts thereof are constituted and arranged in a novel and expeditious manner effective to hold all of the sheets below the top sheet of such a stack from being fed by the mechanism during a feeding operation thereof.

Another object is to afford a novel feeding mechanism of the aforementioned type embodying novel sheet holding mechanism of the aforementioned type, which is automatically adjustable in a novel and expeditious manner in accordance with the height of the stack from which the sheets are being fed.

Another object is to afford a novel feeding mechanism of the aforementioned type which may be quickly and easily reloaded with a supply of paper to be fed.

Yet another object is to afford a novel feeding mechanism of the aforementioned type wherein the parts therein are so constituted and arranged as to afford novel stop mechanism for limiting movement of paper during loading or re-loading of such paper into feeding position.

A further object is to afford a novel feeding mechanism of the aforementioned type which is practical and efficient in operation and may be readily and economically produced commercially.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent prin-

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ciples may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a fragmentary longitudinal view of a duplicating machine embodying the principles of the present invention, with parts of the duplicating machine omitted for the sake of simplicity;

FIG. 2 is an enlarged, detail fragmentary view of a portion of the duplicating machine shown in FIG. 1;

FIG. 3 is an exploded top perspective view of the feeding mechanism shown in FIG. 1; and

FIG. 4 is an enlarged detail sectional view taken substantially along the line in FIG. 3.

A duplicating machine 1, embodying the principles of the present invention is shown in the drawings to illustrate the preferred embodiment of the present invention.

The duplicating machine 1 shown in the drawings is of the type which includes, in general, a housing 2, with a printing station 3 disposed in the rear end portion of the housing 2, and a storing station 4 disposed at the front end portion of the housing 2.

In the operation of the duplicating machine 2, sheets of paper to be printed are fed seriatim from the top of a stack of sheets, such as the stack 5 diagrammatically indicated in broken lines in FIG. 1, from the storing position 4 to feed rollers 6, by which it is fed to the printing station 3. A pressure roller 7 is mounted below the feed rollers 6, and in passing to the printing station 3, the sheets of paper pass between the feed rollers 6 and the pressure roller 7, and from there on to the top of another pressure roller 8, which is disposed at the printing station 3. The pressure roller 8 is effective to press the sheets of paper upwardly against a rotatable printing drum, or the like, not shown, during passage of the sheets of paper through the printing station 3.

As will be appreciated by those skilled in the art, duplicating machines of the type of the duplicating machine 1 shown in the drawings include a drive shaft 9 at the printing station 3, which drive shaft 9 is constantly rotating during operation of the machine. Portions of the printing mechanism embodied in the machine, including control cams, such as the cam 10, FIG. 1, and the duplicating drum, not shown, are mounted on the drive shaft 9 and are rotatable therewith. A gear segment 11 is also mounted on and carried by the shaft, but is rotatable relative thereto.

During operation of the machine 2, the gear segment 11 is caused by the cam mechanism carried by the drive shaft 9 to oscillate between a position such as that shown in solid lines in FIG. 1 and a position such as that shown in broken lines in FIG. 1. The gear segment 11 is operatively engaged with a gear 12, FIGS. 2 and 4, secured to a shaft 13, the opposite ends of which are journaled in and supported by suitable supporting plates 14 and 14a in the housing 2. The feed rollers 6 are mounted on the shaft 13 and are rotatable therewith. Therefore, oscillation of the gear segment 11 is effective to oscillate the gear 12, the shaft 13 and the feed rollers 6. As will be appreciated by those skilled in the art, movement of the gear segment 11 from the position shown in solid lines to that shown in broken lines in FIG. 1 is effective to rotate the shaft 13 and the feed roller 6 through a partial revolution in a clockwise direction, as viewed in FIG. 2, into position wherein the flat portion 15 of the outer periphery of the feed roller 6 is disposed in directly facing relation to the pressure roller 7. During this rotation of the feed roller 6, it is effective to feed a sheet of paper on to the top of the pressure roller 8. The pressure roller 8 is constantly rotating in a counterclockwise direction, as viewed in FIG. 2, during the operation of the machine

1, so that when the feed roller 6 stops in the position wherein the flattened portion 15 thereof is disposed directly opposite to the pressure roller 7, the pressure roller 8 and the associated printing mechanism is effected to pull the remaining portion of the sheet through the slot thus formed between the rollers 6 and 7.

During movement of the gear segment 11 from the position shown in broken lines to the position shown in solid lines in FIG. 1, the gear 12 and, therefore, the feed roller 6 is rotated thereby in a counterclockwise direction through a partial revolution in a counterclockwise direction, as viewed in FIG. 2, from the aforementioned position wherein the flat portion 15 is disposed immediately opposite the pressure roller 7, to the position shown in FIGS. 1 and 2. As will be discussed in greater detail presently, during this reverse rotation of the feed roller 6, another sheet of paper is fed from the top of the stack 5 in storing position 4 into engagement with the bite of the rollers 6 and 7.

The present invention is particularly concerned with the feed mechanism for feeding sheets of paper from the storing position 4 to the feed roller 6. For this purpose, I have afforded a novel feed mechanism 16, which is disposed between the feed roller 6 and the storing position 4 on the duplicating machine 2, FIGS. 1 and 2.

The feeding mechanism 16 embodies a supporting frame 17, which includes two elongated side plates 18 and 19 with a cross bar 20 extending between the upper edges of the front end portions of the side plates 18 and 19. The side plates 18 and 19 are mirror images of each other in construction, each being substantially Z-shaped. The side plate 18 includes a rear end portion 31 and a front end portion 22 disposed in substantially parallel planes, and an intermediate portion 23 disposed substantially perpendicular to the end portions 21 and 22 and interconnecting front end portion of the rear portion 21 and the rear end portion of the front end portion 22, FIGS. 3 and 4. The side plate 19 similarly has an outwardly disposed rear end portion 24 and an inwardly disposed front end portion 25, interconnected by an intermediate portion 26.

The free ends or rear ends of the rear end portions 21 and 24 of the side plates 18 and 19 are journaled on the shaft 13 inwardly of and immediately adjacent to the supporting plates 14 and 14a of the housing 2, FIG. 3. The gear 12 is disposed inwardly of the end portion 21 of the side plate 18, and the feed rollers 6 are spaced from each other along the drive shaft 13 inwardly of the gear 12 in position to be disposed vertically above the path of travel of sheets of paper moving from the storing station 4 to the printing station 3.

Another gear 27 is mounted on the shaft 13 for rotation therewith, axially inwardly of the gear 12, FIGS. 3 and 4. The gear 27 is preferably formed integrally with the gear 12, and is meshed with a gear 28, which is rotatably mounted on a pin 29 projecting inwardly from the front end portion of the rear end portion 21 of the side plate 18. The gears 27 and 28 are disposed in substantially parallel relation to the rear end portion 21 of the side plate 18, and the peripheral edge portion of the gear 28 opposite to the portion thereof engaged with the gear 27 projects forwardly into an opening 29 formed in the intermediate portion 23 of the side plate 18, FIGS. 3 and 4. Another gear 30 is rotatably mounted on a pin 31, which projects outwardly from the rear end portion of the front end portion 22 of the side plate 18. The gear 30 is disposed outwardly of the front end portion 22 of the side plate 18 in radial alignment with the gear 28, and the gears 28 and 30 meshingly engage each other within the opening 29.

A spring clutch 32 is mounted on the front end portion 22 of the side plate 18 in forwardly spaced relation to the gear 30, FIGS. 3 and 4. The spring clutch includes a bearing 33 stationarily mounted, and projecting through the front end portion of the side plate 18, and a coupling plate 34 mounted on and rotatable with a shaft 35 which is journaled in and extends through the bearing 33 into the

clutching mechanism 36 disposed on the other side of the side plate 18 from the drive plate 34. Another gear 37 is journaled on the bearing 33 between the clutching mechanism 36 and the side plate 18 in radial alignment with the gear 30, and is operatively meshed with gear 30 for rotation thereby. The spring clutch 32 is of the type which is operable to drivingly connect the gear 37 to the shaft 35 and the coupling plate 34 for rotation therewith, when the gear 37 is rotated in clockwise direction, as viewed in FIGS. 1-3. It is also effective to operatively disengage the gear 37 from the shaft 35 and the coupling plate 34 when the gear 37 is rotated in counterclockwise direction, as viewed in FIGS. 1-3.

A drive shaft 38 extends between the front end portions 22 and 25 of the side plates 18 and 19, below the cross bar 20. One end 39 of the drive shaft 38 is releasably coupled to the coupling plate 34 for rotation therewith, and the other end portion 40 of the drive shaft 38 is journaled in a bearing 41 mounted in the front end portion 25 of the side plate 19. The drive shaft 38 is preferably angular in transverse cross-section such as, for example, of hexagonal transverse cross-sectional shape. Two feed rollers 42 and 43 are slidably mounted on the drive shaft 38, the feed rollers 42 and 43 having openings 44 and 45 extending axially therethrough, respectively. The openings 44 and 45 are complementary in size and shape to the drive shaft 38, and the drive shaft 38 is disposed therein with a relatively snug but freely slidable fit. With this construction, rotation of the drive shaft 38 is effective to similarly rotate the feed rollers 42 and 43, and the feed rollers 42 and 43 are readily adjustable into various positions along the drive shaft 38.

Two substantially L-shaped links 46 and 47, having long legs 48 and 49 and short legs 50 and 51, respectively, are disposed in depending relation to the side plates 18 and 19, respectively. The upper end portions of the legs 48 and 49 are pivotally secured to the lower edge portions of the side plates 18 and 19 substantially vertically below the drive shaft 38 by suitable means such as pins 52 and 53, which project inwardly from the side plates 18 and 19 and extend into openings 54 and 55 in the upper end portions of the long legs 48 and 49 of the links 46 and 47. The legs 48 and 49 extend downwardly from the frame 16 through openings 56 and 57 formed in the top wall portion 58 of the housing 2, which forms the bottom of the storing station 4, FIGS. 1 and 3.

The short legs 50 and 51 of the links 46 and 47 are disposed below the wall 58 of the housing 2 and extend forwardly from the long legs 48 and 49, respectively, in substantially parallel relation to each other on opposite sides of the storing station 4. The legs 50 and 51 terminate at their front end portions forwardly of the wall 58.

The duplicating machine 1 includes two side rails 59 and 60 mounted on top of the wall 58 on opposite lateral sides of the storing station 4, for engaging and guiding respective longitudinal edges of the stack of sheets disposed in operative position at the storing station 4. The side rails 59 and 60 include substantially parallel, vertically extending side walls 61 and 62 having inwardly projecting horizontal flanges 63 and 64 at the lower edge portions thereof, respectively. The side rails 59 and 60 also have outwardly projecting flanges 65 and 66 at the front edges of the side walls 61 and 62, respectively, FIG. 3.

The short legs 50 and 51 of the links 46 and 47, respectively, have vertically extending openings 67 and 68, respectively, formed in the free end portions thereof, forwardly of the wall 58 of the housing 2, FIGS. 2 and 3. A substantially straight, elongated bar or shaft 69 is mounted in the openings 67 and 68, and is releasably secured therein by suitable means, such as, snap rings 70 disposed outwardly of the links 46 and 47. The bar 69 is movable upwardly and downwardly with the links 46 and 47, and is also movable upwardly and down-

wardly relative thereto within the limit of the lengths of the slots 67 and 68.

Two sheet-stripping fingers or stop fingers 71 and 72, which are mirror images of each other in construction, are mounted on the bar 69 in substantially upright, parallel relation to each other. The stop finger 72 includes a substantially flat rear wall 73 disposed in parallel juxtaposition to the rear face of the flange 66 on the side rail. A side flange 74 extends forwardly from the rear wall 73 in abutting engagement with the free edge of the flange 66 on the side rail 60, and a roller 75 is rotatably mounted on the flange 74 and projects inwardly therefrom into abutting engagement with the front face of the flange 66. The stop finger 72 also includes a relatively short pointed hook member 76 which projects forwardly from the upper edge of the front wall 73 thereof in abutting engagement with the rear edge portion of the inner face of the side wall 62 of the side rail 60. The flange 66 on the side rail 60 includes a lower extension 77 projecting downwardly below the bottom flange 64. The extension 77 has an elongated, vertically extending opening 78 extending therethrough, and the rear wall 73 of the stop finger 72 has a downwardly and forwardly projecting ear 79 projecting forwardly through the slot 78. The ear 79 has an opening 80 extending therethrough, and the bar 69 extends through the opening 80 with a relatively snug, sliding fit to thereby mount the stop finger 72 on the bar 69.

Like the flange 66, the flange 65 on the side rail 61 on the other side of the storing station 4 includes a lower extension 81 projecting downwardly below the bottom flange 63 on the side rail 61, the extension 81 having an elongated, vertically extending slot 82 extending therethrough. The stop finger 71 has a rear wall 83 disposed in uniplanar relation to the front wall 73 of the stop finger 72, and includes a downwardly and forwardly projecting ear 84, which extends forwardly through the slot 82, and is slidably mounted on the pin or bar 69. The stop finger 71 also includes a side flange 84, which extends forwardly from the rear wall 83 in abutting engagement with the free edge of the flange 65 on the side rail 61, and a roller 85 is rotatably mounted on the flange 84 and projects inwardly therefrom into abutting engagement with the front face of the flange 65. Like the stop finger 72, the stop finger 71 also includes a relatively short pointed hook member 86 which projects forwardly from the upper edge of the rear wall 83 in abutting engagement with the rear edge portion of the inner face of the side wall 61 of the side rail 59.

The stop fingers 71 and 72 are of such size and configuration that the hook members 86 and 76 thereof, respectively, are always disposed directly vertically above respective rear corners of the area in which the stack of paper to be fed through the machine, such as, for example, the stack 5, is disposed in operative position at the storage station 4 during the operation of the machine 1.

The supporting frame 17 of the feeding mechanism 16 is pivotally mounted on the shaft 13, which extends through the rear end portion of the side walls 18 and 19 of the frame 17. With this construction, the frame 17 is pivotable around the shaft 13 between a fully raised position, such as shown in solid lines in FIG. 2, and lowered positions such as the position shown in broken lines in FIG. 2. The bar 69 and, therefore, the stop fingers 71 and 72 are connected through the links 48 and 49 and the pins 52 and 53 to the forward end portion of the supporting frame 17 substantially directly below the shaft 38. Therefore, during movement of the supporting frame 17 upwardly and downwardly around the drive shaft 13, the stop fingers 71 and 72 move a distance substantially identical to the distance moved by the feed rollers 42 and 43. The elongated slots 67 and 68 at the free end portions of the short legs 50 and 51 of

the links 46 and 47 permits the bar 69 and, therefore, the stop fingers 71 and 72 to move a short distance vertically independently of the movement of the supporting frame 17 for a purpose which will be discussed in greater detail presently.

A latching mechanism 87 is mounted on the rear end portion of the housing 2 above the wall 58, FIGS. 1 and 2, and includes an elongated latching pawl or dog 88 having an upper end portion pivotally mounted on a pin or shaft 89 mounted in the housing 2. The pawl 88 has a forwardly projecting ear 90 on the lower end portion thereof, and also includes a plate 91 projecting forwardly above the ear 90. The plate 91 is secured to the lower end portion of a plunger 92 by suitable means, such as, for example, welding. The plunger 92 is slidably mounted in an upper bracket member 93 and a lower bracket member 94 carried by the housing 2, and has a collar 95 projecting radially outwardly from the upper portion thereof. A compression coil spring 96 is disposed around the plunger 92 in abutting engagement with the collar 95 and the lower bracket member 94 to thereby urge the plunger 92 toward fully raised position, as shown in FIG. 2.

A cover member 97 mounted on the outer face of the front end portion 22 of the side rail 18 of the supporting frame 17 in covering relation to the gears 30 and 37, has an upwardly projecting rear end portion 98, FIGS. 2 and 4. A pin 99 projects inwardly from the portion 98 of the cover member 97 in such position that when the supporting frame 17 is disposed in fully raised position, as shown in solid lines in FIG. 2, with the plunger 92 disposed in fully raised position, the ear 90 on the pawl 98 latchingly engages the pin 99 to thereby hold the feeding mechanism 16 in raised position. When the feeding mechanism 16 is disposed in such raised position, the storage area between the side rails 59 and 60 at the storage station 4 is substantially fully open from the front thereof so that a stack of paper, such as, for example, the stack 5 may be readily inserted into storage position from the front of the machine 1. When the feeding mechanism 16 is disposed in the aforementioned raised position, the stop fingers 71 and 72 are also disposed in raised position, as shown in FIG. 1 and as shown in solid lines in FIG. 2, to thereby afford abutment members at the rearward edge of the storage station 4 which are effective to engage the rear edge at the stack of papers being inserted into the machine 1 to thereby effectively define the rearward limit to which the stack may be inserted.

After the papers to be fed through the machine have thus been inserted into operative position at the storage station 4, the plunger 92 may be pressed downwardly against the urging of the spring 96 to thereby swing the pawl 88 in a clockwise direction, as viewed in FIG. 2, out of latching engagement with the pin 99, and thereby permit the feeding mechanism 16 to swing downwardly around the drive shaft 13 into position wherein the feed rollers 42 and 43 thereof rest on top of the stack of papers such as the stack 5, disposed in operative position at the storage station 4. During this downward movement of the feeding mechanism 16, the fingers 71 and 72 also move downwardly into position wherein the hook members 86 and 76 thereof, respectively, rest on the upper faces of respective rear corners of the stack 5. The limited movement of the fingers 71 and 72 relative to the feed rollers 42 and 43, permitted by the elongated slots 67 and 68 in the links 46 and 47, insures that both the hook members 86 and 76 and the feed rollers 42 and 43 rest firmly on the upper face of the top sheet in the stack 5.

In operation of the duplicating machine 1 shown in the drawings, when the gear segment 11 swings in a clockwise direction, as viewed in FIG. 1, from the position shown in broken lines in FIG. 1 to the position shown in solid lines therein, it is effective to rotate the gear 12 and,

therefore, the gear 27 and the drive shaft 13 in a counterclockwise direction. This is effective through the gears 27, 28, 30, and 37, and the clutch 32 to rotate the drive shaft 38 and, therefore, the feed rollers 42 and 43 in a clockwise direction, as viewed in FIG. 2. Such rotation of the feed rollers 42 and 43 is effective to urge the top sheet on the stack 5 to move rearwardly. It will be remembered that the hook members 86 and 76 on the stop fingers 71 and 72, respectively, are disposed in overlying juxtaposition to the front face of the rear corners of this top sheet. Therefore, during initial rotation of the feed rollers 42 and 43, the top sheet is bulged upwardly until the front corners thereof slide over the hook members 86 and 76. Thereafter, the top sheet is fed rearwardly by the feed rollers 42 and 43 into position between two guide plates 100 and 101, disposed forwardly of the wall 58 of the housing 2. The guide plates 100 and 101 are disposed in vertically spaced relation to each other, with the lowermost plate 101 terminating closely adjacent to the feed roller 6 on the drive shaft 13, FIG. 2. During this rearward movement of the top sheet from the stack 5, the feed rollers 6 are rotated in a counterclockwise direction, a distance slightly less than a complete rotation. The stack 5 is disposed forwardly of the feed rollers 6 such a distance that by the time the forward edge of the sheet being fed therefrom moves into abutting engagement with the periphery of the feed rollers 6, the flat portion 15 thereon has moved in a counterclockwise direction, as viewed in FIG. 2, beyond such point of engagement. Therefore, the front edge of the sheet being fed engages the circular-shaped peripheral portion of the feed rollers 6 and its forward movement is stopped thereby. The continued rotation of the feed rollers 42 and 43 causes the sheet to be bowed upwardly along the upper guide plate 100. At the end of the movement of the gear segment 11 from the position shown in broken lines to the position shown in solid lines in FIG. 1, the feed rollers 42 and 43 move out of engagement with the front edge of the sheet which has just been fed rearwardly thereby.

Thereafter, during movement of the gear segment 11 in the reverse direction, that is, from the position shown in solid lines to the position shown in broken lines in FIG. 1, the gear segment 11 is effective to rotate the gear 12 and, therefore, the gear 27, the drive shaft 13 and the feed rollers 6 through a partial revolution in a clockwise direction, from the position shown in FIG. 2. During this rotation of the gear 27, the gear 32 is rotated in a counterclockwise direction and, therefore, is rendered inoperative by the clutch 32 to rotate the shaft 38. However, such rotation of the feed rollers 6 is effective to advance the sheet of paper which has been fed forwardly from the stack 5 between the feed rollers 6 and the pressure roller 7 rearwardly along the upper face of a guide plate 102 from whence it is fed onto the top of the pressure roller 8. At the completion of this stroke of the gear segment 11, when the gear segment 11 is disposed in broken lines in FIG. 1, the flat portion 15 of the roller 6 is disposed in directly facing relation to the pressure roller 7 to thereby afford a slot between the pressure roller 7 and the feed rollers 6. Hence, continued rotation of the pressure roller 8 is effective to advance the portion of the sheet disposed below and forwardly of the pressure rollers 6 through the slot formed between pressure roller 6 and the pressure roller 7. This cycle of operation may be repeated for each sheet fed through the machine 1.

As the sheets are fed off from the stack 5, the feed mechanism 16 is free to pivot downwardly around the shaft 13, to thereby maintain the feed rollers 42 and 43 and the hook members 86 and 76 in engagement with the upper feed of the top sheet of the stack. Also, it will be seen that the rollers 42 and 43 may be adjusted to any desired position along the shaft 38, so that, if desired, they may be disposed in position to engage the sheets outside of the area to be printed.

From the foregoing, it will be seen that I have afforded a novel, automatic feeding mechanism which is practical and efficient in operation.

Also, it will be seen that this invention affords a novel sheet feeding mechanism, which is so constituted and arranged that new supplies of sheet material to be fed through the machine may be readily inserted into operative position therein.

Also, it will be seen that the present invention affords a novel feed sheet mechanism which may be readily and economically produced commercially.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a duplicating machine having a storing station for storing a stack of sheets of paper to be printed, a printing station spaced from said storing station, rotatable feed means disposed between said stations in spaced relation to said storing station for engaging and feeding sheets of paper to said printing station, and means for oscillating said rotatable means to thereby alternately rotate said rotatable means through a feeding rotation and through a reverse rotation,

(a) roller means

(1) disposed at said storing station

(2) in position to engage the top sheet of such a stack of sheets disposed at said station, and

(b) means operatively connected to said rotatable means and to said roller means for rotating the latter through a rotation and in a direction effective to move said top sheet from said storing station into engagement with said rotatable means during said reverse rotation of said rotatable means.

2. In a duplicating machine having a storing station for storing a stack of sheets of paper to be printed, a printing station spaced from said storing station, rotatable feed means disposed between said stations in spaced relation to said storing station for engaging and feeding sheets of paper to said printing station, and means for oscillating said rotatable means to thereby alternately rotate said rotatable means through a feeding rotation and through a reverse rotation,

(a) roller means

(1) disposed at said storing station

(2) in position to engage the top sheet of such a stack of sheets disposed at said station,

(b) gears operatively connected to said rotatable means for oscillation thereby upon said oscillation of the latter, and

(c) clutch means

(1) disposed between said roller means and said gears and

(2) operable

(a') to operatively connect said roller means to said gears for rotation thereby during said reverse rotation of said rotatable means and

(b') to disconnect said roller means from said gears during said feeding rotation of said rotatable means, and

(d) means rotatably supporting said roller means, said clutch means, and said gears for rotation as a unit around said rotatable means.

3. The combination defined in claim 2 and which includes stop means movable with said mounting means and disposed in position to stoppily engage the edge of said stack of sheets facing toward said rotatable means.

4. The combination defined in claim 2 and which includes stop means mounted on and movable with said mounting means in position to engage said stack in posi-

tion to hold all of said sheets below said top sheet from movement toward said rotatable means.

5. In a duplicating machine having a storing station for storing a stack of sheets of paper to be printed, a printing station spaced from said storing station, rotatable feed means disposed between said stations in spaced relation to said storing station for engaging and feeding sheets of paper to said printing station, and means for oscillating said rotatable means to thereby alternately rotate said rotatable means through a feeding rotation and through a reverse rotation,

- (a) an elongated supporting frame having one end portion rotatably mounted on said rotatable means,
- (b) roller means rotatably mounted
 - (1) on the other end portion of said frame
 - (2) above said storing station,
- (c) gear means
 - (1) rotatably mounted on said frame and
 - (2) operatively connected to said rotatable means for oscillation therewith,
- (d) clutch means operatively connected to said gear means and to said roller means,
- (e) said frame, said roller means, said gear means, and said clutch means being rotatable as a unit around said rotatable means between
 - (1) a lowered position effective to dispose said roller means in engagement with the top sheet of such a stack disposed at said storing station, and
 - (2) a raised position effective to dispose said roller means above said stack in spaced relation thereto,
- (f) said clutch means being operable
 - (1) to operatively connect said roller means to said gear means for rotation thereby in a direction operable to move said top sheet of said stack toward said rotatable means when said roller means is disposed in said engagement with said top sheet during said reverse rotation of said rotatable means, and
 - (2) to operatively disconnect said roller means from said gear means during said feeding rotation of said rotatable means.

6. The combination defined in claim 5 and which includes

- (a) stop means attached to and movable with said frame,
- (b) said stop means being disposed in position to stoppily engage said stack between said stations in all positions of said frame when said stack is disposed at said storing station.

7. The combination defined in claim 5 and which includes

- (a) two elongated stop fingers disposed in vertically extending position between said stations,
- (b) said stop fingers
 - (1) being movable upwardly and downwardly with said frame and
 - (2) having hooked upper end portions disposed in position to overlies respective corners of said stack in said storing station in all positions of said frame, and
- (c) said hooked upper end portions being disengageable from said top sheet to said stack upon movement of said top sheet toward said rotatable means.

8. The combination defined in claim 7 and

- (a) which includes means for guiding said fingers in said upward and downward movement thereof,
- (b) said last-mentioned means comprising
 - (1) guide channels on said machine, and
 - (2) roller means on said fingers and operatively engaged in said channels, and
- (c) in which said fingers are movable upwardly and downwardly relative to said frame.

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