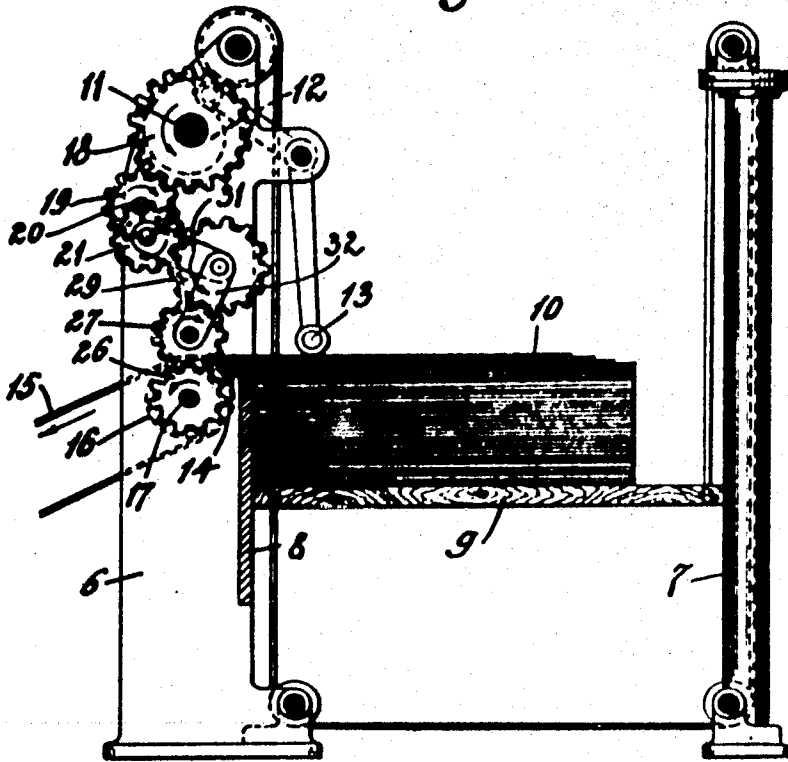


R. L. HANAU.
SHEET FEEDING MACHINE.
APPLICATION FILED OCT. 16, 1908.

985,496.

Patented Sept. 28, 1909.
2 SHEETS—SHEET 1.

Fig. 1



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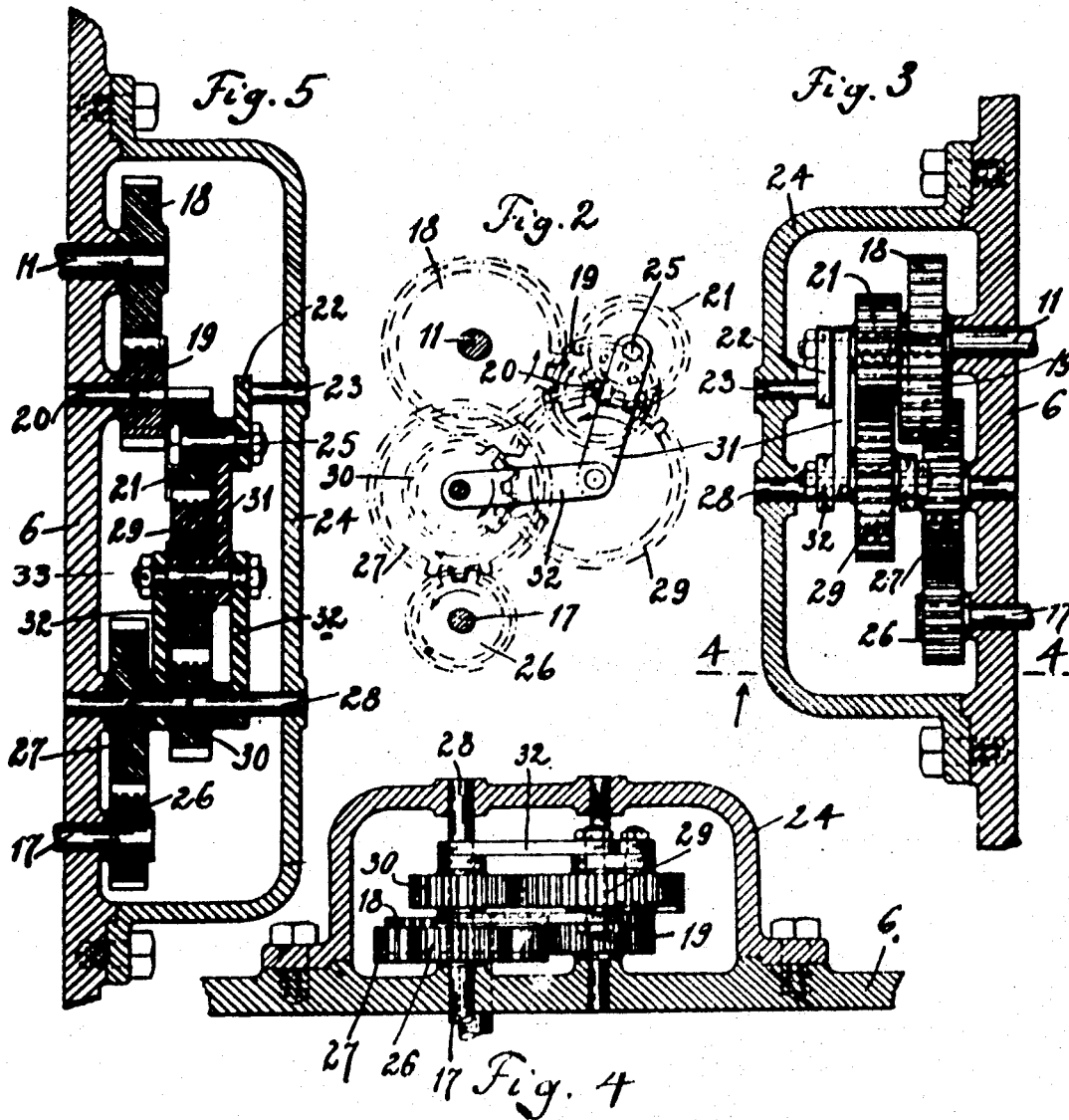
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935,496.

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3 SHEETS-SHEET 2



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UNITED STATES PATENT OFFICE.

RUDOLPH L. HANAU, OF NEW YORK, N. Y., ASSIGNOR TO AUTO PAPER FEEDER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SHEET-FEEDING MACHINE.

933,496.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed October 15, 1908. Serial No. 457,067.

To all whom it may concern:

Be it known that I, RUDOLPH L. HANAU, a subject of the King of England, and resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sheet-Feeding Machines, of which the following is a specification.

The present invention relates to sheet feeding mechanism for conveying sheets in succession from a feeding machine to a printing press, or to any other machine designed to operate upon paper.

More particularly, the invention relates to that class of feeding machines, which feed the sheets in succession to apparatus which advance the same at a high speed to the registering device, which latter delivers the same to the grippers of the press or to the sheet manipulating devices of the machine to which they are being fed.

It is obvious that, when the sheets are brought against the registering devices at high speed, either the front edges of the sheets will be injured or the sheets will not be brought into their proper registering position. To overcome these defects, heretofore devices have been used which slow down the sheet before the front edge of the same reaches the front gages, which devices either decrease the speed of the sheet on the feed table step by step, or comprise a plurality of conveying means driven at different speeds, which are adapted to engage the sheet simultaneously and when traveling at the same speed; the means running at higher speed are then disengaged with the sheet as soon as the slower means properly engages the same. The first class of these slow down devices is defective, for the reason that the sheets vary suddenly their speed and are thereby apt to be brought out of their proper positions, while the second class necessitates a rather complicated mechanism being very expensive to manufacture and unreliable in its operation.

The object of the present invention is to provide a simple and inexpensive device of the character specified, comprising as few parts as possible and obviating the defects of the feeding devices, heretofore in use.

To this end the device consists of a train of gears interposed between the main shaft of the feeding device and the conveying-tape actuating rollers in such a manner, that the

speed of the conveying tapes is gradually increased after the sheet had been placed thereon, and gradually decreased to or near to zero before the sheet reaches the front gages, so that it is prevented from being injured and, on the other hand, is positioned accurately at the front gages.

Other objects and the various features of the invention will be apparent from a reading of the specification and an examination of the drawings, forming a part of the present application for Letters Patent.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a paper feeding machine, having the attachment, forming the subject matter of the present application for Letters Patent, Fig. 2 is a diagrammatic view of the attachment, Fig. 3 is a sectional side view of the same, and Fig. 4 is a section taken on line 4, 4 of Fig. 3. Fig. 5 is a vertical section of the attachment, all of the gears being located in one plane so as to more clearly show the device.

In Fig. 1 of the drawings, only those parts of the feeding machine are shown which are necessary to understand the operation of the slow-down device, which can obviously be attached to any paper feeding machine, where the paper is being fed from a pile.

In the drawings, 6 indicates one of the side parts of the main frame of a feeding machine, and 7 one of the uprights, between which and the vertical transverse wall 8 is arranged a vertically movable sheet support 9, upon which rests the pile of paper 10. The sheet separating mechanism and the movement of the same are immaterial as far as the present attachment is concerned, and may be, therefore, of any suitable construction; for instance, the main shaft 11 of the paper feeding machine may be provided with a cam 12, which actuates the paper feeding mechanism 13, advancing the sheets to the forwardly bent lip 14 of the transverse wall 8, wherefrom the sheets are presented to the conveying tapes or bands 15, actuated by the roller 16, operated from the main shaft of the apparatus by means to be described.

A train of spur-gears is arranged, preferably, between the main shaft 11 of the paper feeding machine and the shaft 17 of the roller 16, in such a manner that the roller shaft 17 rotates with a varying speed. More

particularly, a gear 18 is mounted upon the main shaft 11 and in mesh with a gear 19, carried by an arbor 20, journaled in the frame 6 of the apparatus. A gear 21 is eccentrically and fixedly secured to the gear 19, whereby the gear 21 will swing around its eccentric axis 20, and may be guided in its movement by an arm 22, fixedly secured to a spindle 23, journaled in a cover 24 of the attachment, which arm is pivotally connected to the spindle 25 of the gear 21. To the roller shaft 17 is attached a gear 26, in mesh with a gear 27, mounted upon an intermediary shaft 28, journaled in the frame 6 of the machine and the cover plate 24 of the attachment. The gear 27 may be operated by the eccentric gear 21 by means of an idle gear 29, as shown in Fig. 1 of the drawings, or, if another ratio of speeds be required, a gear 30 may be keyed upon the intermediary shaft 28, as shown in Figs. 2 to 5 of the drawings, which gear 30 meshes then with the gear 29. The idle gear 29 is connected to the eccentric gear 21 and the gear 27, or 30, as the case may be, by means of arms 31 and 32, pivoted on the shafts 21 and 28, respectively, and the spindle 33 of the idle gear 29. Thus the idle gear is kept always in operative connection with the eccentric gear 21 and the gear mounted upon the shaft 28. Obviously, thereby the axis of rotation of the idle gear is kept at the same distance from the shaft 28, but at varying distances from the spindle 20 around which the eccentric gear 21 swings.

The operation of the device is as follows: The gear 18, being fixedly secured to the main shaft 11, turns with a constant speed, rotating thus the gear 19, which in turn swings the gear 21 around the spindle 20. The gear 21 being eccentrically attached to the gear 19, it will be observed that the angular velocity, that is the rate of rotation of the different points of the periphery of the gear 21, is proportional to the distance of said points from the axis of rotation of the gear 19. Therefore, the gear 29 will be rotated with a variable speed, and thus the roller shaft 17 will vary its speed as the teeth of the gear 29 mesh at varying distances from the axis of rotation of the gear 19 with the teeth of the gear 21.

It will be observed that when the gears 19 and 21 are attached to each other in such a manner that the pitch circle of the gear 21 runs through the axis of rotation of the gear 19, there will be a point at which the angular velocity of the gear 21 and the speed of the gear 29 are equal to zero. Obviously this occurs when the gear 29 meshes with the tooth or teeth of the gear 21, which are arranged in the axis of rotation of the gear 19. Thence the velocity of the gear 21 increases to a point on the pitch circle of the same, the distance of which is the greatest from the

axis of the rotation of the gear 19. Obviously this point is diametrically opposite to the minimum point. The angular velocity of the gear 21 then decreases from this maximum point gradually down back to the minimum point of zero.

The gears are arranged in such a manner that the roller 16 rotates with its minimum speed, that is in the case shown in the drawings with a speed equal to zero, when the paper is placed upon the same by the sheet advancing means 13, thence the velocity of the roller increases gradually as the sheet slides down the feed table (not shown in the drawings), and the speed of the roll 16 and, thus, of the sheet of paper becomes equal to zero just at the point, where the front edge of the paper reaches the front gages or the registering device of the printing press or any other machine operating upon the paper.

It will be easily seen that the difference between the maximum and minimum speeds of the gear 21 depends entirely upon the distance between the centers of the gears 19 and 21. When the pitch circle of the gear 21 runs, as heretofore described, through the axis of rotation of the gear 19, the speed varies from zero to maximum. Obviously when the center of rotation of the gear 19 is located outside of the pitch circle of the gear 21, a negative speed is obtained. That is, the roll 16 will reverse its direction of rotation for a given time. In this case, therefore, the speed varies from a negative minimum to a positive maximum. When, on the other hand, the center of rotation of the gear 19 is located within the pitch circle of the gear 21, the speed varies from a positive minimum to a positive maximum. It is thus apparent that a great variation of speeds may be obtained, depending upon the relative positions of the center of rotation of the gear 19 and the pitch circle of the gear 21. On the other hand, it is obvious that many minor changes may be made in the arrangement and construction of several parts without departing from the spirit and scope of the present invention. For instance, gears may be interposed between the various shafts of the device in order to vary the ratio of speed of the same.

Attention is called to the fact that the invention is not limited to the use of the roller 16 in connection with the conveying tapes, but the same may be used just as well in connection with conveyer rolls operating any suitable conveying means for the sheets to be fed. It is not necessary, on the other hand, to advance the sheets from a vertically movable table, as shown in the drawings, or by automatic feeding means, but the sheets may be placed upon the conveying means by hand, if desired.

Means may be employed to adjust the

distance between the centers of the gears 19 and 21, in order to vary the difference in speeds during each revolution, as hereinbefore mentioned, without departing from the invention.

What I claim is:

1. In an attachment for paper feeding machines, the combination with a driving shaft, of the conveying means for advancing the sheets, a roller operating said conveying means, a train of gears operated by said driving shaft and connected to said roller, and a plurality of arms pivotally connecting three of the gears of said train, one of the outer gears of said three gears being secured to a gear of said train, whereby said roller and thus said conveying means is moved with a variable speed.

2. In an attachment for paper feeding machines, the combination with a driving shaft, of conveying means for advancing the sheets, a roller operating said conveying means, a train of gears operated by said driving shaft and connected to said roller, and a plurality of arms pivotally connecting three of the gears of said train, one of the outer gears of said three gears being attached eccentrically to one of the gears of said train, whereby said roller and thus said conveying means is moved with a variable speed.

3. In an attachment for paper feeding machines, the combination with a driving shaft, of the conveying means for advancing the sheets, a roller operating said conveying means, a train of gears operated by said driving shaft and connected to said roller, and a

plurality of arms pivotally connecting three of the gears of said train, one of the outer gears of said three gears being secured to a gear of said train in such a manner that the pitch circle of said outer gear runs through the axis of rotation of the gear to which the same is attached.

4. In an attachment for paper feeding machines, the combination with a driving shaft, of conveying means for advancing the sheets, a roller operating said means, an eccentric gear driven by said driving shaft, an idle gear, arms for keeping said idle gear and said eccentric gear always in operative connection, a third gear, arms operatively connecting said third gear to said idle gear, and a gearing between said third gear and the roller of said conveying means.

5. In an attachment for paper feeding machines, the combination with a driving shaft, of conveying means for advancing the sheets, a roller operating said means, an eccentric gear driven by said driving shaft, a second gear in operative connection with said roller, and an idle gear, the axis of rotation of which is caused to vary its distance from the axis of rotation of said eccentric gear and to be at a constant distance from the axis of rotation of said second gear.

Signed at New York, in the county of New York and State of New York, this 10th day of October, A. D. 1908.

RUDOLPH L. HANAU.

Witnesses:

SIEMUND HENZEL,
S. BERNBAUM.