W. B. STORY.

REGISTER DEVICE FOR FEEDERS.

APPLICATION FILED MAR. 12, 1912.

1,193,731.

Patented Aug. 8, 1916.

2 SHEETS—SHEET 1.

Fig. 1

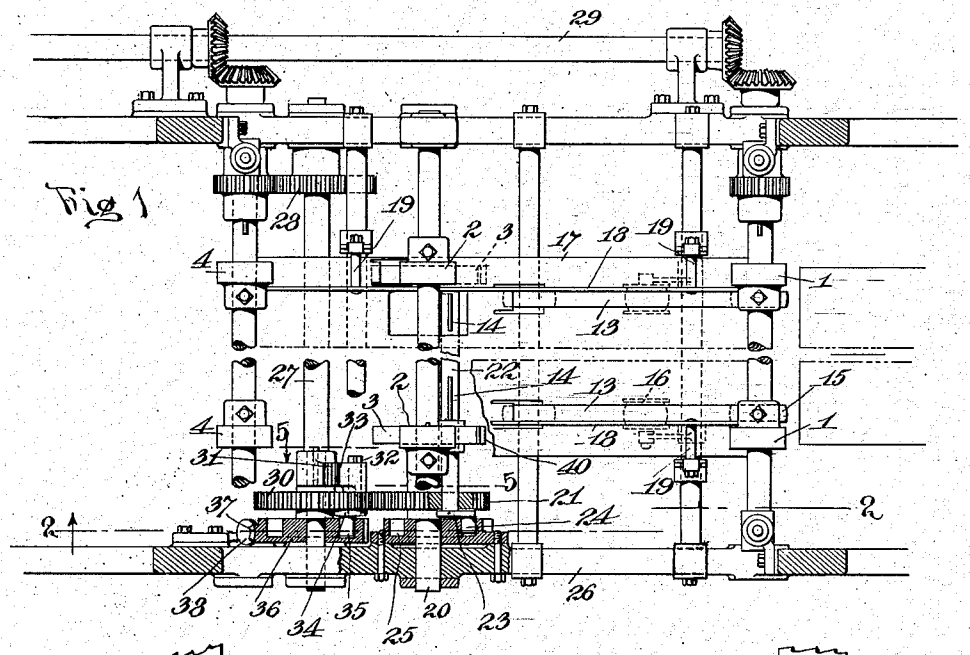


Fig. 2

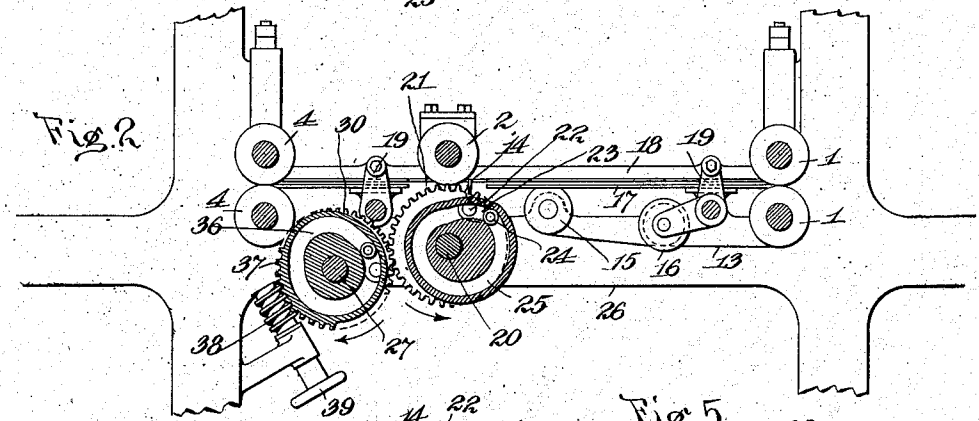


Fig. 3

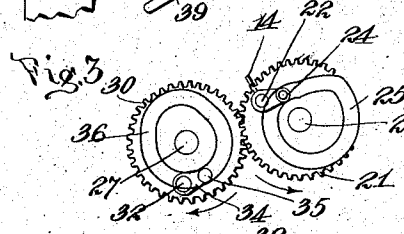


Fig. 5

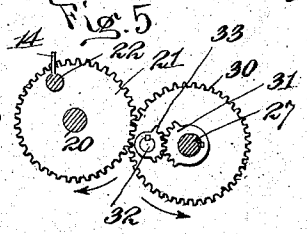
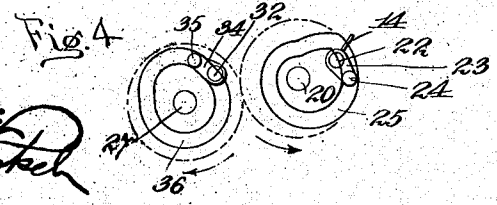


Fig. 4



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2 SHEETS—SHEET 2.

Fig. 6

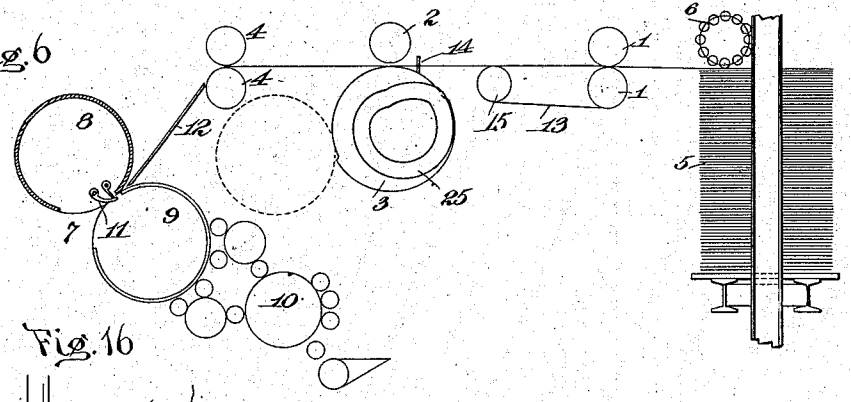


Fig. 15

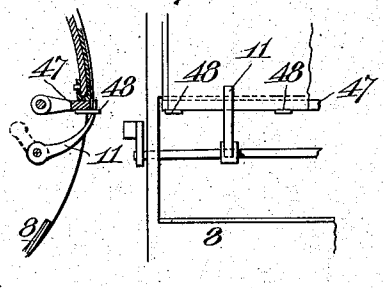


Fig. 16

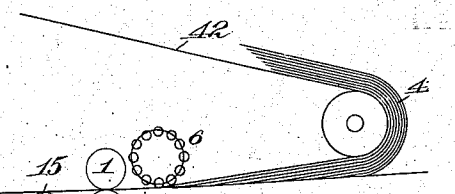


Fig. 7

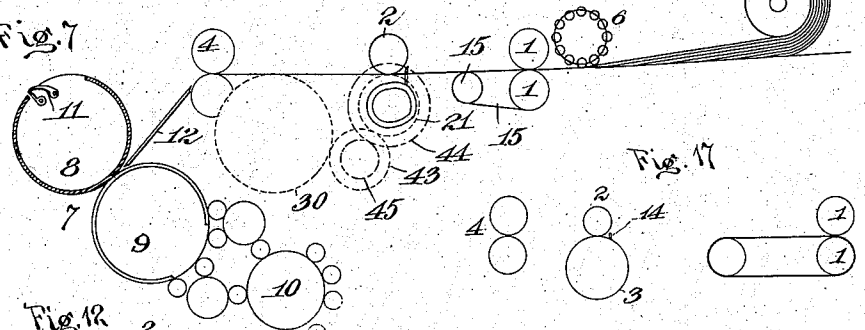


Fig. 17

Fig. 11

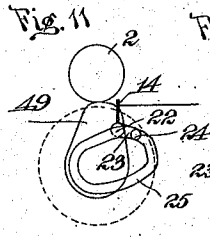


Fig. 12

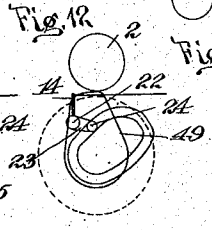


Fig. 13

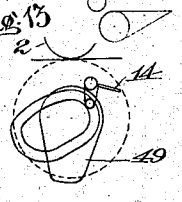


Fig. 14

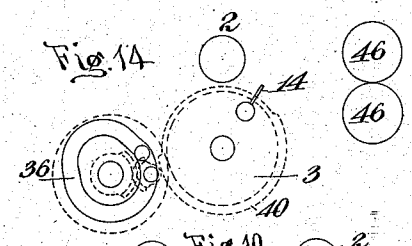


Fig. 8

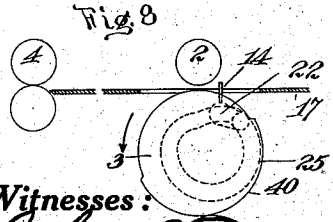


Fig. 9

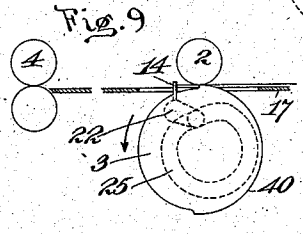
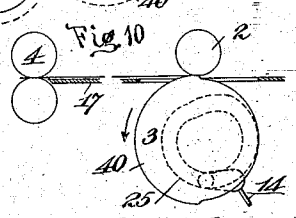


Fig. 10



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UNITED STATES PATENT OFFICE.

WARD B. STORY, OF NEW YORK, N. Y., ASSIGNOR TO WARD B. STORY COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

REGISTER DEVICE FOR FEEDERS.

1,193,731. Specification of Letters Patent. Patented Aug. 8, 1916.

Application filed March 12, 1912. Serial No. 683,330.

To all whom it may concern:

Be it known that I, WARD B. STORY, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Register Device for Feeders, of which the following is a specification.

This invention relates to improvements in registering devices, in connection with machines for feeding sheets to printing presses and similar structures.

The present type of registering device now in use is provided with mechanism which brings the sheet to an absolute rest at the time it is alined against the gage. According to the usual form of structure, the sheet is fed by means of rollers or belts, and by means of slow-down rollers and a propelling roller it is brought against a gage, and its movement absolutely arrested. When the apparatus is employed in connection with a printing press, the gage is usually arranged above the impression or taking cylinder. In order to keep the sheet away from the surface of the impression cylinder, guides have to be provided in the form of fingers which extend beyond the fingers which constitute the gage. The impression cylinder carries a gripper, so arranged that it will be swung up when it passes a certain point. The gage is arranged to swing up at the same moment. The parts are so proportioned as to have the gage rise with an advanced movement equal to the cylinder speed, so that when the gripper engages with the sheet, the sheet will always be engaged by the gage or by the gripper, and will never be entirely unsupported at its front edge. This is the ideal condition. In practice, however, owing to a number of variables, it is found that the gage will leave the sheet before or after the gripper comes in contact with it, but not at the precise moment when the gripper comes in contact with the sheet. The front edge of the sheet is, therefore, not in absolute control. These variables may consist of differences between the thicknesses of sheets, vibrations of the machine, electrical influences, rebound of the gripper at high speeds, or may be also caused by improper adjustment where it is necessary to run the press at different speeds to accommodate different work. It is a matter of the greatest difficulty to set the gripper so that it will properly act when the speed of the press is changed. It is necessary to attain perfect work that the gripper must always engage the sheet at the precise moment that the gage leaves it, so there will be no period of time when the front edge of the sheet is not under control.

According to the present invention, devices are utilized which do not require the sheet to be stopped in order to be gaged. These devices permit the sheet to be always under control. One of the difficulties and objections to the prior apparatus is that the sheet being stopped, must be jerked forward by the grippers at cylinder speed, producing something that is incapable of uniform work, owing to the numerous different variables before referred to. Unless the line of grippers be uniformly set, the resistance of the sheet to motion, from absolute rest, will cause it to wrinkle around the cylinder.

The objects of the invention are to overcome the difficulties before pointed out. According to my invention, I avoid the necessity of bringing the sheet to rest. I also produce devices which always keep the sheet under control.

According to my invention, the speed of the sheet may be normal, or may be slightly reduced or accelerated. It is brought gently into contact with the gage, so that it is squared up and always remains under control, and it is continuously under control up to the point of delivery. This produces the easiest possible gripper motion, because the grippers do not have to turn upon their axes so rapidly as they must do with prior apparatuses. As the sheet is always traveling with the grippers, the latter may be closed at any angle which may be chosen.

A further object of the invention is to produce a device for accelerating the speed of the sheet at the moment of delivery. This allows the stops to be placed upon the cylinder for final register, if desired. This makes it possible to leave off the stops from the cylinder so that the leading margin of the sheet may be increased or decreased, as desired. The pressman may then accelerate or retard the sheet while the press is running, to accommodate a slightly different location of the sheets on the cylinder for a second impression.

In feeding covers or insert sheets to the folder of a web machine, it is possible with

this device to adjust the front edge of the sheet relative to the webs while the machine is in operation.

These and further objects will more fully appear from the following specification and accompanying drawings, considered together or separately.

In the drawings, Figure 1 is a plan view, partly in section, of a registering mechanism embodying my invention. Fig. 2 is a section on the line 2—2 of Fig. 1, looking in the direction of the arrow. Figs. 3 and 4 are detail sections taken on the line 2—2 of Fig. 1, showing mechanism in different positions. Fig. 5 is a section on the line 5—5 of Fig. 1, looking in the direction of the arrow, the parts being in the same position as is shown in Fig. 2. Fig. 6 is a diagrammatic view of the feeding devices shown in Figs. 1 to 5, applied to a pile feeder, and also in connection with a printing couple. Fig. 7 is a similar view of a modified form of device, applied to a continuous feeder also in connection with a printing couple. Figs. 8, 9 and 10 are diagrammatic views showing the operation of the device illustrated in Figs. 1 to 6. Figs. 11, 12 and 13 are similar views of the device illustrated in Fig. 7. Fig. 14 is a diagrammatic view of a modified form of feeding device. Figs. 15 and 16 are detail views of an impression cylinder, showing the registering stop. Fig. 17 is a diagrammatic view of still another modification.

In all of the views, like parts are designated by the same reference characters.

I will describe my invention as embodied in the structures illustrated. It is to be understood that these structures are merely illustrative, and that obvious modifications may be made.

Referring to Figs. 1 to 5 inclusive, the feed rollers 1, 1, shown as located at the right of the machine, first feed the sheets, taking them from the pile or from the continuous feeder. The sheets are fed to the rollers by the usual combing rollers. These feed rollers are positively driven, and the upper roller is elastically engaged with the lower roller by the ordinary spring arrangement, as shown. To the left of the feed rollers are shown the upper intermittent feed roller 2 and the lower intermittent feed roller 3. To the extreme left are shown the feed table rollers 4, 4. These rollers are preferably the same size as the rollers 1, 1. The upper roller engages with the lower roller by the usual spring arrangement, as shown. These rollers are rotated positively at the same rate of speed as the rollers 1, 1. The rollers 1, 1, and 4, 4, rotate at the normal speed of the machine, which is the speed of the apparatus to which the sheets are being fed. Referring to Fig. 6, the pile 5, is shown at the extreme right. The sheets are taken off and fed to the rollers 1, 1, by the usual combing roller 6. In the same view, to the extreme left, is shown the printing couple 7, which comprises the impression cylinder 8 and type cylinder 9, with the usual inking rollers 10. The impression cylinder carries the usual gripper 11, which is actuated by cam mechanism in the usual manner, so as to grip the front edge of the sheet which passes through the feed table rollers 4, 4, and along the feed table 12.

13 are the usual tapes.

14 is the gage. This gage is not fixed but is movable. It is carried by the roller 3. This gage, as shown in Fig. 1, is preferably made in a plurality of sections, so that it will be presented to the front edge of the sheet through the openings in the table. The tapes 13 are supported upon the tape rollers 15. Suitable tension is imparted to them by the jockey pulleys 16 (see Fig. 2).

17 represents the table having openings for allowing the feed tapes and the feed rollers to engage with the sheets. The edges of the sheets are retained in position by means of the guides 18, carried by suitable supports 19.

The roller 3 is carried upon a shaft 20. This roller is in several sections, so that it will engage with substantially the entire width of the sheet. The shaft 20 is rotated positively by mechanism which will be described later. I provide mechanism so that the rollers 3 are rotated preferably one revolution to feed each sheet. The gage, which is carried by the roller, is so supported that its speed in relation to the movement of the periphery of the roller will be retarded during the period of time immediately preceding and immediately following the engagement of the front edge of the sheet with it. This produces what I term a relative retarded movement of the gage, and compensates for the irregularities of feed made by the feeding rollers 1, 1, and tapes 13. It also compensates for other irregularities in the feeding mechanism. The relative retardation can be attained by either retarding the gage to a speed below normal, or by accelerating the sheets to a speed above normal, or both combined, as will be described. The roller is made with a portion of its periphery of greater diameter than the other portion (see Figs. 8, 9 and 10); this raised portion being indicated by the numeral 40. This enlarged part of the roller engages with the upper roller 2.

The unenlarged portion of the roller will not engage with the upper roller 2, owing to its being of less radius than the distance from its center to the periphery of the upper roller, and, consequently, the sheet will be pinched between the two rollers only when the enlarged part of the lower roller

is in engagement with the upper roller. The gage is located on the portion of the lower roller of smaller diameter (see Fig. 8) immediately in advance of the portion of larger diameter. This gage in the embodiment chosen for illustration is so supported that it may be swung in relation to the roller so that its movement will be retarded relative to the movement of the roller. The devices for securing this movement are illustrated best in Figs. 1, 2, 3, 4, 8, 9 and 10. These devices comprise means for rotating the roller shaft, and means for swinging the gage upon its support. For rotating the lower roller I employ a spur gear 21, connected to and turning the shaft 20. This shaft, as already stated, carries the sections of the lower roller with it. The gage is supported upon a shaft 22, which is mounted in suitable bearings in the sections of the roller 3, and is also mounted in the spur gear 21. On the shaft 22 is a crank 23, and on this crank 23 is a crank pin 24. This crank pin may carry a roller, as shown, for reducing friction. The crank pin engages in a cam 25. This cam 25 is so supported that it will not turn, preferably by being secured to the frame 26 of the machine. For the purpose of rotating the spur gear 21, a lay shaft 27 is provided with suitable gearing, which I will later describe, for rotating it. The operation of the gage is best shown in Figs. 3, 4, 8, 9 and 10. As the spur gear 21 is rotated, the crank 23 will engage with the cam 25. This cam is so shaped that the shaft 22 which carries the gage will be turned in its bearings so that the gage will be moved during a portion of the rotation of the roller 3, in the direction opposite to the direction of rotation of the shaft 20, roller 3, and spur gear 21. Referring particularly to Figs. 8, 9 and 10, Fig. 8 represents the position of the gage just before the front edge of the sheet is brought into contact with it by means of the tapes 13; Fig. 9 represents the position of the gage just as the high part 40 of the lower roller comes in contact with the upper roller 2 and pinches the sheet between the two rollers so that it will be positively fed. During the movement from the position shown in Fig. 8 to that shown in Fig. 9, the gage has been turned upon its supporting shaft in the direction opposite to the direction of travel of the periphery of the roller, consequently, the speed of the gage is a retarded movement compared to the speed of the periphery of the roller. Any irregularities in feeding, therefore, of the sheets to the gage, will be compensated for, owing to the retardation of the gage.

In order to provide for accelerating the speed of the sheet after it has been brought into contact with the gage and is being driven forward by engagement of the high portion of the lower roller with the upper roller, as has been described, I provide means for increasing the speed of the lower roller after the high part 40 comes in contact with the upper roller 2. This is so that the sheet may then be fed at normal speed, when it reaches the feed table rollers 4, 4, and be advanced or retarded relative to a point on such rollers 4, 4. I prefer to combine with this mechanism, mechanism which can be controlled as to the degree of acceleration, so that the sheet may be fed to the feed table rollers 4, 4, either in advance or behind a fixed point, to accommodate the irregularities in location of the plates upon the type cylinder, or provide for atmospheric conditions which may produce an acceleration or retardation in the feed. This mechanism is so arranged that it may be adjusted by the operator while the machine is running. Some or all of the devices which I will now describe may be utilized.

Referring to Figs. 1 and 2, the lay shaft 27 is turned at normal speed by means of gears 28, and also bevel gears from the main driving shaft 29. This main driving shaft 29 carries bevel gears which rotate the shafts of the rollers 1, 1 and 4, 4, at normal speed. The lay shaft 27 carries a spur gear 30, which is loosely mounted upon it. The shaft 27 has fixed upon it a toothed sector 31. The spur gear 30 carries bearings which support a short shaft 32. This short shaft 32 carries a toothed sector 33, which is in engagement with the other toothed sector 31. The shaft 32 carries a crank 34, which has a pin 35. This pin may be provided with a roller, as shown, for reducing friction. The pin 35 engages with the cam 36. This cam 36 is supported upon a lug concentric with the shaft 27, and is free to rotate thereon.

The position of the cam is adjusted while the machine is in operation, by devices best shown in Fig. 2. These devices comprise worm teeth 37 on the cam, and these worm teeth engage with a worm 38 mounted in suitable bearings in the frame 26. The worm is rotated by suitable devices, as by means of a hand wheel 39. By rotating this hand wheel, the rotary position of the cam 36 may be adjusted within the necessary limits. The effect of this mechanism is as follows: Assuming the cam 36 to be fixed in one position, the rotation of the shaft 27 will carry with it the toothed sector 31. This toothed sector will carry with it the toothed sector 23, and, through the agency of the shaft 32, will rotate the spur gear 30. Were the cam 36 simply a groove of constant radius, there would be no relative movement between the two sectors. The cam, however, has a high part, as shown in Fig. 2, consequently, as the pin 35 engages with this high part, the crank 34 will be moved and the shaft 32 will be turned in its

bearings. The effect of this will be to cause the sector 33 to rotate on the sector 31 which, in turn, will rotate the spur gear 30 in relation to its shaft 27. This rotation will be in the direction of movement of the spur gear, and then, as the pin engages the lower portion of the cam, it will be in the opposite direction, consequently, the periphery of the spur gear 30 will travel first faster and then slower than the normal rate of speed of the shaft 27. This cam 36 is so configured that the acceleration of the spur gear 30, and consequently, the intermeshing spur gear 21, will begin only after the high part 40 of the gauge roller 3 is in contact with the upper gauge roller 2, and the sheet is pinched between the two rollers. From this time until the sheet is released from engagement with the rollers 2 and 3, its speed will be accelerated; the degree of acceleration depending upon the angular position of the cam 36 which is adjusted by means of the hand wheel 39. It is apparent that this can be done while the machine is running, consequently, the operator can adjust the degree of acceleration, which will depend upon the character of the work, which may vary from time to time.

According to all of the mechanism described, it is apparent that the sheet will first be brought into contact with the gage, which will be retarded in its movement in relation to the other moving parts of the feeder, so that any irregularities in feed caused by the feed rollers 1, 1, or any irregularities in the shape or position of the sheet, will be taken care of; for example,—should the sheet be not exactly square to the gages, the tapes 13 which move at normal speed, will bring the sheet into accurate engagement with the gages before the sheet is gripped between the high part of the lower roller 3 and the upper roller 2. It is also apparent, from the before-described mechanism, that the retardation of the sheet caused by the relative backward movement of the gage, will be compensated for by the momentarily increased speed of rotation of the rollers 2 and 3, so that, when the sheet leaves the engagement of the rollers, it will be moving at normal speed. It is also apparent that by adjusting the position of the cam 36, the time at which the sheet is brought under the control of the nipping rollers 4, 4 may be retarded or advanced and consequently, the sheet can be made to accommodate itself to the different positions of the plates upon the printing roller and will also accommodate varying conditions or requirements of sheets which may occur during the operation of the machine. This latter adjustment is for the purpose of delivering the gaged leading edge of the sheet to the nipping rolls 4, 4 at the proper time so that it may be fed to the printing couple in proper registry with the plate carried by the type cylinder. This plate may vary somewhat in its position on the cylinder and the sheet must be delivered to it sooner or later as the case may be.

The modification shown in Fig. 7 employs a continuous feeder 41, having a higher supply table 42, and the usual combing roller 6. It is to be understood, however, that the character of feeder is immaterial, as the continuous feeder may be used in connection with the mechanism shown in Fig. 6, while the pile feeder may be used in connection with the mechanism shown in Fig. 7. As a matter of fact, these two forms of feeders are illustrated simply to show the application of the invention, and any form of feeder may be employed for feeding the sheets to the feed rollers 1, 1. In the modification of the invention shown in Fig. 7, the roller 3 is rotated at twice the speed of the roller illustrated in Figs. 1 to 6 inclusive. This permits the use of a much lighter roller. The same arrangement of gage is employed as described, but as the roller makes two revolutions to feed each sheet, it is apparent that the gage must be so mounted that it will be lowered below the sheet at each alternate revolution of the roller. This is accomplished by mounting the cam 25 in bearings so that it is rotated by suitable gearing at one-half the speed of the roller. The mechanism is shown diagrammatically in Fig. 7. The spur gear 21 is rotated from the spur gear 30 by means of an intermediate spur gear 43.

The cam is provided with a spur gear 44, which is rotated from the spur gear 30 by means of an intermediate spur gear 45. As the cam, therefore, turns at one-half the speed of the roller, it will entirely depress the gage below the periphery of the roller, on the alternate revolutions, as shown in Fig. 13. It will, however, impart the twisting movement to the gage, to secure retardation as previously described, when the gage is in contact with the front edge of the sheet, as shown in Figs. 11 and 12. The same mechanism for accelerating the speed of rotation of the spur gear 30, as described in connection with Figs. 1 to 5 inclusive, is used upon this embodiment of the invention, but is not illustrated. Instead of the high portion 40, of the lower roller 3, a cam 49 is provided for moving the upper roller 2 away from the lower roller, when the gage is passing immediately under the upper roller.

The retarding effect of the sheet in relation to the gage may be accomplished by other devices than those illustrated.

Fig. 14 shows diagrammatically a structure where the feed rollers are made larger, so that the feed to the gage will be above normal speed. These are indicated by the characters 46, and are arranged to have a

somewhat higher peripheral speed than normal. The gage which is shown in Fig. 14 has no relative movement in relation to the roller, consequently, the sheet is fed to the gage at a speed above normal. In order to compensate for this, the cam 36 is so arranged that the gears and the rollers are rotated after the high part of the roller gets in contact with the upper roller at a normal speed. The cam in Fig. 14 shows how this is accomplished.

In connection with the device already described, I prefer to employ a gage in connection with the gripper on the impression roller. Referring to Figs. 15 and 16, the blanket holder 47 of the usual type carries a gage 48. The employment of this gage is possible as, by reason of the very fine adjustment accorded by the acceleration or retardation of the roller 3, by means of the hand wheel 39, the operator can always bring the front edge of the sheet in contact with the gage 48. He can then always be assured that the front edge of the sheet will be engaged by the grippers at the same place.

The complete apparatus described may be used in connection with a side gage or not, as described. To avoid the necessity of stopping the sheet, to bring it into contact with the gages heretofore used, I may utilize the form of gage disclosed in my copending application filed April 5, 1912, and numbered serially 688,805. This gage will correct irregularities of placement of the sides of the sheets, without stopping the latter.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is merely illustrative and that the invention can be carried out in other ways.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A registering device having a roller, a moving gage, means for retarding the movement of the gage relatively to the roller, means for accelerating movement of the sheet and means for varying the amount of acceleration.

2. A registering device having means for feeding a sheet to a gage; a roller; a cam; connections between the cam and the roller, for accelerating or retarding the movement of the roller; and means for varying the period of retardation or acceleration while the feeding means are in operation.

3. A register device having a sheet roller, a movable gage, means for changing the relative movement of the gage and roller, and means for varying the speed of the roller, said means being adjustable while the roller is in operation.

4. A registering device having a sheet feeding roller; a movable gage; means for changing the relative movement of the gage and the feeding roller; a cam for accelerating or retarding the movement of the roller; and means for changing the position of the cam while the roller is in operation.

This specification signed and witnessed this 7th day of March, 1912.

WARD B. STORY.

Witnesses:
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JOHN L. LOTSCH.