R. C. ANNAND.

FLAT BED PRINTING MACHINE.

APPLICATION FILED OCT. 27, 1919.

1,437,461.

Patented Dec. 5, 1922.

7 SHEETS—SHEET 1.

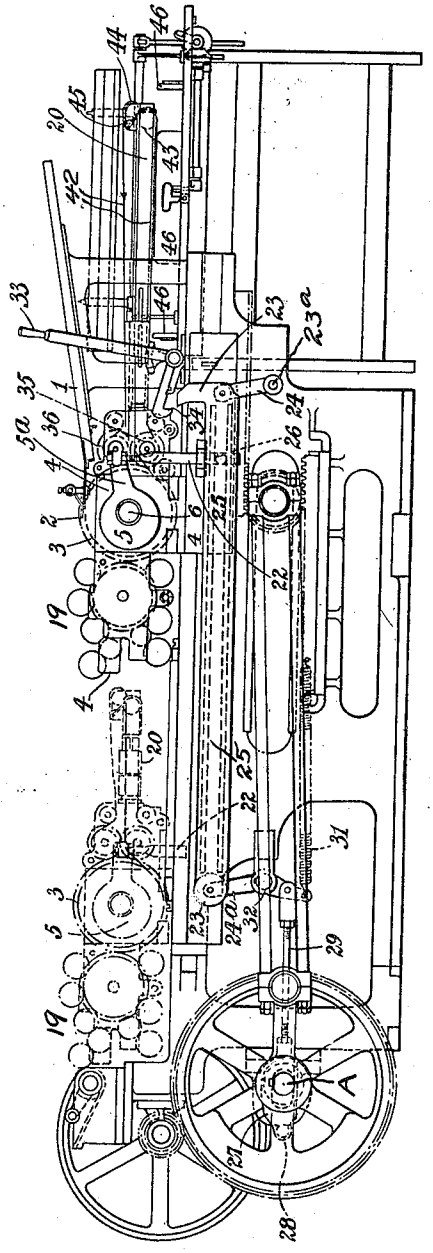


Fig. 1.

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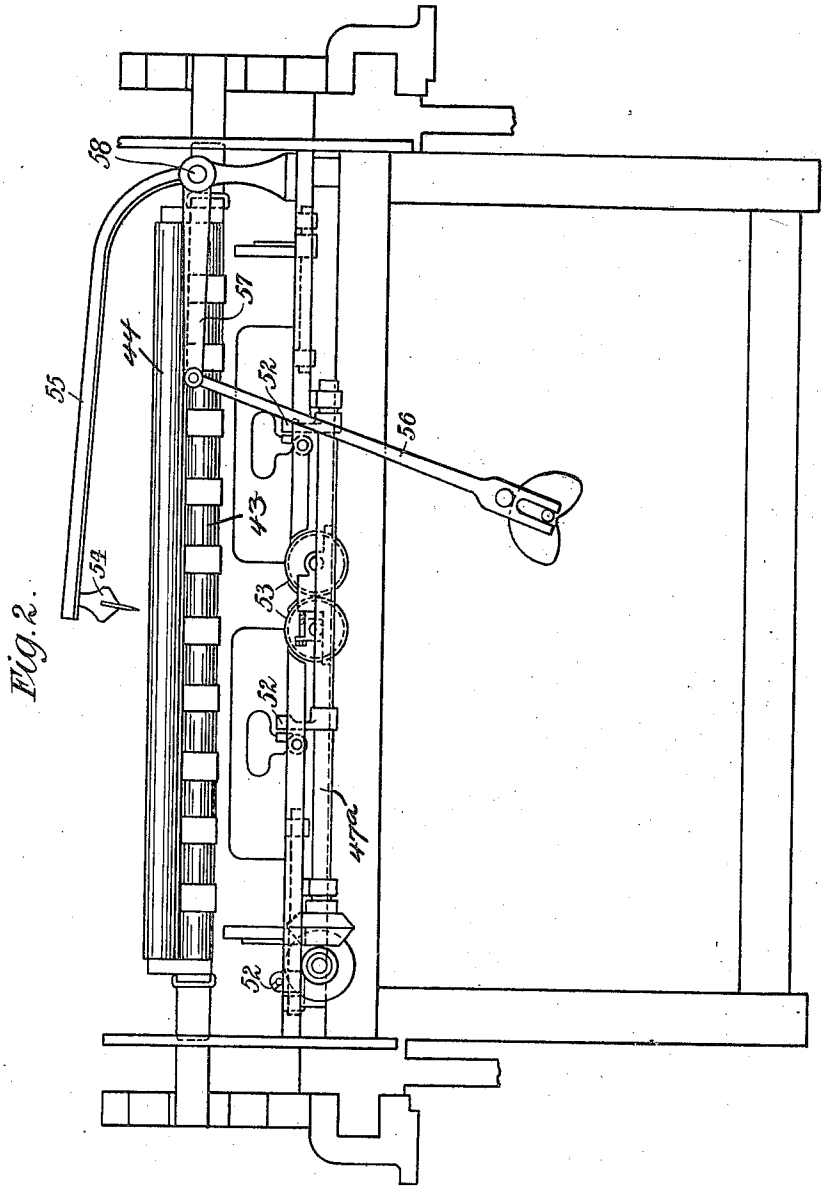


Fig. 2.

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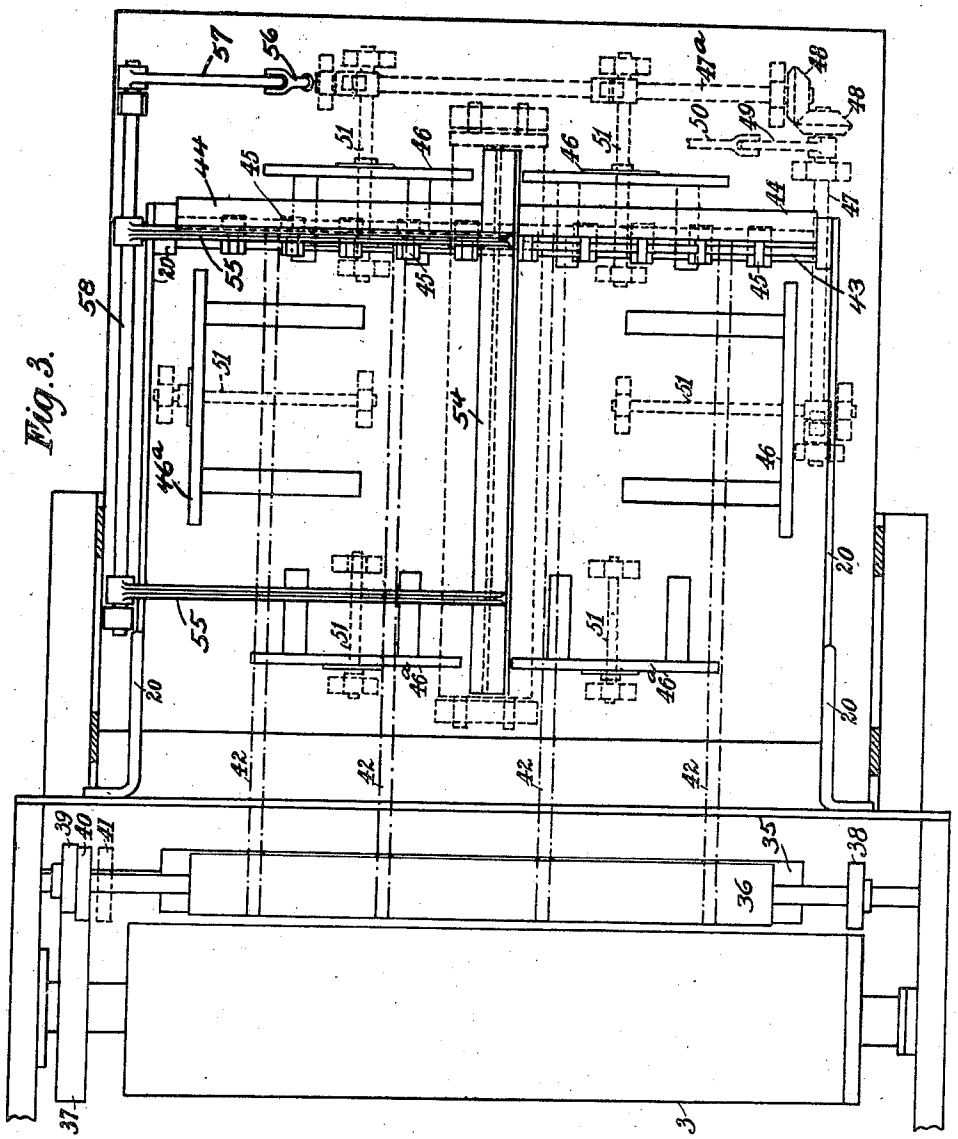
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7 SHEETS—SHEET 3.

Fig. 3.



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7 SHEETS—SHEET 4.

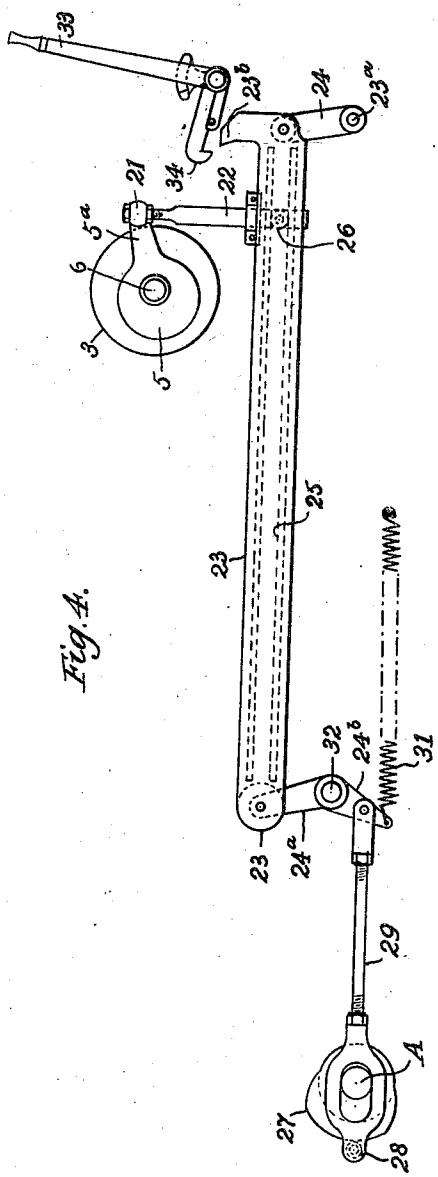


Fig. 4.

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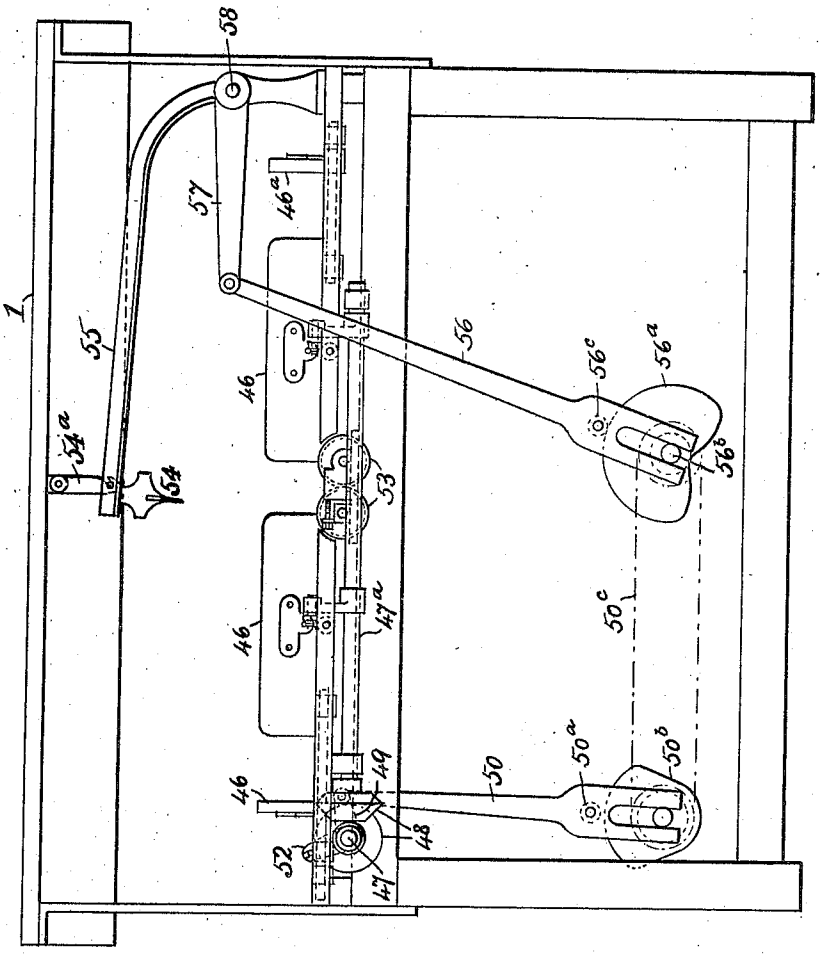
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7 SHEETS—SHEET 5.

Fig. 5.



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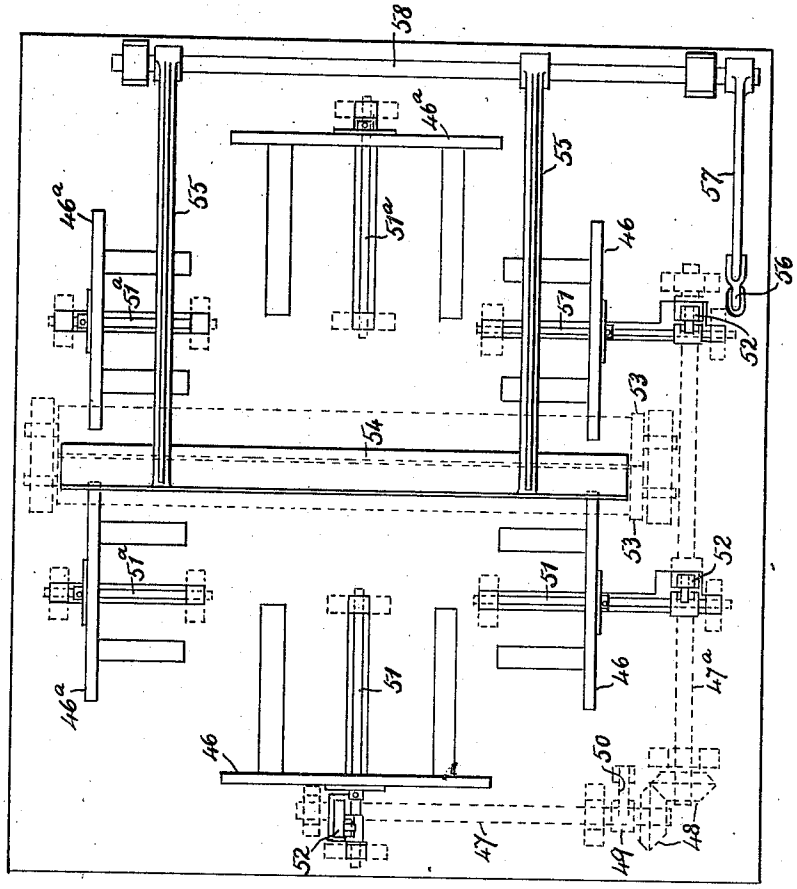
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7 SHEETS—SHEET 6.

Fig. 6.



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7 SHEETS—SHEET 7.

Fig. 7.

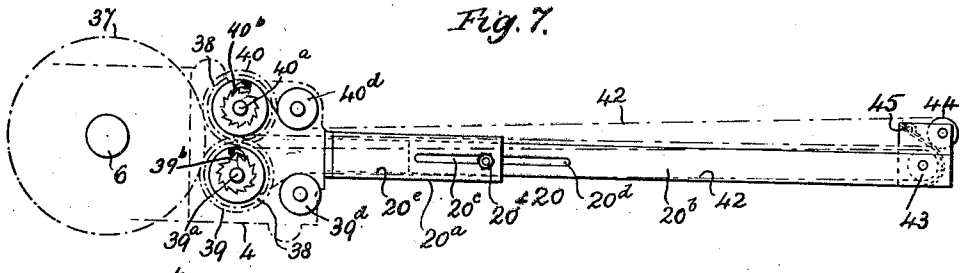
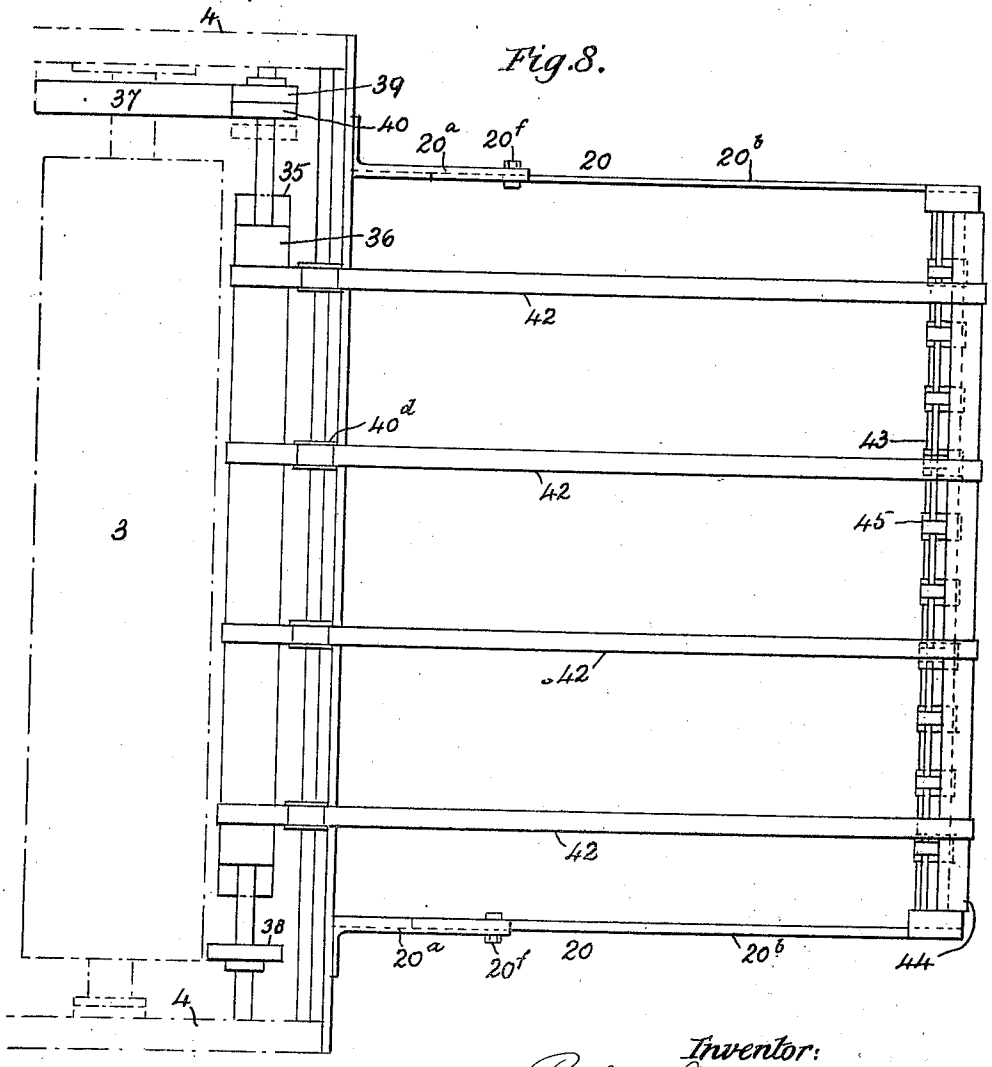


Fig. 8.



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Patented Dec. 5, 1922. 1,437,461

UNITED STATES PATENT OFFICE.

ROBERT CUMMING ANNAND, OF LONDON, ENGLAND.

FLAT-BED PRINTING MACHINE.

Application filed October 27, 1919. Serial No. 333,556.

To all whom it may concern:

Be it known that ROBERT CUMMING ANNAND, a subject of the King of Great Britain, residing at 20 Whitefriars Street, in the city of London, England, has invented certain new and useful Improvements in and Relating to Flat-Bed Printing Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to flat bed printing machines of the reciprocating cylinder type and refers more particularly to machines of the character described in the specification of my United States Patent No. 1,262,616.

The present invention has for its object certain improvements in machines of the type referred to and consists primarily in the provision of a reciprocating delivery device to which the printed sheet is delivered from the printing cylinder and by which device it is deposited upon the delivery board associated therewith and which latter is also made to form the table of a folding machine with rollers fitted into it for giving the sheet the first of several folds provision being made whereby if so desired the sheet can be deposited on the table either side uppermost.

In order that the invention may be the better understood drawings are appended illustrating the application of the present improvements to the machine forming the subject of the aforementioned previous Letters Patent, in which however only such parts are shown and described as are considered necessary for the proper understanding of the said invention.

In the accompanying drawings—

Fig. 1 is an elevation showing a general arrangement of the machine.

Fig. 2 is an end view in elevation of machine showing the delivery mechanism and means for giving a sheet its first fold.

Fig. 3 is a plan view of delivery.

Fig. 4 is a view showing the parts for putting on and taking off the impression cylinder, detached from the machine.

Fig. 5 is a view similar to Fig. 2 showing the means for operating the folding blade and the joggers.

Fig. 6 is a corresponding plan.

Fig. 7 is a detached view of the delivery mechanism and tapes showing the telescoping members and means for effecting their adjustment.

Fig. 8 is a corresponding plan.

Referring to Figure 1; 1 indicates the sheet feeding board of usual construction provided with stops 2 against which the sheets are fed. 4 indicates the travelling carriage which carries the printing cylinder 3 and the inking mechanism 19 of more or less known form and as it forms no part of the present invention no detailed description is necessary. 20 indicates the reciprocating delivery.

The carriage 4 is shown in full lines at one end of its stroke at the right hand of Fig. 1 and in dotted lines at the other end of its stroke upon the left hand. For the sake of clearness in the dotted or left hand position the reciprocating delivery mechanism 20 is shown broken so as to be clear of the inking mechanism in the full line position. 5 indicates an eccentric block which is mounted on the carriage 4 and provided with a bearing for the printing cylinder shaft 6 and an arm 5^a the purpose of which latter will be hereafter more fully described.

20 Figs. 1, 3, 7 and 8 indicates the delivery mechanism comprising telescoping members 20^a, 20^b adapted to be extended or brought more or less one within the other so that the said members can be adapted for the different sizes of sheets to be centered on the folder so that the sheet will be folded in register. To this end the members 20^a, 20^b which are carried by the printing cylinder frame or carriage 4 are slotted as at 20^c 20^d and the member 20^b is adapted to slide in a guideway 20^e formed in the member 20^a and to be retained in the desired position of adjustment by bolts 20^f. By slackening these bolts the members 20^b may be slid into position for giving the required length of delivery to suit the size of the sheets in course of production. The sheets are conveyed into the first position in the delivery mechanism by means of the tapes indicated at 42, the arrangement being such that the adjacent operative surfaces of the said tapes move in the same direction irrespective of the direction of travel of the printing cylinder carriage 4. Thus by means of a gear wheel 37 carried by the printing cylinder which meshes with gear wheels 39 and 40 freely mounted on the re-

spective shafts 39[a] and 40[a] and ratchets and pawls 39[b] and 40[b] the rollers 35, 36 are operated rotatively so as to effect the required directionary movement of the tapes. It will be seen that the wheels 39 and 40 run freely on their respective shafts and that by means of the pawls carried thereby which engage the ratchet wheels fast on the respective shafts and the gear wheels 38 operatively connecting rollers 35 and 36 the latter are caused to rotate according to the direction of travel of the cylinder, the one roller free wheeling, so to speak while the other is being driven. The tapes 42 are supported by guide rollers 43 and 44 carried on shafts situated at one end of the delivery frame. 42 indicates tapes whereby the sheets are conveyed into the first position in the delivery mechanism. Connected to the aforesaid arm 5[a] by means of a pivotal connection 21 at the upper end is a bar 22 hereinafter referred to as the "impression bar." Disposed on each side of the machine are two members 23 carried by arms 24, 24[a] pivoted respectively upon a stud 23[a] and axle 32 in the side frames of the machine. The members 23 are grooved or formed with guide-ways 25, rollers 26 carried by the bar 22 engaging and running with said guideways or grooves. The purpose of the arrangement just described is to raise and lower the arm 5[a] and thereby rotate within limits the eccentric bush 5 and thus raise or lower the printing cylinder 3 so as to cause the same to work in contact with the type or to remain out of contact with the type as long as the operator wishes. In the previous patent before referred to a means is shown of raising and lowering the cylinder at each end of its stroke trusting to frictional means to keep the cylinder up or down as required, during its travel forward and back. This means I have found insufficient and I am now shewing a way whereby the impression regulating devices are kept in either position after the change has been made at the ends of the stroke.

The members 23 are raised and lowered by a cam 27 mounted on the main axle A and contacting with cam roller 28 on a rod 29 connected to the arm 24[b], a powerful spring 31 serving to keep the roller 28 always in contact with the said cam 27. While the carriage travels backwards and forwards the rollers 26 run in the cam tracks or guideways 25 of the members 23. In Fig. 1 these members are indicated in the top position whereby the impression is kept off the type, it being assumed that the carriage has just completed the return journey. It is now necessary to put the impression on the type and for this purpose the cylinder must be lowered. Therefore, previous to the cylinder starting on its printing stroke to the left the cam 27 is operated so as to allow the spring 31 to oscillate the shaft 32 to a sufficient extent to move the arms 24 and 24[a] downwards and with them the members 23 and consequently the rollers 26. Thus the members 23 and rod 22 are lowered and simultaneously a turning movement is imparted to the bush 5 with the effect that the printing cylinder is also lowered and brought into contact with the type. When it is desired to keep the impression off and prevent the machine printing, should the feeder be unable to feed a sheet in time, a handle 33 is provided which if moved to the left will enable the catch 34 operated by said handle to drop down and by engaging the nose or projection 23[b] to hold back the members 23 and so prevent them being moved to the left and lowered, and also preventing the spring and the weight of the cylinder from bringing the cylinder and type into printing contact. When the attendant wants to resume printing he moves handle 33 to the right but he will not be able to lift the catch 34 until the cam 27 comes into action and takes off the pressure of the cam and spring and thereby enables the hooked catch to be lifted.

An important feature of my invention is the combination in a reciprocating cylinder machine of a reciprocating delivery which receives the sheets direct from the printing cylinder and deposits them in a pile at one end of the machine, the pile table at the same time forming the top of the folding mechanism which can be used or not as is desired.

The sheet when printed is run or passed between the two sets of tapes 42 forming part of the reciprocating delivery, these tapes being driven by the two rollers 35, 36 which are geared together at one side of the machine by the wheels 38. At the opposite side of the machine these rollers are driven by a gear wheel 37 on end of printing cylinder 3, the cylinder wheel driving the two wheels 39 and 40 on the axles of the rollers 35 and 36. The arrangement of this mechanism is such that these two rollers always rotate in one direction irrespective of the direction of rotation of the gear wheel 37 with which both the gear wheels 39, 40 are in mesh, although they are not in mesh with each other. Thus they are free on their axles while running in one direction and only engage with their axles through pawl and ratchet mechanism of any well known free wheel type while running in the other direction, it being understood that one pawl and ratchet device is operative at a time, the other "free wheeling" meanwhile.

In Figs. 1, 3, 7 and 8 the tapes between which the sheet is carried are indicated at 42 which tapes are carried by rollers 43 and 44 disposed at the right hand end of the deliv-

ery; 45 45 indicate the switches which pass between the rollers 43 and 44 and serve to direct the sheet downwards and towards the left on the pile while the carriage completes its travel over the pile to the right.

The action of the delivery is as follows.— When printing a sheet the full capacity of the machine and when the reciprocating members have travelled the full extent of the printing stroke to the left the leading edge of the newly printed sheet will be about half way along the length of the reciprocating delivery. When the carriage starts on its right hand stroke the rollers 35 and 36 continue to rotate in the one direction. This is secured by the free wheel drivers being so arranged that while the one is running free on say the bottom roller the other is engaged driving the top roller and vice versa. By the time the end of the delivery reaches the delivery table the sheet has been so advanced that its leading edge is approaching the end of its travel between the tapes whereupon it is directed backwards by the switches 45 and by the time the delivery has reached its full right hand travel the sheet will have been delivered on to the pile.

The delivery board is provided with joggers that can be set to suit any size of sheet and to even the sheets up to an exact position either for folding or for open delivery.

In the foregoing the reciprocating delivery mechanism is described as working in attachment to the carriage of the travelling printing cylinder and delivering the sheet with its printed side up. This system is adapted for bookwork and the better class of work as it permits of the folder folding the freshly printed side inwards or inside. By this means the folding tapes and rollers do not come in contact with the newly deposited ink and smearing is reduced to a minimum. In the production of newspapers the outside and most important pages are usually printed at the second printing. These important pages are required to be folded outside. Before this can be done the delivery has to be changed to deliver the last printed side face downwards. By slight modification of the mechanism already described this desirable alteration can be effected. To effect this the rod on which the switches 45 are arranged is removed from the machine together with the switches. The free wheel 40 is moved along its shaft to a position out of gear with the gear wheel 37 as shown in dotted lines in Figs. 3 and 8. The pair of rollers 35 and 36 are now only driven by the one driving wheel 39 on the lower roller while the tapes 42 are only driven when the cylinder is on its printing stroke and remains stationary on the return stroke. By this arrangement the sheet is not rolled out of the delivery frame until the carriage with its whole mechanism is on its printing stroke for the next sheet. The telescopic arrangements on the reciprocating delivery frame are adjusted to shorten the delivery to the desired extent. The lengthening and shortening of the delivery frame necessitates the use of elastic tapes already known in the art. Joggers are common to modern machines and are worked from a swivelling mechanism in the centre of the delivery board. When the delivery table also forms part of the folder as it does in this case, the folding rollers have to be in the middle of the table and a special provision has to be made for operating the joggers, which is effected according to this invention in the following manner.

46, 46ª indicate the joggers. Of the size shown on the delivery board three are arranged with simply a capability of adjustment thereon, while the other three are adapted for being adjusted so as to suit the size of the sheet and are capable of operating backwards and forwards so as to jog and manoeuvre the sheets against the other joggers and ensure the symmetry of the pile being preserved.

The shafts 47, 47ª are fastened to the underside of the delivery table and operated simultaneously by bevel gearing 48. The said shafts 47, 47ª are given a partial rotation by means of the arm 49 which is operated by the reciprocating rod 50 whereof the lower end carries a roller 50ª adapted to work against the edge of a cam 50ᵇ the latter being actuated by a chain gear as indicated diagrammatically at 50ᶜ.

The rods 51 of the reciprocating joggers 46 slide backwards and forwards in bearings in the delivery board and are operated by the arms 52. The said rods 51 pass through the joggers at their undersides and as the shafts 47 47ª are moved by the cam 50ᵇ and operating rod 50 they cause the joggers to move apart to allow the sheet to settle down between them after which they close and jog the sheet into central position the rods 51ª pertaining to the joggers 46ª are similarly mounted at the under sides but are not movable after being set in the desired position as is the case with the joggers 46.

The rollers indicated at 53 beneath the delivery board are the two folding rollers that give the sheet its first fold after it has been correctly placed or positioned by the joggers. The sheet is tucked in between the said rollers by the folding blade 54 which is vibrated by the arm 55 mounted on the pivot at 58 through the arm 57 and link or rod 56. This link or rod is actuated by a cam 56ª on the main driving shaft 56ᵇ of folder said cam engaging a roller 56ᶜ carried by the rod 56. When it is not desired to fold the folder blade 54 and arm 55 are suspended by means of the hook 54ª which depends from the under side of the feeding board 1 and is adapted to engage a pin 54ᵇ on the

arm 55. When the arm and folding blade are so suspended the link or rod 56 will be held up so that the cam 56ª will be ineffective in moving the same.

After the first fold has been made any further folding may be effected by any suitable known mechanism the construction and application of which will be readily apparent to those versed in the art.

Claims:

1. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device, the combination with a reciprocating delivery mechanism adapted to receive the sheets from the printing cylinder and deliver the same either side uppermost of a delivery board adapted to receive the sheets deposited thereon by said delivery mechanism and to effect the registering of said sheets preparatory to the folding thereof and a folding blade in operative relation to said delivery board.

2. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device, the combination with a reciprocating delivery mechanism comprising an upper and a lower set of tapes adapted for unidirectional operation and a delivery board adapted to receive the sheets deposited thereon by said delivery mechanism and comprising jogging devices and rollers and a folding blade in operative relation to said delivery board.

3. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device, the combination with a reciprocating delivery mechanism adapted to receive the sheets from the printing cylinder, of a folding table, joggers on said table, rollers positioned relatively to said table and a vibrating folding blade adapted to operate in conjunction with the joggers on said table whereby the sheets received thereon are folded before they issue from the machine.

4. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device the combination of means for delivering sheets which have the outside printed matter impressed at the second printing on to the delivery table with the said outside printed face downwards and means for folding said sheets with said printed matter outwards.

5. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device, the combination with the reciprocating printing cylinder carriage of a reciprocating delivery mechanism comprising telescopic side members, an upper and a lower set of tapes, means operatively related to the printing cylinder and adapted to move said tapes in one direction, and a delivery board adapted to receive the sheets deposited thereon by said delivery mechanism and comprising jogging devices and rollers and a folding blade in operative relation to said delivery board.

6. In a flat bed printing machine of the type in which a reciprocating printing cylinder is operatively connected with a reciprocating delivery mechanism and with a sheet folding device, the combination with the reciprocating printing cylinder carriage of a reciprocating delivery mechanism comprising telescopic side members, means comprising duplicate sets of tapes, rollers for carrying said tapes, actuating means operatively related to the reciprocating printing cylinder and adapted to move said tapes in one direction, a delivery board and switches adapted to pass between the tapes carrying rollers to direct the sheet downwards and backwards and deliver the said sheet on to the pile on said delivery board.

Signed at London, England, this seventh day of October 1919 in the presence of two witnesses.

ROBERT CUMMING ANNAND.

Witnesses:

H. J. Frisby,

Harry Middleton.