Aug. 8, 1961 D. G. PITTWOOD 2,995,363

RECORD FEEDING APPARATUS

Filed Aug. 13, 1959 2 Sheets-Sheet 1

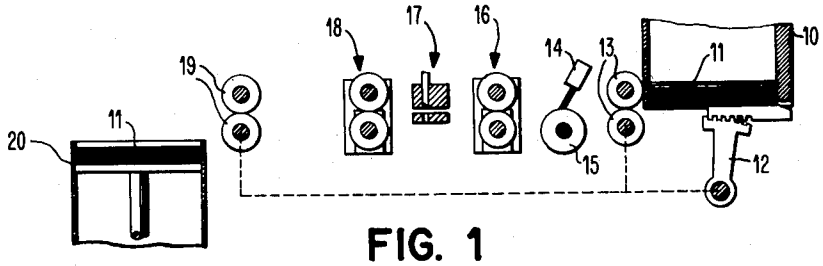

FIG. 1

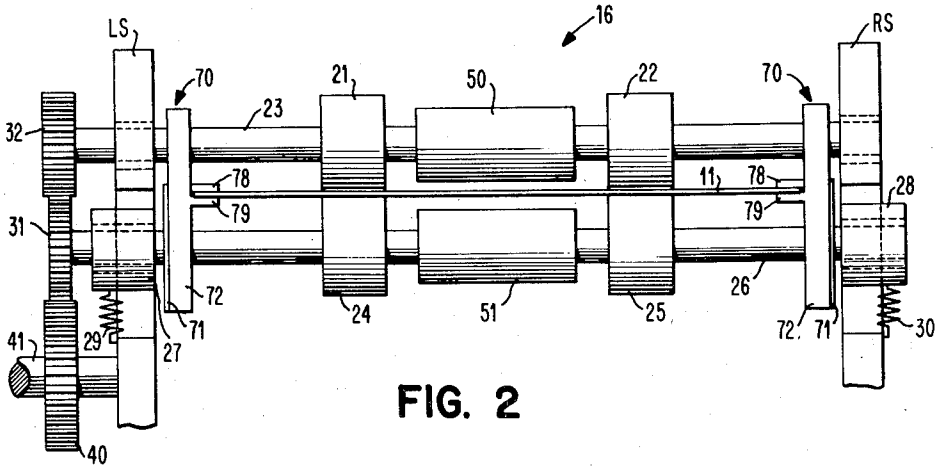

FIG. 2

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RECORD FEEDING APPARATUS

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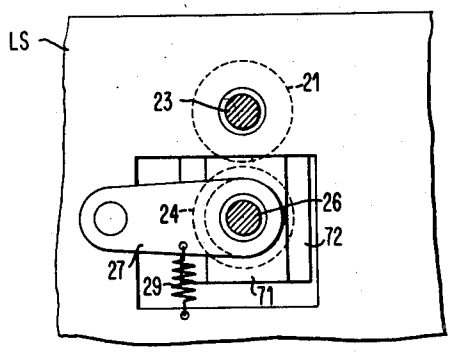

FIG. 3

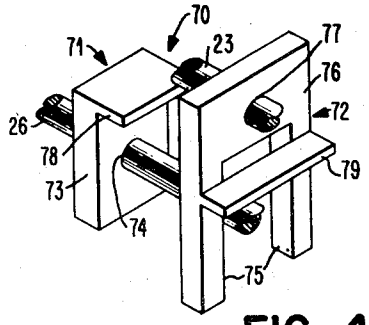

FIG. 4

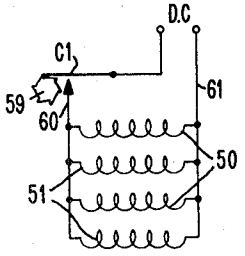

FIG. 5

United States Patent Office 2,995,363 Patented Aug. 8, 1961

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RECORD FEEDING APPARATUS

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Filed Aug. 13, 1959, Ser. No. 833,536
9 Claims. (Cl. 271—51)

This invention relates to record feeding apparatus for feeding records in card or web form and, more particularly, to record feeding apparatus capable of feeding records continuously or intermittently while being driven continuously.

Heretofore, for intermittent operation, it had been the practice to interpose a clutch mechanism between the feed rolls and drive therefor. In some instances, it had been the practice to utilize a Geneva drive for the feed rolls to accomplish the intermittent operation. Further, and more similar to the present invention, it was not uncommon to selectively move the feed rolls out of cooperation with each other by means of cam or solenoid-operated linkages to effect intermittent operation of the feed rolls. However, this latter arrangement involved or gave rise to registration problems in connection with the records being fed. The present invention is an improvement over these devices.

In this invention, one feed roll of the pair of cooperating feed rolls is normally biased away from the other feed roll. The feed rolls are carried by shafts which extend through electric coils journaled thereon to permit the turning of the shafts. A pair of feed rolls are mounted on each shaft adjacent the ends of the electric coils. The feed rolls and shaft are of magnetic material and become magnetized upon energization of the electric coils. Current is applied to the terminals of the electric coils so that the associated feed rolls become magnetized with opposite polarity. In this manner, the feed rolls are attracted toward each other to come into cooperative relationship for the feeding of the records. Hence, so long as the electric coils are energized, the feed rolls will be in position for feeding the records.

When the electric coils are de-energized, the feed rolls are biased away from each other to be out of cooperative relationship for the feeding of the records. Each of the feed roll shafts carries gears which mesh with each other so that, when driven by any suitable driving means, the shafts are simultaneously rotated in opposite directions. The gears only de-mesh slightly when the feed rolls are biased away from each other upon deenergization of the electric coils. Hence, because the records are fed only when the feed rolls are brought into a cooperative feeding relationship, the drive to the gears on the feed roll shafts may be continuous.

The amount of separation between the feed rolls when the electric coils are de-energized is limited by grippers or record clamping devices which primarily function to grip the record being fed when the same is to be held against movement. The record clamping devices are in the open position during the feeding of the records. By this arrangement, the record being fed is more positively arrested upon de-energization of the electric coils. Of course, when the feed rolls separate from each other, the feeding of the record is halted and the record clamping devices are operated to grip the record.

Accordingly, it is a principal object of this invention to provide an improved intermittent record feeding device which is continuously driven.

Another object of the invention is to provide record feeding apparatus which may operate continuously or intermittently.

Still another object of the invention is to provide record feeding apparatus which actuates grippers to open and

closed positions upon the starting and stopping of the feeding of a record, respectively.

A more specific object of the invention is to provide improved record feeding apparatus which intermittently feeds records while being driven continuously by moving into and out of a cooperative relationship for feeding the records.

Another important object of the invention is to provide improved record feeding apparatus which operates intermittently while being driven continuously through the facility of selectively magnetized feed rolls of opposed polarity which, when magnetized, come into cooperative feeding relationship.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a schematic view of a record card punching machine incorporating the present invention;

FIG. 2 is a front elevational view showing the feed rolls in cooperative relationship for feeding the record card engaged therebetween;

FIG. 3 is a partial left side elevational view showing the details of the mechanism for supporting the lower feed roll shaft;

FIG. 4 is an exploded isometric view of the gripper assembly; and

FIG. 5 is a schematic view of the circuitry for energizing the electric coils journaled on the feed roll shafts.

Referring to the drawings and particularly to FIG. 1, the invention is illustrated by way of example as being utilized in a record card punching machine. The record card punching machine includes a card hopper or magazine **10** from which record cards **11** are removed in seriatim by a conventional clutch-controlled picker knife **12** and presented to a pair of feed rolls **13** operated in synchronism with the picker knife. The feed rolls **13** feed the record cards between conventional sensing brushes **14** and contact roll **15** to a pair of continuously driven, but intermittently operating, feed rolls **16** which are constructed and controlled according to the present invention. The feed rolls **16** are intermittently operated to feed the record cards row by row or column by column relative to a punch mechanism **17** for selectively entering perforations into the records at discrete index positions. The punch **17** operates to enter the perforations into the record cards while the same are at rest. Hence, it is necessary to advance the record cards in increments and bring the same to rest to successively position different rows or columns on the record cards relative to the punch mechanism **17**. The stopping of the record cards to correctly bring a row or column into punching position is quite critical. Any misregistration of the record cards will cause the perforations to be entered out of registration. This can lead to malfunction or misfunction of the machine to be controlled by the record cards.

A pair of feed rolls **18** spaced from the feed rolls **16** are also intermittently operated according to the present invention to aid in the feeding of the record cards relative to the punch mechanism **17**. As the record cards leave the control of the feed rolls **18**, they engage feed rolls **19** spaced therefrom and also operated in synchronism with the picker knife. The feed rolls **19** advance the record cards to a conventional drop-type stacker **20**.

Since the pairs of cooperating feed rolls **16** and **18** and the control mechanism therefor are identical in structure and principle of operation, only the mechanism for the feed rolls **16** will be described.

With reference to FIG. 2, the pair of cooperating

feed rolls 16 consist of pairs of spaced apart upper feed rolls 21 and 22 fixed to a shaft 23 and spaced apart lower feed rolls 24 and 25 fixed to a shaft 26. The shaft 26 is journaled in and extends through pivotally mounted hanger members 27 and 28. The hanger members 27 and 28 are biased downward by springs 29 and 30, respectively, which are attached at one end to the hangers 27 and 28 and to the machine side frame members RS and LS at the other end, as shown in FIGS. 2 and 3. Each of the machine side frame members RS and LS, FIG. 3, has a cutout portion to accommodate the hangers 27 and 28 and springs 29 and 30.

A gear 31, FIG. 2, is fixed to one end of the shaft 26 extending through the associated supporting hanger 27. The gear 31 meshes with a gear 32 fixed to one end of shaft 23 extending through a bearing fixed in the machine side frame LS. The other end of the shaft 23 is similarly journaled in a bearing fixed in the other machine side frame member RS.

From the structure so far described, it is seen that the lower feed rolls 24 and 25 fixed to shaft 26 are normally biased by springs 29 and 30 away from the opposed upper feed rolls 21 and 22 fixed to shaft 23. As it will be seen shortly, the degree that the lower feed rolls 24 and 25 are separated from the opposed upper feed rolls 21 and 22 is limited by card grippers 70 and the gears 31 and 32 are in mesh at all times. The feed rolls are driven through a gear 40 fixed upon a shaft 41 to be in mesh with gear 31. The shaft 41 is driven by any suitable driving source, not shown.

In order to bring the lower feed rolls 24 and 25, which are normally biased away from or out of cooperation with the upper feed rolls 21 and 22, into cooperative relationship with feed rolls 21 and 22, electric coils 50 and 51 are respectively disposed to embrace the feed roll shafts 23 and 26, respectively. The electric coils 50 and 51 embrace the shafts 23 and 26 so as to permit free turning of these shafts. Further, the diameter of the electric coils 50 and 51 is restricted to the extent that the coils do not interfere with the passage of the records being fed. While the records could be guided by the opposed outer peripheries of the coils 50 and 51, the coils are shown as being out of contact with the records. Further, the coils 50 and 51 could be fitted with bearings, where the inner races of the bearings are fixed to the shafts 23 and 26 and the outer races are fixed to the bore of the coils 50 and 51. However, except for the fact that the coils 50 and 51 should not interfere with the feeding of the records, the particular manner for mounting the coils 50 and 51 is relatively insignificant.

The leads of the coils 50 and 51 are connected to be electrically energized so that the feed rolls 21 and 25 are of like polarity and the feed rolls 22 and 24 are of like polarity; the polarity of the feed rolls 21 and 25 is opposite to the polarity of feed rolls 22 and 24. Hence, when the electric coils 50 and 51 are electrically energized, the lower feed rolls 24 and 25 are urged into cooperative feeding relationship with the upper feed rolls 21 and 22 by the attracting magnetic forces set up which overcome the biasing forces of the springs 29 and 30. Of course, the biasing force of the springs 29 and 30 could also be driven by energizing the electric coils 50 and 51 so that all of the feed rolls 21, 22, 24 and 25 are of like polarity, whereby the opposed feed rolls repel each other so that the lower feed rolls are moved out of cooperative relationship with the upper feed rolls.

By the arrangement so far described, it is seen that the lower feed rolls 24 and 25 will be in cooperative relationship with the upper feed rolls 21 and 22 so long as the electric coils 50 and 51 are energized to magnetize the feed rolls 21 and 25 with like polarity to each other and opposite to the like polarity of feed rolls 22 and 24. Hence, records may be continuously fed by keeping the electric coils 50 and 51 energized in the manner just stated. However, in this example, the record cards are to be fed in increments so that successive rows or columns of the cards are positioned relative to the punch mechanism 17 in FIG. 1. Further, in this example, the machine is assumed to be operating on a 14-cycle point basis. Hence, the electric coils 50 and 51 and like electric coils for the cooperating feed rolls 18 are alternately energized and de-energized fourteen times each machine cycle. To accomplish this, a multilobe or 14-lobe cam 59, FIG. 5, is disposed to actuate one contact of normally open contacts C1 connected in an electrical circuit for energizing the electric coils. The electric coils are connected in parallel between conductors 60 and 61 which lead to a suitable source of D.C. supply voltage. The normally open contacts C1 are connected by the conductor 60 to be in series with the electric coils. In this manner, each time the contacts C1 are closed by the rotating cam 50, the lower feed rolls 24 and 25 are brought into cooperative relationship with the upper feed rolls 21 and 22 to feed the record card engaged thereby. Hence, the record card is advanced in increments, whereby rows of index positions are successively positioned relative to the punch mechanism 17.

As previously stated, it is essential that the record cards be stopped precisely so that the index positions will be in proper relative alignment with the punch mechanism 17. While the intermittently operated feed rolls will feed the record cards just so far each time the feed rolls are in cooperative relationship with each other, it is desirable to employ some type of gripping device to hold the record card while the same is being punched.

In this example, card grippers 70, FIGS. 2 and 4, are disposed to grip the marginal lateral edges of the record cards being fed. The gripper assemblies 70 for each lateral edge are substantially alike in structure. Each gripper assembly 70 is adapted to grip the related marginal lateral edge when the electric coils 50 and 51 are de-energized and to release its grip upon the related marginal lateral edge when the electric coils 50 and 51 are energized.

Each of the gripper assemblies 70 is composed of two interfitting members 71 and 72, FIG. 4. The member 71 is of an L-shaped configuration where a vertical leg 73 is provided with a bore 74 which is adapted to embrace the shaft 26. The width of the leg 73 is such so as to fit between two spaced apart legs 75 of the member 72. The legs 75 are joined at their upper end or are integral with a cross-member 76 which has a bore 77 adapted to embrace the shaft 23. As it will be seen shortly, the centers of the bores 74 and 77 are located in the members 71 and 72 so that, when the members 71 and 72 are disposed upon the shafts 26 and 23, respectively, a laterally extending arm 78 of the member 71 is spaced from and above a laterally extending arm 79 of the member 72, FIG. 2. The arm 78, FIGS. 2 and 4, extends at right angles from the upper end of the leg 73, while the arm 79 extends from and between the legs 75. The spacing between the arms 78 and 79 increases and decreases as the electric coils 50 and 51 are energized and de-energized, respectively. The spacing is such that, when the electric coils 50 and 51 are energized, the arms 78 and 79 are out of contact with the marginal edges of the record cards. However, upon de-energization of the electric coils 50 and 51, the arm 78 is carried downward with the shaft 26 to grip the related marginal edge of the record card against the arm 79. By this arrangement, the record cards are positively gripped to be held against movement during the punching operation and will be free to be moved when the lower feed rolls 24 and 25 are urged into cooperative relationship with the upper feed rolls 21 and 22 for feeding the record cards. Further, by this arrangement, the members 71 and 72 act as limiting stops to prevent the springs 29 and 30 from separating the lower feed rolls from the upper feed rolls far enough to move the gears 31 and 32 out of mesh.

From the above, it is seen that apparatus has been

provided to intermittently or continuously feed records while the apparatus itself is driven continuously. Further, it is seen that the invention achieves its objectives in a rather inexpensive and direct manner. It is also seen that the apparatus for feeding the records is operably connected to actuate record gripping apparatus. The record gripping apparatus is actuated to release a record when the same is to be fed and to grip the record upon the termination of the feeding thereof.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A device of the type described comprising: a pair of parallel spaced feed roll shafts; a pair of spaced apart feed rolls carried by each shaft, the feed rolls carried by one shaft being disposed opposite the feed rolls carried by the other shaft, said feed rolls capable of being magnetized; electric coils journaled on each of said shafts; means for normally biasing said shafts away from each other to hold the oppositely disposed feed rolls out of cooperative feeding relationship with each other; and means for energizing said electric coils to magnetize said oppositely disposed feed rolls with different polarities so that the same are attracted toward each other into cooperative feeding relationship.

2. A device of the type according to claim 1 further comprising means for selectively operating said means for energizing said electric coils so as to selectively bring the oppositely disposed feed rolls into cooperative feeding relationship.

3. A device of the type described comprising: a pair of parallel spaced feed roll shafts; oppositely disposed feed rolls carried by said shafts, said feed rolls capable of being magnetized; electric coils journalled on each of said shafts; biasing means for normally biasing said shafts away from each other so as to urge said feed rolls out of cooperative feeding relationship with each other; and means for energizing said electric coils to magnetize said oppositely disposed feed rolls with different polarities so that the same are attracted toward each other into cooperative feeding relationship.

4. A device of the type according to claim 3 further comprising control means for selectively operating said means for electrically energizing said electric coils to selectively bring said oppositely disposed feed rolls into cooperative feeding relationship.

5. A device of the type according to claim 4 further comprising gripping means operably connected to be actuated to a closed position by said biasing means and to an open position when said control means operates said means for electrically energizing said electric coils to bring said oppositely disposed feed rolls into cooperative feeding relationship.

6. A device of the type according to claim 5 wherein said gripping means consists of gripping elements disposed to cooperate with each other so as to limit the amount that said shafts are biased away from each other.

7. A device of the type described comprising: a pair of parallel spaced feed roll shafts; gears fixed to said shafts so as to be in mesh with each other; means for continuously driving said shafts through said gears; oppositely disposed feed rolls carried by said shafts, said feed rolls adapted to be magnetized; electric coils journalled on each of said shafts to permit the free turning thereof; biasing means for normally biasing said shafts away from each other so as to urge said feed rolls out of cooperative feeding relationship with each other; means for limiting the amount that said feed rolls are biased away from each other so that the gears carried thereby remain in mesh with each other; and means for selectively energizing said electric coils to magnetize said oppositely disposed feed rolls with different polarities so that the same are attracted toward each other overcoming said biasing means to come into cooperative feeding relationship.

8. In a device of the type described, a pair of parallel spaced feed roll shafts relatively movable a predetermined distance toward and away from each other; a first gripper member carried by one of said feed roll shafts; and a second gripper member carried by the other of said feed roll shafts, said first and second gripper members being relatively moved into cooperative gripping relationship when said feed roll shafts are relatively moved said predetermined distance away from each other and out of cooperative gripping relationship when said feed roll shafts are relatively moved said predetermined distance toward each other.

9. A device of the type described comprising: a pair of parallel spaced feed roll shafts relatively movable a predetermined distance toward and away from each other; oppositely disposed feed rolls carried by said shafts, said feed rolls capable of being magnetized; biasing means for normally biasing said shafts away from each other so as to urge said feed rolls out of cooperative feeding relationship with each other; electric coils journalled on each of said shafts; a first gripper member carried by one of said feed roll shafts; a second gripper member carried by the other of said feed roll shafts, said first and second gripper members being moved into cooperative gripping relationship when said feed rolls are out of cooperative feeding relationship with each other and out of cooperative gripping relationship when said feed rolls are moved into cooperative feeding relationship with each other; and means for energizing said electric coils to magnetize said oppositely disposed feed rolls with different polarities so that the same are attracted toward each other overcoming said biasing means to come into cooperative feeding relationship.

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