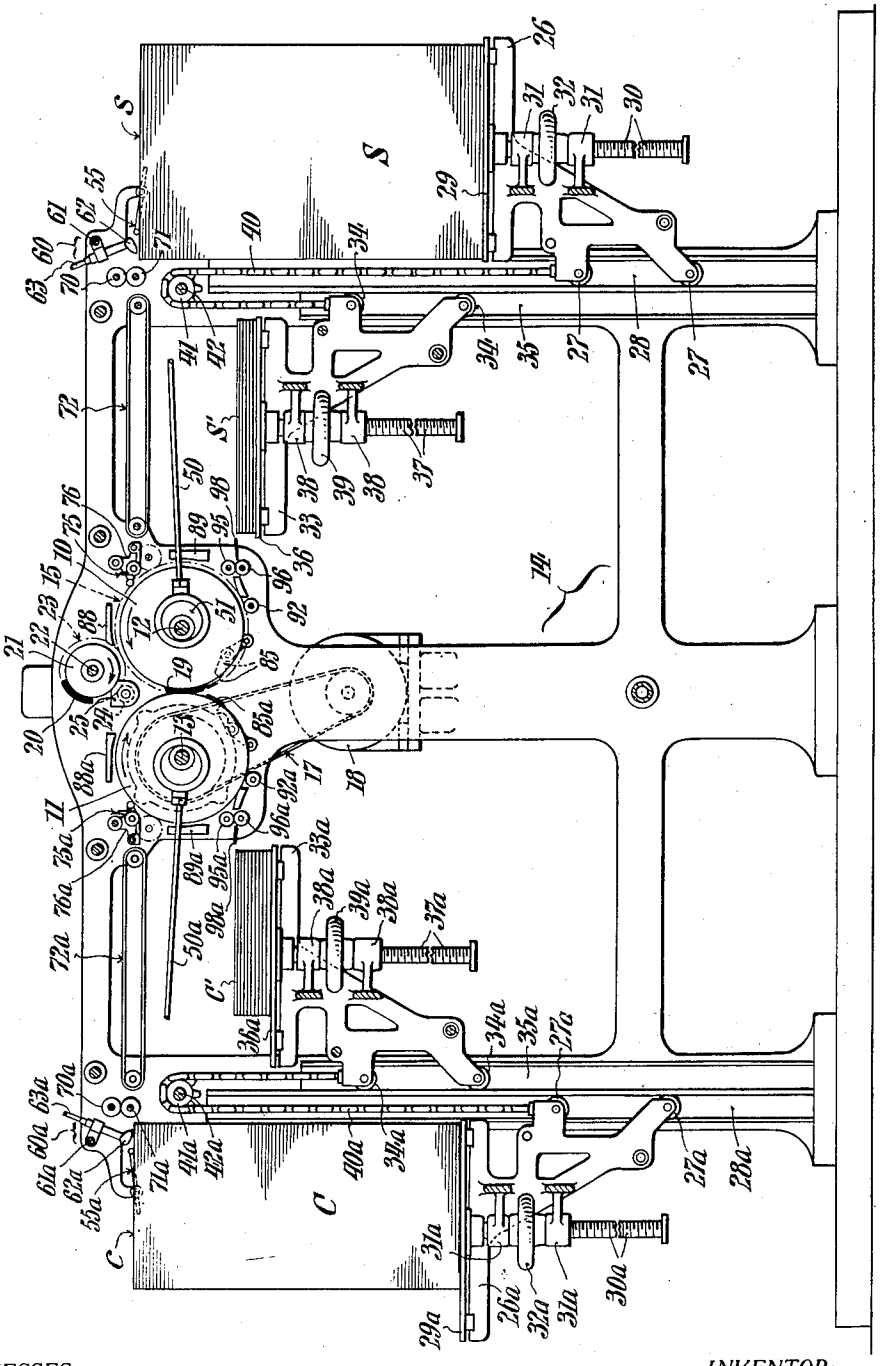
Oct. 23, 1951 R. J. CRISSY 2,572,450

DATA COPYING MACHINE

Filed June 25, 1947 3 Sheets-Sheet 1

FIG. 1



WITNESSES

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DATA COPYING MACHINE

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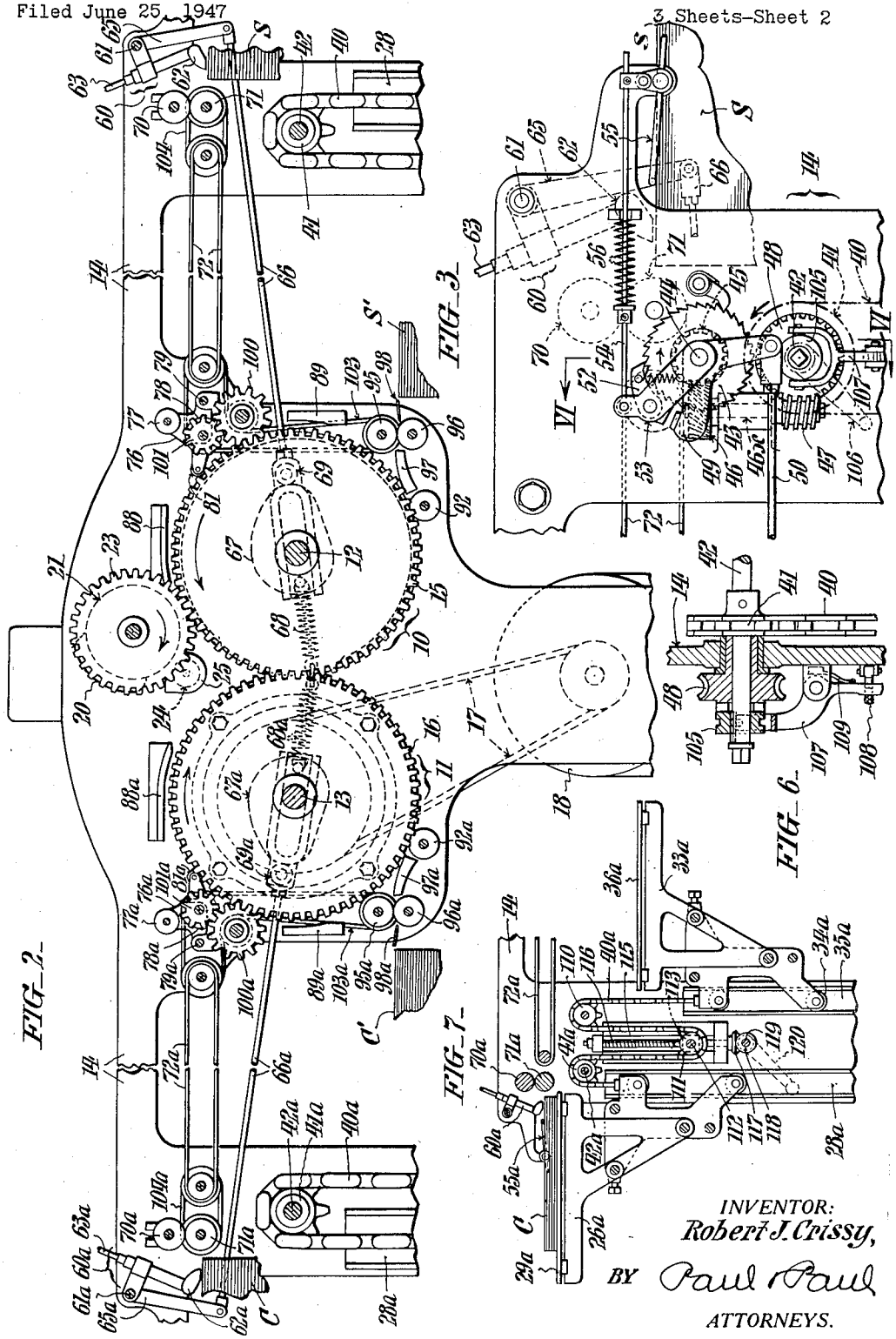


FIG. 2.

FIG. 3.

FIG. 6.

FIG. 7.

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DATA COPYING MACHINE

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FIG. 4.

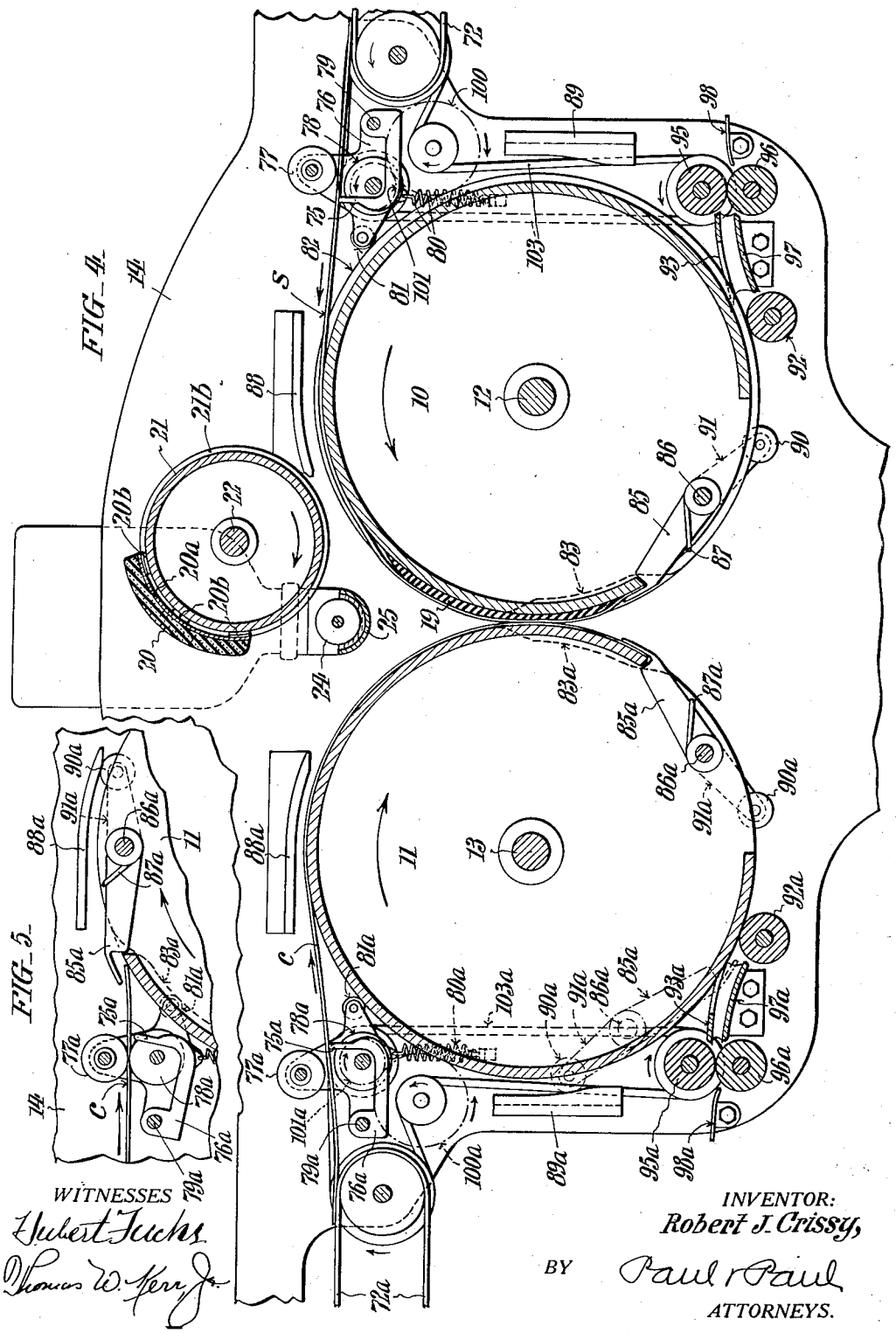


FIG. 5.

WITNESSES

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Patented Oct. 23, 1951

2,572,450

UNITED STATES PATENT OFFICE

2,572,450

DATA COPYING MACHINE

Robert J. Crissy, Union, N. J., assignor to Business Systems, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application June 25, 1947, Serial No. 756,993

7 Claims. (Cl. 101—132)

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This invention relates to machines designed for transferring printed or typed matter, for example, from data-bearing cards capable of repeated use, to blanks such as letter sheets, mailing evelopes, etc.

In machines of the kind referred to as ordinarily constructed heretofore, the blanks and the cards, after being passed in contact with each other between a pair of cooperating counter-rotating press cylinders, were released together into a common receiver. Thus after each run of the machine, it was necessary to separate the cards from the printed sheets before they could be re-used. This was not only a time consuming operation, but invariably resulted in the derangement of the cards from the standpoint of their original serial order.

My invention has for one of its aims to overcome the above drawbacks. This objective is attained in practice as hereinafter more fully disclosed, through provision, in addition to pile supports from which individual sheets and cards are respectively fed in succession to the press cylinders, of separate stacking receivers to which said sheets and cards are respectively delivered upside down but in the same order as originally received.

In a data copying machine having the foregoing attributes, it is a further aim of my invention to provide for compensative leveling as between the pile supports and the receivers both for the sheets and the cards, so that the feeding and delivery of the latter is effected always substantially in the same horizontal planes.

Other objects and attendant advantages will appear from the following detailed description of the attached drawings, wherein, Fig. 1 is a longitudinal sectional view of a data copying machine conveniently embodying my invention.

Fig. 2 is a broken out fragmentary view, like Fig. 1, of the upper portion of the machine drawn to a larger scale.

Fig. 3 is a fragmentary view of the machine in side elevation showing part of the feeding mechanism by which the blank sheets are successively advanced from a stock pile to the impression cylinders of the machine.

Figs. 4 and 5 are fragmentary views in longitudinal section drawn to a still larger scale in order to better show important structural features of the machine.

Fig. 6 is a detail sectional view taken as indicated by the angled arrows VI—VI in Fig. 3; and

Fig. 7 is a fragmentary view in longitudinal section corresponding to Fig. 1 and showing a modification.

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With more specific reference first more particularly to Figs. 1–3 of these illustrations, the cooperative press cylinders of the machine are designated 10 and 11, the same being fixed to shafts 12 and 13 which are journalled in suitable bearings on the machine framework 14. Through attached intermeshing spur wheels 15 and 16, the press cylinders 10 and 11 are caused to rotate in unison but in opposite directions as indicated by the arrows in Fig. 1, the cylinder 11 being driven by a speed-reducing belt connection 17 from an electric motor indicated at 18. As shown in Fig. 1, the cylinder 10 carries a pad 19 adapted to be contacted by a pad 20 on an applicator roll 21 whereof the shaft 22 is also journaled in the machine framing 14. During each rotation of roll 21 which is driven by a spur pinion 23 from gear 15, pad 20 wipes against a roll 24 which is partly submerged in a fountain trough 25 containing suitable transfer or copying fluid. By the means just described, the pad 19 on cylinder 10 is moistened with the fluid during each rotation of said cylinder. As shown, the pad 20 has an arcuate backing plate 20*a* with means, indicated at 20*b*, for engaging a circumferential groove or grooves 21*b* in the roll 21 to removably hold it in place for convenience of interchange with others for a purpose later explained. A similar arrangement may be made for the opposing pad 19 on cylinder 10.

Disposed at one end of the machine relatively remote from the cylinders 10 and 11, is a support 26 for stock pile S of blank sheets *s* which are to receive the impressions from the data bearing cards, said support being in the form of an elevator with guide rollers 27 confined to an upright channel track, whereof one is indicated at 28, on the machine framing. As shown, the elevator 26 has a platform 29 with a pendent threaded rod 30 which passes through guide bosses 31 and which, in the interval between said bosses, is engaged by a nut wheel 32. By this arrangement, the platform 29 can be raised or lowered relative to the elevator 26. After being printed, the sheets are delivered, in a manner later on explained, to a receiver 33 which is likewise in the form of an elevator with rollers 34 confined to another upright track channel 35 alongside the track channel 28. Like the elevator 26, the receiver elevator 33 has a platform 36 with a pendent screw rod 37 which is guided in bosses 38 and which between said bosses, is engaged by an adjusting nut wheel 39. Chains, such as the one indicated at 40, passing over a sprocket 41 on a transverse shaft 42 at the top of the machine, connect the elevators 26

and 33 so that lift movements of the one will be attended by corresponding drop movements of the other. Sprocket shaft 42 is intermittently rotated by mechanism (Figs. 3 and 6) including a ratchet wheel 43 which is free on a stud 44 projecting laterally from the machine framing 14, and to which is secured a spiral gear 45 that meshes with a companion spiral gear 46 at the top of a vertical shaft 46x. A worm 47 at the lower end of vertical shaft 46x drives an intermeshing worm wheel 48 on the sprocket shaft 42. Freely fulcrumed on the stud 44 is a bell crank 49 which, through a link rod 50, is constantly oscillated by an eccentric 51 (Fig. 1) on the shaft 12 of the press cylinder 10. The pawl 52, for picking the ratchet wheel 43, is carried by an arm 53 fulcrumed for independent movement on the stud 44 and connected, through another link rod 54, to a feeler finger 55 which, through a spring 56, is held in yielding engagement with the blank top sheet s of the pile S on the elevator 26 with the pawl normally moving idly back and forth on the ratchet. As the feeler 55 recedes upon removal of a few sheets from the pile S, the pawl arm 53 is moved into the range of the constantly oscillating bell crank 49 and the ratchet wheel 43 given an incremental rotary shift by the pawl 52. As a consequence of repetitions of such actions, the elevators 26 will be progressively raised and the top of the dwindling pile S maintained at a substantially constant level to insure successive removal of individual sheets by means presently referred to. The intermittent lifts of the elevator 26 will, of course, be attended by corresponding incremental drops of the receiving elevator 33, so that the top of the growing stack of printed sheets will likewise be maintained at a substantially uniform level to insure proper stacking of the printed sheets as they are delivered horizontally from the cylinder 10 as also presently explained.

The mechanism for removing individual sheets from the pile S on the elevator 26 and advancing them to the press cylinders 10 includes a lifting element 60 which is secured to a transverse shaft 61, and which has a suction foot 62 in communication, by way of a flexible tube partly shown at 63, with a suitable suction pump. Also affixed to the shaft 61 is an arm 65 which, through a link rod 66, is operated from a rotary cam 67 on the shaft 12 of the press cylinder 10 (see Fig. 2). The spring indicated at 68 draws upon the link 66 and thereby serves to keep a follower roller 69 on said link engaged with the periphery of the cam 67. By the action of the element 60, the leading edge of the topmost blank sheet s is presented to a pair of constantly rotating nip rolls 70 and 71 and, by the latter, advanced to a continually travelling horizontally-arranged endless feed belt 72 which is disposed over the receiver elevator 33 in the interval between the press cylinder 10 and the sheet supply elevator 26. Each sheet s is momentarily arrested on the feed belt 72 by a stop projection 75 on a member 76 which carries a nip roll 77 adapted to coact, at certain times, with a constantly rotating companion nip roll 78 journalled in the machine framework. The member 76 is fulcrumed for up and down movement about a transverse axis rod 79 and is subject to the downward pull of a spring 80 by which a follower roller 81 thereon is maintained yieldingly in engagement with a peripheral cam tread 82 at one end of the press cylinder 10. As shown, the cam tread 82 has a depression at 83 which, when it arrives at the roller 81, permits the element 76 to drop, with the result that the stop projection 75 is lowered to release the sheet S on the belt 72 and the roll 77 brought into contact with the roll 78, as shown in Fig. 5, to advance said sheet for engagement of its leading edge by grippers, of which one is indicated at 85 on the press cylinder. The grippers 85 are in the form of fingers which occupy voids at one point in the periphery of the press cylinder 10, and which are secured to a rock shaft 86. The gripper fingers 85 are influenced by torsion springs 87 whereby their free ends are normally maintained in engagement with the periphery of the press cylinder 10 to effectively grip the leading edge of each sheet s, and to thereby hold it to said cylinder. For actuating the grippers 85 at the proper times, I have provided fixed cam pieces 88 and 89 which are respectively positioned directly above and to the right of the press cylinder 10 in the path of a roller 90 on an arm 91 affixed to the gripper shaft 86.

Running in contact with the cylinder 10 at the bottom is a roller 92 whereby the leading edge of the sheet s, after actuation of the gripper 85 by the cam 89 to release it, is controlled for deflection by a stripper indicated at 93 toward another pair of constantly rotating nip rolls 95 and 96 by which said sheet, after having passed half way around the cylinder, is finally discharged onto the receiver 33. In order to properly direct the printed sheets horizontally to the receiver 33, I have further provided guides 97 and 98 respectively beneath the stripper 93 and beyond the delivery nip rolls 95 and 96.

The motion for driving the various elements by which the sheets s are individually advanced to and delivered from the press roll 10 is derived from the gear wheel 15 with which, as shown in Fig. 2, meshes a pinion 100 which in turn drives a pinion 101 on the shaft of the nip roll 78 previously referred to. The feed belt 72 and the delivery rolls 95 and 96 are driven from the shafts of the nip roll 78 and the gear pinion 100 by a belt connection 103; while the receiving nip rolls 70 and 71 are driven by a belt connection 104 from one of the end pulley shafts of the feed belt 72 as shown in Fig. 2. The various gears and pulleys of this drive system, it will be noted, are so proportioned that the surface speed of the feed nip rolls and the feed belt 72 is somewhat faster than that of the press cylinder 10, and the surface speed of the delivery nip rolls 95 and 96, synchronous with that of said cylinder.

In order that the elevators 26 and 33 may be properly positioned at the beginning of each run of the machine, I have provided (Figs. 3 and 6) a clutch collar 105 whereby the worm wheel 48 can be disconnected from the sprocket shaft 42 and said shaft turned by application of a hand crank 106 to its square end, as indicated in broken lines in Fig. 3 to actuate the chain 40. As shown in Fig. 6, the clutch collar 105 is retractable by means of a shifter arm 107 and is lockable in retracted position by a releasable latch 108. The collar 105 is normally held in clutching position through the action of a spring 109 upon the shifter arm 107 in a manner readily understood from Fig. 6.

From Figs. 1, 2 and 4 it will be noted that appurtenances identical to those described above are provided for feeding the data-bearing cards c individually to the press roll 11, and for subsequently delivering them individually from said roll. Accordingly, in order to preclude the neces-

sity for repetitive description, these duplicated parts have been identified by the same reference numerals previously employed with addition however in each instance, of the letter "a" for convenience of more ready distinction.

The operation of the machine is as follows:

The piles S and C respectively of blank sheets *s* and cards *c* are placed on the elevators **26** and **26***a*. If the quantities in the piles are less than the full capacity of the machine, the elevator platforms **29** and **29***a* are adjusted by means of the nut wheels **32**, **32***a* so that the upper sheets and cards in the piles are brought to the level of the feelers **55**, **55***a*. The platforms **36**, **36***a* of the receiver elevators **33**, **33***a* are in turn adjusted by manipulation of the nut wheels **39**, **39***a* so that said platforms are properly leveled with respect to the sheet and card delivery guides **98**, **98***a*. With this preparation, the machine is set in motion by starting the motor **18**. At each actuation of the suction elements **60**, **60***a*, the topmost sheet *s* in the pile S and the topmost card *c* in the pile C are presented to the nip rolls **70**, **71** and **70***a*, **71***a* and by the latter transferred to the feed belts **72**, **72***a* which advance them until they are intercepted by the stops **75**, **75***a* on the elements **76**, **76***a*. As the rollers **90**, **90***a* arrive at the fixed cams **88** and **88***a* as exemplified in Fig. 5, the arms **91**, **91***a* are actuated, with the result that the grippers **85**, **85***a* on the press cylinders **10** and **11**, are momentarily opened to respectively receive the leading edge of the sheet *s* and of the card *c* which latter have in the meantime been released and fed forward by the nip rolls **77**, **78** and **77***a*, **78***a* upon momentary dropping of the stop elements **76**, **76***a* as the cam depressions **83**, **83***a* on the press cylinders **10** and **11** pass the rollers **81**, **81***a* on said elements, also as shown in Fig. 5. By action of the grippers **85**, **85***a*, the sheet *s* and the card *c* are carried around the oppositely rotating press cylinders **10** and **11** and brought into face to face contact in passing through the nip of said cylinders as shown in Fig. 4, so that said sheet, after previous moistening of a predetermined area of its surface by the pad **20** on roll **21**, receives the desired impression from said card. Eventually as the leading edges of the sheet and card arrive at the strippers **93**, **93***a* to which they are assisted by the rolls **92**, **92***a*, they are directed by the guides **97**, **97***a* to the nip rolls **95**, **96** and **95***a*, **96***a*, the grippers **85**, **85***a* having been opened in the meantime through actuation of their roller arms **91**, **91***a* by the stationary cams **89**, **89***a* as exemplified in dot and dash lines in Fig. 4. By the action of the nip rolls **95**, **96** and **95***a*, **96***a*, the now printed sheet and the used card are ejected and horizontally directed, faces downward, over the delivery guides **98**, **98***a* and onto the receivers **33** and **33***a*. As the sheet and card piles S and C are reduced, the elevators **26** and **26***a* are gradually raised by intermittent movement of the sprocket chains **40** and **40***a* through picking of the associated ratchet mechanism under automatic control of the feelers **55**, **55***a*, with attendant descent of the elevators **33**, **33***a* to accommodate growth of the stacks S' and C' of the printed sheets and used cards. The feelers **55**, **55***a* thus serve as a means for maintaining the supply and receiver elevators **26**, **33** and **26***a*, **33***a* in such positions that the top sheets and cards of the stock piles S, C and the receiving piles S', C' are caused to occupy substantially constant levels respectively with the suction elements **60**, **60***a* and the delivery guides **98**, **98***a*.

In addition to their motion transmitting function, the worm **47** and worm wheel **48** and the corresponding worm and gear (not shown) at the left hand end of the machine in Fig. 1, serve as locking means to prevent slip of the chains **40**, **40***a* through unbalance of the elevators **26**, **33** and **26***a*, **33***a* as the respective loads on them change. However, as hereinbefore pointed out, the worm wheels can be unclutched from the sprocket shafts **42** and the latter turned by means of the crank handle **106** as in Fig. 6, to quickly return the elevators to re-starting position after each run of the machines. With the pads **19** and **20** arranged as shown in the drawings, only definite areas of the sheets *s* are moistened, and only corresponding portions transferred to them of the data on the cards. However, through the hereinbefore described provisions **20***b*, **21***b* made for interchange, pads of larger or smaller areas may be substituted in accordance with the amount of the data desired to be transferred from the cards to the sheets.

From the foregoing it will be seen that in my improved data copying machine, the sheets and cards are not only neatly stacked upside down in different piles after having passed between the press cylinders, but kept in the serial order which they occupied in the stock piles at the beginning of each run of the machine. I have accordingly obviated the necessity for any subsequent separation and sorting of the cards from the sheets as was required with copying machines of the prior art constructions.

In the modification illustrated in Fig. 6, the sprocket chain **40***a* connecting the supply and receiver elevators **26***a* and **33***a*, is diverted to pass downwardly in the interval between two top sprockets **41***a*, **100** and to underpass an auxiliary or idler sprocket wheel **11** whereof the shaft **112** is journalled at each end in a slide block **113** confined to a vertical guideway **115** on the machine framing **14**. As shown, the guide block **113** is engaged by a screw spindle **116** which, at its lower end, carries a bevel gear pinion **117** in mesh with a similar pinion **118** on a transverse shaft **119** provided with a removable hand crank **120**. By turning the shaft **119** one direction or the other, it will be apparent that, through the intermediate elements just described, the sprocket chain **40***a* will be either taken up or payed out, with resultant compensative adjustment of the levels of the elevators **26***a* and **33***a* in preparing the machine for operation on different batches of sheets and cards.

Having thus described my invention, I claim:

1. In a data copying machine, a pair of counter rotated press cylinders with their axes in the same horizontal plane; a support for a stock pile of sheets disposed remotely from the cylinders to one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders to the other side thereof; separate means operative to remove individual sheets from the respective piles and advancing them for downward passage, face to face, between the cylinders; a collecting receiver arranged at a lower level between the cylinders and one of the stock pile supports for receiving the first sheets after passage between the cylinders; a second collecting receiver similarly arranged with interval between the cylinders and the second stock pile support for receiving the second mentioned sheets after passage between the cylinders; means for progressively elevating the two supports concurrently as the sheets are removed from them; and means for directing the sheets laterally in opposite direc-

tions to the respective receivers after having passed between the cylinders as aforesaid.

2. A data copying machine, according to claim 1, further including connections whereby the receivers are compensatively lowered as the corresponding stock pile supports are progressively elevated.

3. In a data copying machine, a pair of counter-rotated press cylinders with their axes in the same horizontal plane; a support for a stock pile of sheets disposed remotely from the cylinders on one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders on the other side thereof; a collecting receiver arranged at a lower level between the cylinders and one of the stock pile supports for receiving the first sheets after passage between the cylinders; a second collecting receiver similarly arranged in the interval between the cylinders and the second stock pile support for receiving the second mentioned sheets after passage between the cylinders; oppositely driven horizontal transfer belts respectively operating in the intervals between the cylinders and the respective stock pile supports; means for progressively elevating the two supports concurrently for presentation of the top sheets of the decreasing piles substantially at the level of the two belts; simultaneously-actuated feed means, operative at each actuation, to feed the top sheets from the respective stock piles to the respective belts for transfer to the respective cylinders; means for guiding the respective sheets so fed downwardly to meet in the bight between the cylinders; and means for laterally directing the sheets to the respective receivers after having passed between the cylinders as aforesaid.

4. In a data copying machine, a pair of counter-rotating press cylinders; a support for a stock pile of sheets disposed remotely from the cylinders on one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders on the other side thereof; feeding means for concurrently removing individual sheets successively from the two piles and advancing them to the cylinders for downward passage, face to face, between the latter; a collecting receiver arranged between the cylinders and one of the stock pile supports for receiving the first mentioned sheets after passage between the cylinders; a second collecting receiver similarly arranged between the cylinders and the second stock pile support for receiving the second mentioned sheets after passage between the cylinders; a vertically-arranged chain trained over sprocket wheels to the pendent ends of which chain the first mentioned stock pile support and the first mentioned sheet receiver are connected; a similarly arranged chain trained over a sprocket wheel to the pendent ends of which chain the second mentioned stock pile support and the second mentioned receiver are connected; and means for incrementally rotating the respective sprocket wheels so that the corresponding stock pile supports are gradually raised as the sheets are removed from them and the corresponding receivers are concurrently lowered for stocking of respective sheets.

5. In a data copying machine, a pair of counter-rotated press cylinders; a support for a stock pile of sheets disposed remotely from the cylinders on one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders on the other side thereof; feeding means for concurrently removing individual sheets successively from the two piles and advancing them to the cylinders for downward passage, face to face, between the latter; a collecting receiver arranged between the cylinders and one of the stock pile supports for receiving the first mentioned sheets after passage between the cylinders; a second collecting receiver similarly arranged between the cylinders and the second mentioned stock pile support for receiving the second mentioned sheets after passage between the cylinders; a vertically-arranged chain trained over sprocket wheels to the pendent ends of which chain the first mentioned stock pile support and the first mentioned sheet receiver are connected; a similarly arranged chain trained over a sprocket wheel to the pendent ends of which chain the second mentioned stock pile support and the second mentioned receiver are connected; means for incrementally rotating the respective sprocket wheels so that the corresponding stock pile supports are gradually raised as the sheets are removed from them and the corresponding receivers are concurrently lowered for stacking of respective sheets, the last mentioned means including worm wheels on the shafts of the respective sprockets, intermeshing worms for driving the shafts, and retractable clutches whereby the worm wheels can be released from the shafts; and removable crank handles for the sprocket shafts whereby, upon unclutching of the worm wheels, the stock pile supports and the receivers can be quickly returned to restarting positions after each run of the machine.

6. In a data copying machine, a pair of counter-rotated press cylinders; a support for a stock pile of sheets disposed remotely from the cylinders on one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders on the other side thereof; feeding means for concurrently removing individual sheets successively from the two piles and advancing them to the cylinders for downward passage, face to face, between the latter; a collecting receiver arranged between the cylinders and one of the stock pile supports for receiving the first mentioned sheets after passage between the cylinders; a second collecting receiver similarly arranged between the cylinders and the second mentioned stock pile support for receiving the second mentioned sheets after passage between the cylinders; a vertically-arranged chain trained over sprocket wheels to the pendent ends of which chain the first mentioned stock pile support and the first mentioned sheet receiver are connected; a similarly arranged chain trained over a sprocket wheel to the pendent ends of which chain the second mentioned stock pile support and the second mentioned receiver are connected; ratchet wheels and individual actuating pawls associated with the respective sprockets; and feelers contacting the topmost sheets on the respective stock piles for automatically controlling picking of the ratchets by the respective pawls so that the stock pile supports are gradually raised as the sheets are successively removed from them and the receivers concurrently lowered for stacking of the sheets after their passage between the cylinders.

7. In a data copying machine, a pair of counter-rotated press cylinders; a support for a stock pile of sheets disposed remotely from the cylinders on one side thereof; a support for another stock pile of sheets disposed remotely from the cylinders on the other side thereof; separate feeding means for concurrently removing individual sheets successively from the tops of the two piles and advancing them to the cylinders for downward passage, face to face, between the latter; a col-

lecting receiver arranged between the cylinders and one of the stock pile supports for receiving the first mentioned sheets after passage between the cylinders; a second collecting receiver similarly arranged between the cylinders and the second mentioned stock pile support for receiving the second mentioned sheets after passage between the cylinders; a vertically-arranged chain trained over a pair of spaced sprocket wheels over which each chain is trained; and auxiliary sprocket wheels underpassed by the respective chains and regulatable up and down between the sprocket wheel pairs aforesaid for adjustment of the levels of the stock pile supports and the respective receivers to adapt the machine for operation upon different stack quantities of the respective sheets.

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