F. L. CROSS.

FRONT REGISTERING MECHANISM.

APPLICATION FILED APR. 17, 1914.

1,134,822.

Patented Apr. 6, 1915.

2 SHEETS—SHEET 1.

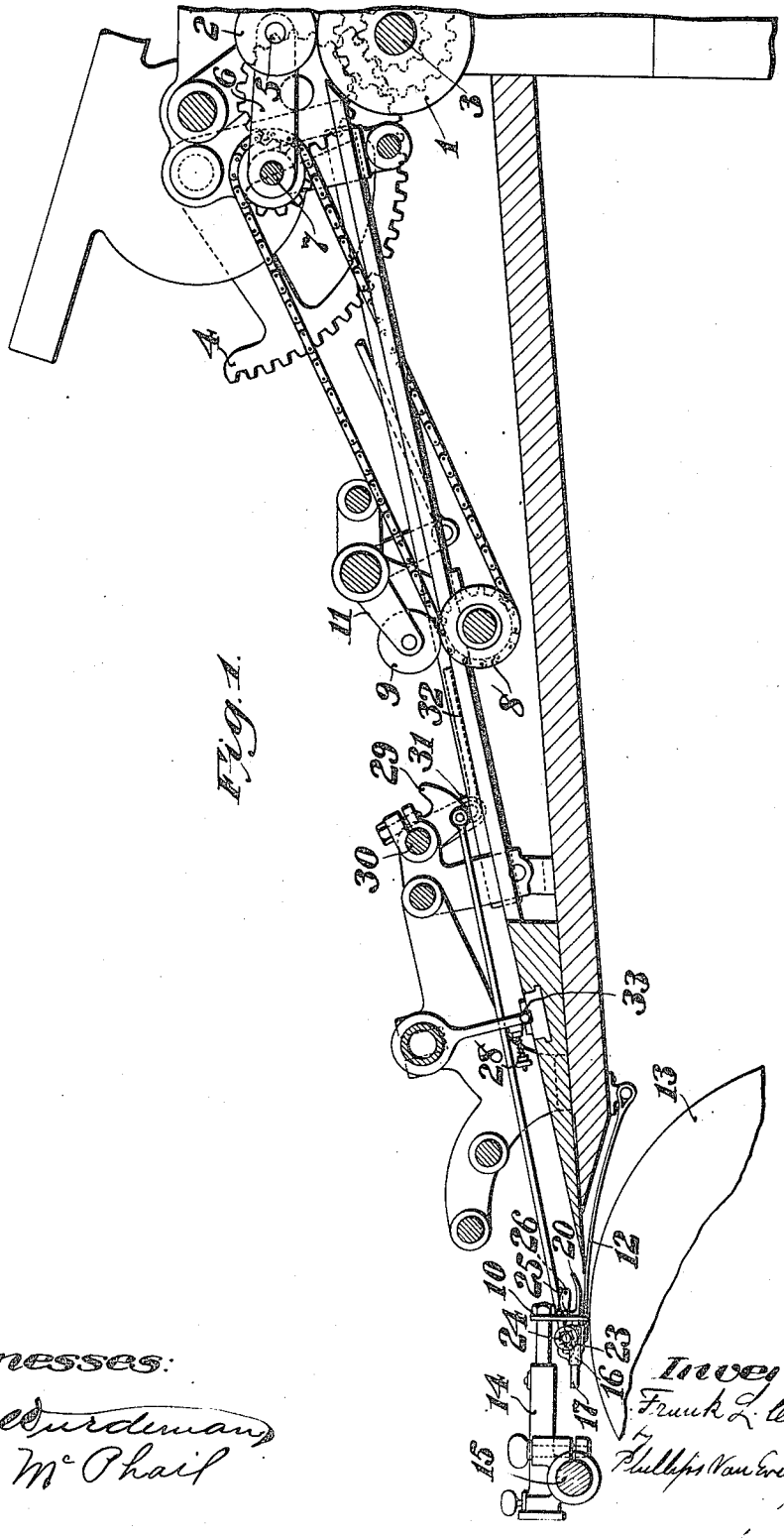


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

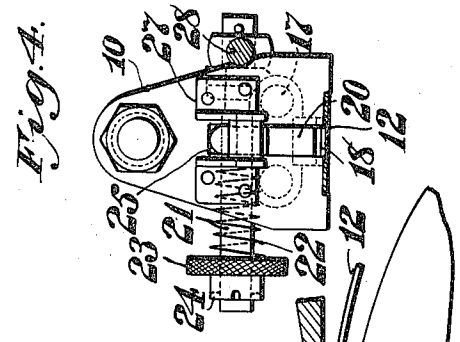


Fig. 2.

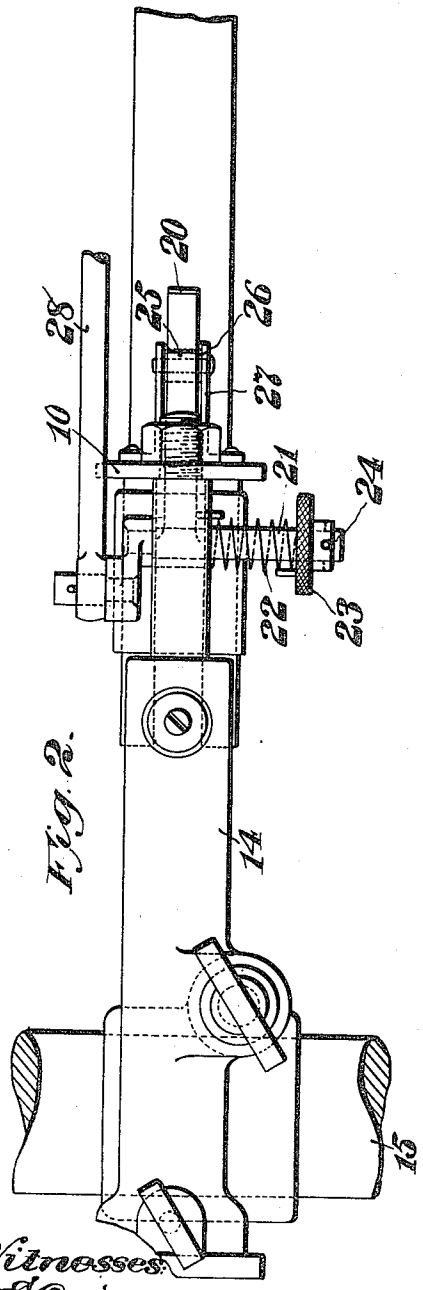
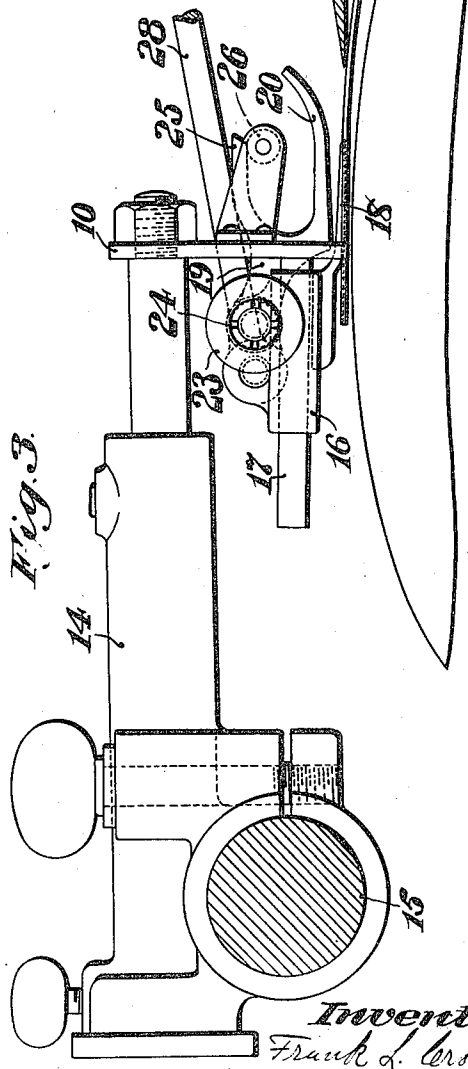


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FRONT-REGISTERING MECHANISM.

1,134,822. Specification of Letters Patent. Patented Apr. 6, 1915.

Application filed April 17, 1914. Serial No. 832,446.

To all whom it may concern:

Be it known that I, FRANK L. CROSS, a citizen of the United States, residing at Port Washington, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Front-Registering Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to paper feeding machines, and more particularly to mechanism for securing the front registry of sheets which are fed to the front guides of a printing press.

The devices which have commonly been employed for bringing the front edge of the sheet against the front guides have usually consisted of means for pushing against the rear edge of the sheet, or of slowly traveling tapes or similar means which engage the sheet back of its front edge and continually crowd it against the front guides. While these devices operate satisfactorily in doing certain classes of work, and when operating on certain kinds of sheets, they have not been found satisfactory under all conditions and in operating upon all sizes and qualities of sheets. For instance, in doing color work, and in operating upon large and comparatively thin sheets which may be highly charged with static electricity, it has been found that front registering devices of the character heretofore used will not secure the accurate and fine register requisite for satisfactory work, owing to the tendency of the paper to stick to the tapes or other supporting devices, and to its tendency to buckle or crimp when its rear edge is engaged by the pushing devices, or when its front edge is crowded against the front guides or gages.

It is accordingly the object of the present invention to overcome the objections to the prior front registry devices, and to provide devices which will operate to secure a uniformly accurate front register.

To this end the invention contemplates the provision of two gripping devices corresponding to the two front guides, and each of which engages the front edge of the sheet at or near the corresponding front guide and draws the sheet forward until its edge strikes the front guide, after which the jaws of the gripping devices slide over the sheet. After the edge of the sheet has been drawn against the front guides, the registering grippers move out of the path of the sheet so that they will not interfere with it as it is seized and carried away by the grippers of the printing press. In case the front edge of the sheet is out of alinement so that it is drawn against one of the front guides before it strikes the other, the gripping devices will not offer any material resistance to the lateral swing of the sheet necessary to bring it into register against both guides, since they engage only the front edge of the sheet close to or at the points about which the sheet swings laterally in being brought into proper register against the front guides.

The front registering grippers are preferably arranged to act through slots formed in the front guides, and the sheet forwarding devices are preferably so constructed and operated that the rapid forward movement of the sheet is arrested, and the sheet brought to rest or substantially to rest, before its front edge strikes the front guides, and before it is operated upon by the registering grippers. This insures the accurate drawing forward of the front edge of the sheet against the front guides, without danger of so crumpling or buckling the front edge of the sheet, or that portion directly back of the front edge, as to destroy the accurate register of the sheets.

The invention will be readily understood from an inspection of the accompanying drawings and the following detailed description of the mechanism illustrated therein.

In the drawings, Figure 1 is a longitudinal sectional elevation showing so much of an automatic sheet feeding machine as is necessary to illustrate the application of the present invention thereto; Fig. 2 is a plan view showing one of the front guides and the corresponding registering gripper; Fig. 3 is a side elevation of the front guide and gripper, the lower end of the feed table being shown in section; and Fig. 4 is an elevation of the registering gripper and front guide, looking toward the left in Fig. 3.

In the drawings the invention is shown as embodied in the automatic sheet feeding machine known as the "Cross paper feeder." In this machine a bank of feathered sheets is acted upon by two independently controlled combing wheels which are lowered upon the sheets at regular intervals, and

each of which is independently disengaged from the sheet by devices controlled by a trip arranged to be engaged by the front edge of the top sheet when the sheet has been advanced into position to be acted upon by the delivery rolls 1 and 2. The lower delivery rolls are secured to a shaft 3 which is actuated by an oscillating segment 4, and the upper delivery rolls are mounted upon a shaft 5 which is carried by arms 6 secured to a rock shaft 7. The rock shaft is operated to raise and lower the upper delivery rolls at proper intervals, and the operating segment 4 for the lower delivery rolls is so timed that the sheet is started from a state of rest with a gradually accelerated motion. The delivery rolls forward the sheets to forwarding rolls 8 and 9, the lower rolls of which are driven in unison with the lower delivery rolls, and forward the sheets to the front guides 10 of the printing press to which the sheets are being fed. The forwarding rolls are so driven through their connection with the lower delivery rolls that they act to gradually slow down the sheet and bring it to rest with its front edge a short distance back of the front guides. The upper forwarding rolls 9 are carried in arms 11 which are operated at proper intervals to raise and lower the rolls.

The front guides 10 are similar to the usual drop guides commonly used on printing presses, and coöperate with the usual tongues or strips 12 which project from the front edge of the feed board over the cylinder 13 of the printing press. The front guides are secured to arms 14 carried by a rock shaft 15 which is operated in the usual manner to raise and lower the drop guides. There are two front guides, as usual (one only of which is shown), and a front registering gripper coöperates with each guide in securing the accurate register of the front edge of the sheet against the guides. In the construction shown each front guide 10 is provided with a central vertical slot for the passage of the corresponding registering gripper, and the coöperating tongue 12 is recessed or slotted to receive the lower jaw of the gripper. The gripper is mounted to move with the drop guide so that it will be moved up out of the path of the sheet when the drop guide is raised, and will be moved down into position to act upon the succeeding sheet when the drop guide is lowered. As shown, the jaws of the gripper are formed or mounted on a carrier block 16 arranged to slide on two guide rods 17 which project from the front side of the front guide. The under jaw 18 of the gripper comprises a thin plate adapted to pass under the front edge of the sheet, and so constructed and arranged that its end will lie within the recess in the tongue 12 when the gripper is in position to receive the sheet. The upper jaw of the gripper consists of a lever 19, one arm 20 of which overlies the lower jaw 18, and is provided with an upwardly curved end under which the front edge of the sheet passes as it is forwarded into position back of the front guides. The lever 19 is pivoted on a stud 21 secured in the carrier block 16, and is forced in a direction to press the jaw 20 against the jaw 18 by a torsional spring 22 surrounding the stud, and having one end secured to the lever and the other to a disk 23 mounted on the stud. The disk 23 is held in position on the stud by a pin 24 adapted to engage slots formed in the hub of the disk, and the disk may be adjusted to vary the tension of the spring and the pressure of the gripping jaws on the sheet. The lever 19 on which the upper jaw 20 of the gripper is formed is provided with a second arm 25 arranged to ride over a roll 26 carried by supporting brackets 27 which are secured to the rear face of the drop guide. The gripper carrying blocks are advanced and retracted at proper intervals through links 28 connecting the gripper carriers with arms 29 secured to a rock shaft 30. An arm 31 is secured to the end of the rock shaft, and is operated through a link 32 from a cam carried by the cam shaft of the machine.

As the gripping jaws 18 and 20 are advanced into position to receive the front edge of the sheet, the upper jaw is raised by the engagement of the arm 25 with the roll 26 so that the front edge of the sheet may pass between the gripper jaws as the sheet is brought into position back of the front guides by the sheet forwarding rolls 8 and 9. As the sheet is released by the sheet forwarding rolls, the grippers are moved forward through the front guides, and during the first part of their movement the arms 25 ride off of the rolls 26, so that the jaws 20 are forced down into engagement with the front edge of the sheet. During the continued movement of the grippers, each gripper draws the front edge of the sheet forward until further advancement of the edge at the point of engagement by the gripper is arrested by its engagement with the corresponding front guide. The gripper then continues its forward movement, and the gripper jaws slide over the sheet, keeping its front edge smooth, and retaining it snugly against the front guide without danger of crinkling or buckling the edge of the sheet. If the edge of the sheet strikes one front guide before it does the other, the gripper engaging that part of the edge which has not been brought against the corresponding front guide continues to draw the sheet forward at that point until the front edge is arrested by the front guide. During this movement of the sheet the sheet will swing laterally about the other front guide as a fulcrum, and the gripper which

is holding the edge of the sheet against the fulcrum guide will offer no material resistance to the swinging of the sheet, since it engages the sheet at its front edge only, and at or substantially at the point about which the sheet is swinging. The forward movement of the grippers continues until the lower jaw 18 is carried beyond the front edge of the sheet, and this occurs before the front guides are raised, so that when the guides are raised to allow the withdrawal of the sheet, the registering grippers are carried up with the guides out of the path of the sheet. After the sheet has been drawn against the front guides, and before the guides and grippers are raised, the sheet is acted upon by side registering devices indicated at 33, which may be of any suitable or well-known construction.

While it is preferred to employ the construction and arrangement of grippers shown and described, and to mount the grippers so that they will pass through slots formed in the front guides, and will be moved out of and into the path of the sheets by the movement of the front guides, it will be understood that such construction and arrangement is not essential to the broader features of the invention, and may be varied or modified without departing therefrom.

Having explained the nature and object of the invention, and specifically described one form of mechanism in which it may be embodied, what is claimed is:—

1. A front registering mechanism for sheet feeders, having, in combination, front guides movable into and out of the path of the sheet, registering grippers arranged to grip the front edge of the sheet adjacent to the front guides, means for actuating the grippers to grip the sheet, draw it forward against the front guides, and slide over the sheet after the forward movement of the sheet is arrested by the corresponding front guide and means for removing the grippers from the path of the sheet.

2. A front registering mechanism for sheet feeders, having, in combination, front guides movable into and out of the path of the sheet, sheet forwarding devices for forwarding the sheet to a position short of the front guides, registering grippers arranged to grip the front edge of the sheet adjacent to the front guides, means for actuating the grippers to grip the sheet, draw it forward against the front guides, and slide over the sheet after the forward movement of the sheet is arrested by the corresponding front guide and means for removing the grippers from the path of the sheet.

3. A front registering mechanism for sheet feeders, having, in combination, slotted front guides, a sheet gripper corresponding to each guide, mechanism for advancing and retracting each gripper through the slot of the corresponding guide, and means for moving the grippers and front guides into and out of the path of the sheet.

4. A front registering mechanism for sheet feeders, having, in combination, slotted front guides, coöperating slotted sheet supporting tongues, registering grippers arranged to pass through the slots in the guides and having their lower jaws arranged to enter the slots in the tongues, means for actuating the grippers to grip and draw the front edge of the sheets against the guides, and means for moving the grippers and front guides into and out of the path of the sheet.

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