

May 9, 1933.

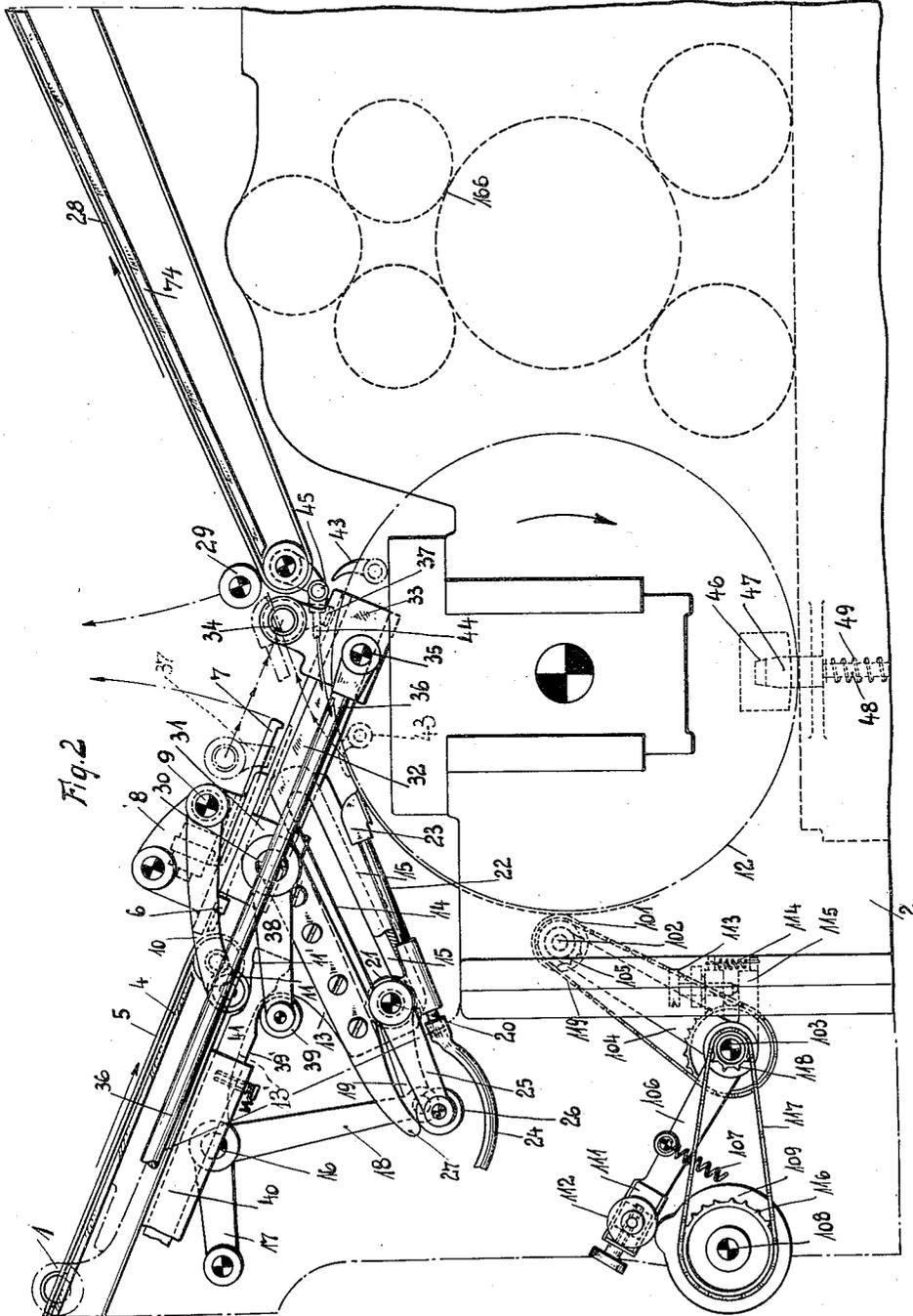
G. SPIESS

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STOP CYLINDER PRINTING MACHINE

Filed Nov. 28, 1931

3 Sheets-Sheet 2



Inventor:
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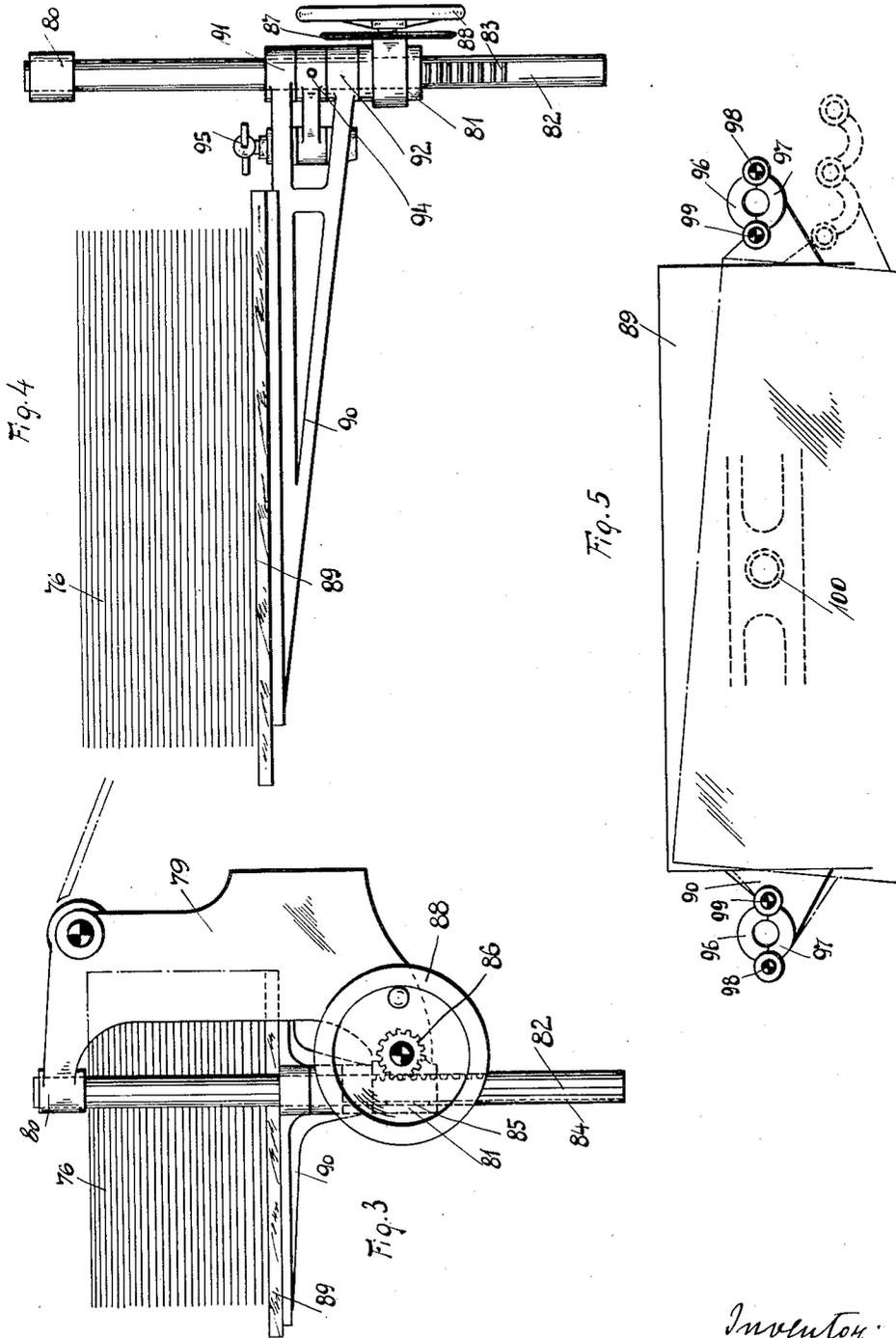
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UNITED STATES PATENT OFFICE

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STOP-CYLINDER PRINTING MACHINE

Application filed November 28, 1931, Serial No. 577,792, and in Germany April 22, 1931.

The present invention relates to a stop-cylinder printing machine having front sheet delivery, where in the front edge of the feed table is located at a certain distance from the impression cylinder, over which the sheet to be printed is fed to the cylinder grippers, the printed sheet being conveyed through the intermediate space with the printed side upwards towards the delivery pile. The feed path and the delivery path of the sheets intersect one another. In known stop-cylinder printing machines the feeding of the registered sheet to the cylinder grippers is effected by means of a swinging table or by means of grippers swinging about an axis either during or shortly after the impression cylinder is stationary, and the taking off of the sheets is effected shortly before the termination of the rotary movement of the impression cylinder or whilst the latter is stationary by means of band conveyers. Whilst, as stated, the paths described by the sheets during the operation of feeding them to the impression cylinder and the operation of delivering them from the said cylinder intersect one another, the paths described by the members feeding the sheets do not intersect the paths described by the members serving for delivering the sheets. The paths of the members which feed and deliver the sheets are comparatively long and the members are generally of considerable weight. As a consequence of this the velocity of their movement is very greatly limited so that in the stop-cylinder printing machines of the kind in question it is not possible to obtain the output of printed material which is required nowadays in modern printing machines. Apart from this it is not possible in stop-cylinder printing machines of this kind to maintain entirely accurate registration. This is to be attributed principally to the fact that grippers swinging about an angle or swinging tables are employed for feeding the sheets. In correspondence with the radius of the swinging movement, the said grippers impart to the sheets, in addition to the movement in the plane of the sheet, a movement perpendicular to the surface of the sheet. This perpendicular movement which causes fluttering of

the sheets acts in certain circumstances detrimentally to the accurate feeding of the sheets to the said grippers. Even deviations to the extent of fractions of millimetres are sufficient, as will readily be understood, to cause inexactitudes in the registration. For these reasons stop-cylinder presses having front sheet delivery have not been adopted to any considerable extent in practice.

It is the principal object of the invention to provide means for constructing stop-cylinder printing machines having front sheet delivery in such manner that their output can be very substantially increased whilst in spite of the increased speed of the machines absolutely exact registration is ensured. This result is primarily obtained by the provision of means whereby both for the feeding of the sheets to the impression cylinder and for the taking off of the printed sheets from the latter, pneumatically or mechanically operating forwarding devices, for example suction rods or grippers reciprocating substantially rectilinearly, are employed, the paths of motion of which intersect one another. The sheet feed table and the sheet delivery table are stationary, but are arranged so that they can be swung back. Preferably the forwarding device for delivering the printed sheets together with its driving and controlling means is connected with one of the two tables (which are stationary during the working operation), for example with the feed table and the mechanical parts thereof in such manner that the sheet feeding and delivering devices can be operated from the same drive. By means of this arrangement the result is attained that when the tables are swung back in the upward direction the impression cylinder is entirely exposed.

By the considerable improvement consisting in causing the paths of motion of the feeding and delivering devices to intersect one another, in contradistinction to the known arrangements in which the said paths only approach one another, several very important advantages are obtained. In particular, by means of the arrangement according to the invention, time is saved in the registration of the sheets without increasing the relative

velocity of the feeding device, and consequently it is rendered possible to maintain exact registration, whilst time is also saved in the taking off of the sheets from the impression cylinder which is still rotating, to a much greater extent than was hitherto possible. Moreover, the arrangement of the inking and distributing mechanism and the whole construction of the printing machines with regard to the space occupied and the accessibility of the printing forme can be designed much more favorably than was hitherto the case. The sheet feeding and delivery devices according to the invention which reciprocate independently of the size of the sheet between the cylinder and the stationary tables in paths of motion which intersect only need to execute quite short paths, and are enabled, as they constitute light gripping members, to adapt themselves to the most rapid working operations. Apart from this, as a result of the rectilinear movement of the feeding members, exact registration is ensured. It is, of course, a condition for obtaining absolutely accurate registration that the impression cylinder is always in exactly the same position when the sheet is fed to it. In order to ensure that the impression cylinder is in the exact position for feeding, a device for locking the said cylinder in the position in which the sheets are fed to it is provided.

As a result of the construction and mode of operation of the sheet feeding and delivering members according to the invention, they are themselves enabled to feed up to and deliver from the impression cylinder the necessary number of sheets corresponding to the high output of the printing machine which it is desired to obtain. Without further constructional modification of the known stop-cylinder printing machine, it is, however, not possible to make use of the increased efficiency of the said feeding and delivering members. One particular obstacle resides in the fact that the printed sheet can only be detached from the impression cylinder with some little difficulty. During the printing operation the air located between the sheet and the surface of the cylinder is almost entirely pressed out and the sheet clings in consequence of this so tightly to the surface of the cylinder, especially in the case of the printing operations under counter pressure, that it is only possible to draw off the sheet at a greater velocity than that of the impression cylinder at the time being, within certain speed limits. If the speed limit is exceeded the sheet usually becomes torn during the operation. The said limit will, however, be exceeded if the sheet delivery member is allowed to operate as rapidly as is necessary for the attainment of the ordinary printing output of other printing machines. For this reason special devices are provided in the machine according to the invention which assist the release of the sheet

from the impression cylinder. A further obstacle to the complete utilization of the efficiency of the sheet feeding and delivery devices according to the invention, if it is attempted to employ them in conjunction with the hitherto known constructions of stop-cylinder printing machines, resides in the fact that the conveyer bands for delivering the printed sheets from the machines operate continuously and uniformly at high speed. They must of necessity move at a high speed in order that sufficient time is available for the feeding of the sheet. As a result of the high speed of the bands conveying the sheets to the pile, the said sheets when they are delivered to the bands are suddenly subjected to a very considerable acceleration. In order to avoid tearing of the sheets the said acceleration must not be allowed to exceed a certain amount; but the amount in question would be exceeded if the attempt were made to utilize the total possible efficiency capable of being attained by the sheet delivery members constructed according to the invention. For this reason it is further preferable in applying the invention to arrange that the conveyer bands forwarding the sheets out of the machine move at variable speed in such manner that they grip the sheets fed up to them from the impression cylinder by the sheet delivery members at the same speed as that of the sheets themselves, whereupon the speed is gradually increased to a considerable extent. The varying speed of the bands conveying the sheets to the delivery pile may also be employed to render it possible to deliver the sheets at low speed to the delivery pile as a result of which a more accurate registration of the delivery pile is obtained. The pile table is preferably arranged so as to be capable of swinging in order to give easier access to the printing forme provided on the reciprocating carriage of the printing machine.

A preferred constructional form of a printing machine according to the invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a side elevation of the complete machine,

Fig. 2 shows a part of the machine as illustrated in Fig. 1, as viewed from the other side to a larger scale, and

Figs. 3, 4 and 5 show a swinging pile table according to the invention in side view, front view and plan respectively.

Referring to the drawings:

The reference numeral 2 denotes the frame of the stop-cylinder printing machine in which frame an impression cylinder 12 is mounted. The impression cylinder is provided on each side with a toothed gear 12', the toothed gears engaging with racks 58'. The racks 58' are mounted on the upper part of a carriage 58 which is adapted to reciprocate in a horizontal direction in the machine frame

2 and which carries the printing forme. On the carriage 58 two racks 58'' are provided at the lower part, each of which is engaged by a corresponding pinion 150. Each of the pinions 150 is in engagement with a corresponding rack 151, the racks being rigidly mounted in the frame 2 and extending in a horizontal direction. The two pinions 150 are mounted on a common shaft 152 with which a connecting rod 153 engages. The connecting rod 153 is pivotally connected with a crank pin 155 provided on a pinion 154. The pinion 154 is mounted on a shaft 156 and is driven from the main driving shaft 157 of the machine by means of a pinion 158. The reference numeral 159 denotes a fly wheel mounted on the main shaft 157. During the rotation of the pinion 154 the pinions 150 roll upon the fixed racks 151 and move alternately towards the right and towards the left with regard to Fig. 1. As a result of their rolling movement the pinions 150 displace the carriage 58 inasmuch as they are in engagement with the racks 58'' so that the latter moves in the same horizontal direction as the pinions 150. The carriage 58 rotates the impression cylinder 12 in its movement through the medium of the racks 58', but it is arranged in such manner so that it only does this when its movement is in the one direction, i. e. in the direction towards the right in Fig. 1. This result is attained in known manner (not indicated on the drawings) by constructing the pinions 12' so that there are no teeth on a small part of their periphery, whereby the racks 58' come out of engagement with the pinions 12' at the end of the forward movement of the carriage 58. In this position the pinions 12' and consequently the impression cylinder 12 are kept stationary during the return movement of the carriage 58. This is effected by means of a lever 56 which is rotatably mounted at its one end at 55 in the machine frame and encloses by means of a fork formed at its other end a pin 160 laterally mounted on the impression cylinder 12. The lever 56 is engaged by a rod 57, the other end of which is constructed so as to form a slot and is guided by a block 161 mounted on the shaft 156. On the right and left hand side respectively of the guide slot 57' of the rod 57 rollers 162', 162'' are mounted each of which bears upon a cam disc 163', 163''. By means of the said cam discs 163', 163'' the rod 57 is moved to and fro and the lever 56 is swung into such a position that the engaging pin 160 of the impression cylinder 12 can either pass into the forked part of the lever 56 and be thereby held in position or can pass out of the said forked part. If the lever 56 is positioned so that the pin 160 can pass out of its forked end, the impression cylinder 12 will be thereby turned through a short distance and adjusted into such a position that on the succeeding movement of the carriage

58 towards the right (with regard to Fig. 1) the racks 58' come into engagement again with the pinions 12' of the impression cylinder 12.

On the impression cylinder 12 a plurality of grippers 43 arranged in a line running parallel to the axis of the impression cylinder are mounted, which serve for holding the front end of the sheet which is to be printed. When the said sheet is brought between the grippers 43 they close and remain closed during almost a complete revolution of the impression cylinders 12, whereupon they open again and release the sheet which they have previously held. The devices for the opening and closing of the grippers 43 are universally known and have therefore not been described or illustrated. An inking mechanism 166 is provided for inking the printing forme carried by the carriage 58.

The sheets to be printed are withdrawn from a pile 164, from which they are lifted singly by means of suction members 165 and are forwarded to conveyer bands 5 which convey them to the impression cylinder 12. The conveyer bands 5 move around a table 4 which is mounted on a projecting part 1 of the machine frame so as to be rotatable around a pin 3 and bears upon projections of the frame 2. For the delivery of the sheets from the impression cylinder 12 to the delivery pile 76 carried by the pile table 89, endless bands 28 are similarly employed which move around a table 74.

The sheet feed table 4 is provided in known manner with a sheet forwarding device 6 and registering stops 7. The registering stops 7 are mounted in bearing members 8 carried by the table 4, on a swinging shaft 9 upon which on the one side of the table a control lever 10 provided at its end with a roller 11 is arranged. The control lever 10 is moved as hereinafter described. The front end of the feed table 4 is located at such a distance from the impression cylinder 12 that suction grippers 23 arranged below the table and serving to deliver the printed sheet from the impression cylinder to the delivery device are able to pass between the said table 4 and impression cylinder 12.

Below the feed table 4 a shaft 30 is mounted on which at the two sides of the table guide rods 32 are fixed by means of hubs 31. On the latter a slide member constituted by guide shoes 33 and a tube 34 extending transversely over the feed table is guided, which is reciprocated by means of rods 36 engaging bolts 35 on both sides. The rods 36 are each connected at the one end with a one-armed swinging lever 167 which is controlled by a cam disc 168. Each cam disc 168 is mounted on a shaft 169 which rotates at the same speed as the shaft 156. On the tube 34 which is connected to a suction pipe, suction nozzles 37 are arranged which serve for transferring

the sheets from the table 4 to the impression cylinder 12. In order that the said suction nozzles 37 may be enabled more easily to grip the sheet resting on the table and thereupon to transfer it to the cylinder grippers 43, the said suction nozzles are arranged so as to effect a small swinging movement around the shaft 30 in addition to their reciprocating movement. For this purpose a lever 38 carrying a roller 39 is fixed on the shaft 30, the said roller being caused by spring action to bear on the curved surface of the side 39' of a slide member 41 movable in a guide 40. The slide member 41 is reciprocated by means of a lever 170 controlled by the cam disc 168 and serves at the same time for the control of the above-mentioned registering stops 7 through the medium of the lever 10, the roller 11 of which bears on another curved surface 11' of the slide member 41.

On the impression cylinder 12 a locking member having a conical recess 46 is fixed laterally at any desired point of the periphery, in which recess a locking tooth 47 is adapted to engage accurately when the impression cylinder is located in the correct position for the feeding of the sheet. The locking device thus provided ensures in conjunction with the above-mentioned fork 56 the exact positioning of the impression cylinder during the feeding of the sheet. The conical recess and the locking tooth may be arranged so as to co-operate in any desired manner in a radial direction with regard to the impression cylinder or in an axial direction. The mounting and controlling of the locking tooth 47 will be suitably arranged accordingly. In the case of a radially operating arrangement the locking tooth is mounted on a swinging lever or on a rod 48 which is guided radially to the impression cylinder and is pressed by a spring 49 in such a manner that, in spite of any wear which may arise, a snug seating of the locking tooth and consequently immovability of the impression cylinder when in the locked position is ensured. It will be obvious that the reverse arrangement can likewise be employed, i. e. that the rod 48 may be provided with a conical recess or a fork and the locking tooth 47 may then be arranged on the periphery of the impression cylinder. In this case, for example, the pin 160 might serve at the same time as the locking tooth.

The locking device is controlled from the shaft 156. The said shaft carries a cam 51 against which the one end of a double-armed lever 53 fulcrumed at the point 52 bears, the other end of the said lever being connected by means of an intermediate member 54 with the rod 48. The eccentric is arranged in such manner that immediately before the commencement of the rotation of the cylinder the locking tooth 47 is brought out of engage-

ment against the action of the spring 49 and is brought into engagement again after one complete revolution of the cylinder.

In order to ensure accurate registration of the sheet it is important that when the new sheet is delivered by the delivery device to the closing impression cylinder grippers the locking device 46, 47 is already in operation, i. e. the impression cylinder is always located at this moment in exactly the right position.

On the under side of the feed table 4 two guide bearings 13 are likewise fixed which are each provided with a slot 14 and a guide groove 15 and with a projection 13' having eyelets (not shown on the drawing) in which a transverse shaft 16 is journaled. To the shaft 16 swinging movements are imparted from the drive of the machine through the medium of a lever 17 mounted on the said shaft 16. As a result of these swinging movements two rollers 21 mounted in the guide grooves 15 of the bearings 13 are reciprocated by means of two levers 18 fixed on the shaft 16 and links 19. The said rollers 21 are carried by a shaft 20 passing through the slots 14 of the bearings 13. On the shaft 20 suction grippers 22 adjustable in hub members are mounted, the suction parts of the grippers being provided as required with rubber mouth pieces and being connected at their ends by means of a pipe connection 24 to a suction pipe (not shown on the drawing) provided with air supply control means. On the shaft 20 a lever 25 provided with a roller 26 is mounted, the said roller running on a guide provided on a guide bar 27 and constructed in predetermined manner. The guide bar 27 is screwed laterally on to one of the two bearings 13 and the roller 26 is pressed against it by spring action. The path of motion of the roller 26 is arranged in such manner that the suction grippers 22 serving for the delivery of the sheets are, whilst the shaft 20 is reciprocated rectilinearly, controlled in such manner that they first approach the surface of the cylinder at the time for the discharge of the sheet, grip the sheet by suction and bring it by a somewhat curved path up to the conveyor 28, which takes over the sheet by means of forwarding rollers 29 and then conveys it onwards at any desired speed to the delivery pile 76. By providing a somewhat curved path for the discharge suction grippers 22 the possibility is avoided that the grippers might, on their return movement, come into contact with the printed surface of the sheets forwarded by the bands 28. On the side of the sheet delivery table 74 located adjacent to the impression cylinder 12 air blast nozzles 44 are mounted which are arranged on a transverse pipe 45 connected with a compressed air supply. From these nozzles 44 air is blown beneath the printed sheet as soon as the cylin-

der grippers 43 have released it and the suction grippers 23 have gripped it. As a consequence of this the separation of the sheet from the surface of the cylinder is facilitated.

5 The air blast nozzles must be arranged in view of the course of the sheet feed path at a certain distance from the place where the sheet is detached from the impression cylinder. In consequence of this in the case of
10 paper which adheres particularly tightly to the cylinder and when the sheet is of large size and the detaching speed is high, the possibility may arise that the air blast current alone does not ensure sufficient detachment of
15 the sheet from the impression cylinder. For this reason further sheet separating means are provided which engage the parts of the printed sheet located on the surface of the cylinder and either lift the sheet from the
20 surface of the cylinder or push the sheet adjacent to the periphery of the cylinder towards the delivery suction grippers 23. This is effected while the cylinder is still rotating at the moment when during the delivering operation a relative velocity exists between the
25 movement of the sheet and the peripheral velocity of the surface of the cylinder. The said sheet separating device can be constructed in various manners. In the constructional
30 example, rotating rollers are employed, which must, of course, be so arranged that they engage the sheet which rests upon the cylinder, at places which have not been printed upon.

35 The said rollers 101 are mounted on a transverse shaft 102 in such manner as to be laterally slidable thereon, but non-rotatable relatively to the shaft, i. e. only capable of turning together with the latter. The said
40 shaft runs in journals provided on swinging levers 104 arranged on the two sides of the machine frame and loosely mounted on a swinging shaft 103, and is driven by means of a chain wheel 105 in such manner that the
45 peripheral velocity of the rollers 101 is somewhat greater than the peripheral velocity of the cylinder 12. Normally the rollers 101 do not bear on the impression cylinder 12 but only come into contact with it or with the
50 sheet carried by it when the grippers 23 have gripped the sheet. The actuation of the rollers 101 for this purpose is effected by means of a lever 106 provided with a roller and fixed on the swinging shaft 103, the said lever 106
55 co-operating under the action of a spring 107 with a cam disc 109 mounted on a shaft 108 making one revolution during the working operation. In order to be able to regulate the time at which the rollers 101 are to contact with the periphery of the cylinder or the
60 printed sheet respectively, the lever 106 is provided with an adjusting device of a kind known per se, by means of which a roller 112 mounted in a guide slot 111 can be displaced
65 so that the length of the lever 106 can be

varied. In order to be able to regulate the pressure of the rollers 101 on the printed sheet the swinging levers 104 are resiliently connected with the control lever 106 by means of adjusting screws 113 which are mounted on
70 projections provided on each of the swinging levers 104 and which bear under the action of tension springs 114 against arms 115 fixed on the swinging shaft 103. The continuous
75 drive of the rollers 101 operating as sheet separating means after the manner of wiping wheels or pushers is effected by means of a chain transmission 116-120 operating the chain wheel 105.

The drive of the conveyer bands forwarding the printed sheets from the impression cylinder 12 towards the delivery pile 76 is effected from the carriage 58. For this purpose a rack 51 is provided in addition to the
80 racks 58' on the underside of the carriage 58, in which rack 51 a pinion 62 mounted on a fixed pin 60 provided on the machine frame 2 engages. With the pinion 62 a chain wheel 63 is connected by means of a coupling (not
85 shown on the drawings) which only comes into operation when the pinion 62 is turning in one direction. From the chain wheel 63 the rotary movement is transmitted by means of a chain 64 to a transmission gear 65, 66, which is arranged outside of the range of motion
90 of the carriage on a pin 67. From the toothed wheel 66 a chain 68 transmits motion to a chain wheel 69 which is rigidly connected to a pinion 70. The pinion 70 drives by means of an intermediate pinion 71 the driving pinion 100
102 of the conveyer roller 73 over which the conveyer bands 28 of the delivery table 74 pass.

During the movement of the carriage 58 in the one direction, namely to the left with
105 reference to Fig. 1, the conveyer bands 28 are set in motion by the pinions and the chain transmission, whilst during the movement of the carriage towards the right they remain stationary as a result of the fact that
110 the coupling of the pinion 62 with the chain wheel 63 is only operative in one direction. In correspondence with the movement of the carriage 58 the movement of the conveyer bands 28 commences at a low speed
115 which gradually increases and then decreases again to zero. By suitable choice of the transmission gears the speed of the conveyer bands is made such that during one working period the sheet which is to be delivered is
120 brought over its whole surface up to the delivery pile 76, or alternatively, for instance, that the sheet at the moment when the conveyer becomes stationary only rests with half its surface on the delivery pile and is only
125 conveyed onwards completely up to the delivery stops 77 during the next working operation and is brought into exact position on the pile after the descent of a sheet pushing device of suitable known type (not shown) 130

on the drawing). The last-named method of operation has the advantage that the sheet arrives at the delivery pile with a small velocity and consequently cannot fall back from the stops, but is exactly registered by the latter. The pile table 89 together with the pile 76 is arranged so as to be capable of swinging about an axle arranged on one side of the machine. For this purpose a vertical rod 82 is provided which is slidably mounted on one side wall 79 of the machine frame 2 in journals 80, 81 which are at a vertical distance apart from one another equivalent to the travel of the pile, the said vertical rod 82 being provided at its lower part with a rack 83 and also with a groove 84 with which a sliding key 85 fixed in the journal 81 engages (Fig. 3). With the rack 83 a pinion 86 co-operates by the rotation of which the pile support and consequently also the pile is raised or lowered in known manner, the said pinion 86 being operated either by a ratchet wheel 87 provided on a pile control device (not shown in the drawing) or by a hand wheel 88.

The support for the pile is constituted by a bracket 90 which is arranged below the pile table 89 and which is loosely mounted so as to be rotatable on the pile supporting rod 82 by means of hubs 91, 92 provided on the arms of the said bracket. Between the hubs 91, 92 a clamping arm 94 is fixed by pinning in such manner that a bore provided in an eyelet constituted by the free end of the said arm 94 exactly comes into register with bores provided in the arms of the bracket, when the pile and the pile delivery table 89 are in the right position on the front stops of the machine frame. A conical pin 95 is provided which is passed through the registering bores whereby the pile is kept rigidly connected with the rod 82 during the working operation.

If desired, pile supports may be arranged on both sides of the machine frame 79 (Fig. 5) so that the pile may be (particularly if it is a heavy one) doubly supported during the working operation. In this case the bracket bearings for the two supporting rods are preferably constructed in such manner that either one or the other of them, as desired, may be opened out or released from the rod and the pile can then be swung out of the machine frame about the other rod as axle. The bearings which are capable of being released may, for instance, consist of pivotally connected bearing members 96, 97, the one member 96 of which forms the end of the arm of the bracket 90. The other bearing member 97 can then be swung around the pivot pin 98 into the open or closed position. The bearing is maintained in the closed position by means of a conical pin 99 or similar locking member which passes through holes provided on the bearing mem-

bers and adapted to register when the bearing is in the closed position. In order that when heavy piles are being handled the bearings 96, 97 on the supporting rods should not be too greatly stressed, it is preferable to arrange at the middle of the pile table an auxiliary support 100 or the like extending from the bracket 90 downwards to a fixed support and provided with a roller or sliding foot, whereby the principal load of the pile is taken up by the said auxiliary supporting member so that on the one hand the load on the bearings of the rods is diminished, and on the other hand the locking device can be opened or closed without difficulty.

I claim:

1. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer receiving sheets from said impression cylinder; and means for delivering sheets from said impression cylinder to said conveyer reciprocating between said cylinder and conveyer and moving in a path intersecting the path of motion of said feeding means.

2. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; grippers for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said grippers; a delivery conveyer receiving sheets from said impression cylinder; and grippers for delivering sheets from said impression cylinder to said conveyer and reciprocating between said cylinder and conveyer in a path intersecting the path of motion of said first-named grippers.

3. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; pneumatically operated grippers for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said grippers; a delivery conveyer receiving sheets from said impression cylinder; and pneumatically operated grippers for delivering sheets from said impression cylinder to said conveyer and reciprocating between said cylinder and conveyer in a path intersecting the path of motion of said first-named grippers.

4. In a stop-cylinder printing machine having front sheet delivery, the combination of a feed table which is stationary during the working operations of the machine; grippers for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said grippers; a delivery conveyer receiving sheets from said impression cylinder; and

grippers for delivering sheets from said impression cylinder to said conveyer and reciprocating between said cylinder and conveyer; said first-named grippers moving in the plane of the sheet in a path passing through the path of delivery of the printed sheet.

5 5. In a stop-cylinder printing machine having front sheet delivery, the combination
10 of a feed table which is stationary during the working operations of the machine; a rod-like suction gripper for feeding sheets from said feed table reciprocating substantially rectilineally; an impression cylinder
15 to which sheets are fed by said suction gripper; a delivery conveyer receiving sheets from said impression cylinder; and grippers for delivering sheets from said impression cylinder to said conveyer and reciprocating
20 between said cylinder and conveyer, said suction gripper moving in the plane of the sheet in a path passing through the path of delivery of the printed sheet.

25 6. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating
30 substantially rectilineally; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is
35 still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; and driving
40 and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together
45 with said last-named table in the upward direction so as to expose said impression cylinder in its entirety.

50 7. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating
55 substantially rectilineally; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is still turning to said conveyer band reciprocating
60 between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means
65 operated by a common drive and arranged

together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder
70 in its entirety; and air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being
75 swung back.

8. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating
80 substantially rectilineally; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from
85 said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery
90 table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means
95 on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating
100 the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being swung back; and sheet separating means operating
105 periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating
110 means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder surface necessary for separation is caused.
115

9. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating
120 substantially rectilineally; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from
125 said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery
130 table to which sheets are conveyed by said

conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being swung back; sheet separating means operating periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder surface necessary for separation is caused; and a periodically driven member operating said delivery conveyer intermittently at gradually increasing speed.

10. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being swung back; sheet separating means operating periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder sur-

face necessary for separation is caused; and a periodically driven member operating said delivery conveyer intermittently at gradually increasing speed, the average speed of said delivery conveyer being so calculated, that the sheet to be delivered is conveyed intermittently from the impression cylinder to the delivery pile.

11. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being swung back; sheet separating means operating periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder surface necessary for separation is caused; a periodically driven member operating said delivery conveyer intermittently at gradually increasing speed, the average speed of said delivery conveyer being so calculated, that the sheet to be delivered is conveyed intermittently from the impression cylinder to the delivery pile; grippers on said impression cylinder holding the sheet in position thereon; and a locking device operating independently of the action of wear and holding said impression cylinder immovably in its position of rest when the sheet is fed up and particularly whilst the grippers on said impression cylinder are closing.

12. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating sub-

stantially rectilinearly; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation connected with one of said tables so as to be capable of being swung back; sheet separating means operating periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder surface necessary for separation is caused; a periodically driven member operating said delivery conveyer intermittently at gradually increasing speed, the average speed of said delivery conveyer being so calculated, that the sheet to be delivered is conveyed intermittently from the impression cylinder to the delivery pile; grippers on said impression cylinder holding the sheet in position thereon; a locking device operating independently of the action of wear and holding said impression cylinder immovably in its position of rest when the sheet is fed up and particularly whilst the grippers on said impression cylinder are closing; two axles arranged on the frame of the machine, one on each side of said delivery table; and bearings for said axles on said delivery table capable of being released from said axles, so that when the bearing on the one side is released, said delivery table can be swung around the axle of the other bearing towards the other side out of the machine frame.

13. In a stop-cylinder printing machine having front sheet delivery, the combination of a stationary feed table; means for feeding sheets from said feed table reciprocating substantially rectilinearly; an impression cylinder to which sheets are fed by said feeding means; a delivery conveyer band receiving sheets from said impression cylinder; means for delivering printed sheets from said impression cylinder whilst it is still turning to said conveyer band reciprocating between said cylinder and conveyer band and moving in a path intersecting the path of motion of said feeding means; a delivery table to which sheets are conveyed by said conveyer band; driving and controlling means for said feeding and delivery means operated by a common drive and arranged together with said feeding and delivery means on one of said tables in such manner that they can be swung back together with said last-named table in the upward direction so as to expose said impression cylinder in its entirety; air blast nozzles for separating the printed sheet from the surface of said impression cylinder at the beginning of the delivery operation, connected with one of said tables so as to be capable of being swung back; sheet separating means operating periodically on the part of the printed sheet located on said impression cylinder in such manner that when the relative movement of the sheet with regard to the surface of the impression cylinder begins, the said separating means impart to the sheet by virtue of their own higher relative velocity a push in the delivery direction, whereby the displacement of the sheet on the cylinder surface necessary for separation is caused; a periodically driven member operating said delivery conveyer intermittently at gradually increasing speed, the average speed of said delivery conveyer being so calculated, that the sheet to be delivered is conveyed intermittently from the impression cylinder to the delivery pile; grippers on said impression cylinder holding the sheet in position thereon; a locking device operating independently of the action of wear and holding said impression cylinder immovably in its position of rest when the sheet is fed up and particularly whilst the grippers on said impression cylinder are closing; brackets supporting said delivery table; bearings on said brackets capable of being opened and of being locked in position; and two axles arranged on the frame of the machine one on each side of said delivery table and journalled in said bearings, whereby when the bearing on the one side is opened said delivery table can be swung around the axle of the other bearing towards the other side out of the machine frame.

Signed at Leipzig, Germany this seventeenth day of November 1931.

GEORG SPIESS.