United States Patent

Steigerwald et al.

[54] RECORD SEPARATING, READING, AND DELIVERING APPARATUS

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[22] Filed: Jan. 5, 1973

[21] Appl. No.: 321,170

[52] U.S. Cl.......... 271/4, 235/61.11 D, 271/64, 271/118

[51] Int. Cl............. B65H 3/06, B65H 29/60

[58] Field of Search........ 271/4, 118, 117, 52, 64, 271/5, 34, 35, 51, 53; 235/61.11 D

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ABSTRACT

There is disclosed sheet handling apparatus which is adapted to read sheets such as data encoded tags. The apparatus includes a sheet feeder, a sheet stacker, and an endless feed member such as a feed wheel which is common to the sheet feeder and to the sheet stacker. A cam-operated pusher causes relative movement between the stack of sheets in a first hopper of the sheet feeder and the feed wheel to effect feeding of successive sheets from the first hopper to either a second hopper of the sheet stacker or to a third hopper. The apparatus reads the encoded data on the sheets and discharges them into the third hopper if successfully read or into the second hopper if not successfully read.

16 Claims, 8 Drawing Figures
RECORD SEPARATING, READING, AND DELIVERING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

Reference is hereby made to a related U.S. application Ser. No. 321,373 of Richard A. Harrison owned by the assignee of the present application, filed on even date herewith, and entitled RECORD READING APPARATUS.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the art of sheet handling and more particularly to the art of feeding, reading and stacking of encoded tags.

2. Brief Description of the Prior Art

The following prior art U.S. patents which are of general background interest are as follows: U.S. Pat. Nos. 549,111; 976,640; 1,441,271; 2,378,250; 2,950,799; 2,971,414; 3,086,772; 3,278,021; 3,561,755; 3,580,566; and 3,791,516.

SUMMARY OF THE INVENTION

The invention is directed to sheet handling apparatus which is simple in construction and yet achieves the result of feeding a sheet from one end of a first stack, utilizing the sheets as they are fed such as by reading data contained on the sheets, and then stacking the sheets directly in a hopper. Alternately certain of the sheets, for example, those that have been successfully read, can be discharged into and stacked in a suitable receiver such as a hopper. It is apparent that other and different functions can be performed as the sheets are being fed from one hopper to one or the other hoppers. For example, the sheets can be counted or imprinted with data. The prior art contains various examples of complicated mechanisms for feeding and stacking sheets. In accordance with a specific embodiment of the invention, there is comprised endless feed means for feeding sheets, a sheet feeder comprised in part by the endless feed means and a sheet stacker also comprised in part by the endless feed means. The endless feed means is cooperable directly with a sheet at the end of a first stack in the sheet feeder for feeding the sheets directly to the sheet stacker and for stacking the sheet in a second stack in the sheet stacker. More specifically, the endless feed means comprises a feed wheel which feeds one sheet at a time directly from the first stack to the second stack. This endless feed means preferably also includes another feed wheel which is cooperable with the endmost sheet in the first stack for assisting the separation of the endmost sheet in the first stack and the initiation of feeding by the one feed wheel. In order to feed the sheets successively one following the other and spaced-apart by a small gap between the trailing edge of one sheet and the leading edge of the next succeeding sheet, there is provided means for enabling the endless feed means to perform its feeding function repetitively. The enabling means comprises means for effecting relative movement between the first stack and the endless feed means, and more specifically comprises a pusher for pushing the stack away from the feed wheels and thereafter permitting the stack to move into cooperation with the feed wheels to effect feeding of another sheet. The pusher is controlled by a continuously rotating cam, and the cam and the feed wheels are driven continuously. According to the invention, a sheet or record such as a tag can be read by the apparatus irrespective of which end edge of the tag is the leading or the trailing edge or which side of the tag with the encoded data faces in either inward or outward directions. Specifically this is accomplished by providing at least one and preferably two read heads outward of the periphery of the feed wheel and at least one and preferably two read heads inward of the periphery of the feed wheel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of sheet handling apparatus in accordance with the invention;
FIG. 2 is a view taken perpendicularly to the front face of the apparatus, the feed wheels contacting the stack;
FIG. 3 is a view taken perpendicularly to the rear face of the apparatus;
FIG. 4 is an enlarged fragmentary view similar to FIG. 2, but showing a frame plate and one of the wheel members broken away for clarity;
FIG. 5 is an enlarged fragmentary view taken generally along line 5—5 of FIG. 4 showing how idler rolls which urge the sheet against the wheel members are arranged and are mounted;
FIG. 6 is an enlarged fragmentary view showing how the shafts for the idler rolls are mounted;
FIG. 7 is a sectional view taken generally along line 7—7 of FIG. 4; and
FIG. 8 is a diagrammatic view showing an arrangement of controls and operative components of the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a perspective view of record reading apparatus generally indicated at 20 for handling sheets 21 arranged in a stack 22. The apparatus 20 is especially useful as a reader for reading encoded data on sheets or records such as the illustrated tags. The apparatus 20 is shown to include a sheet feeder generally indicated at 23 and a sheet stacker generally indicated at 24. The apparatus 20 includes a plate 25 which serves as the main frame. The sheet feeder 23 includes a hopper 26 suitably secured to the front face of the plate 25. The hopper 26 is shown to have a top plate 27 and a bottom plate 28 joined to a side plate 29, and opposed end plates 30 and 31 joined to the top, bottom and side plates 27, 28 and 29. The sheet stacker 24 includes a hopper 32 suitably secured to the front face of the plate 25. The hopper 32 is shown to have a top plate 33 and a bottom plate 34 joined to a side plate 35, and opposed end plates 36 and 37. The apparatus 20 also includes a hopper or bin 38 shown to be suspended from the plate 25 by hangers 39.

A frame plate 40 is mounted in fixed parallel relationship relative to the plate 25 by three posts 41, 42 and 43. A drive shaft 44 is rotatably mounted in a bearing 45 mounted by the plate 25 and in a bearing 46 mounted by the plate 40. A feed wheel generally indicated at 47 is shown to include a pair of wheels or feed wheel members 48 and 49 suitably secured to the shaft 44. A covering of flexible resilient frictional material such as rubber is disposed at the peripheries of the wheel members 48 and 49 as indicated respectively at 50 and 51 in FIG. 4. A cam 52 is formed integrally with
the shaft 44 between the wheel members 48 and 49. The cam 52 drives a follower or pusher generally indicated at 53. The follower 53 is shown to include a lever 54 pivotally mounted by the post 43. The lever 54 rotates to rotate a follower roller 55 at its one end. A tension spring 56 is secured to the plate 25 and to the other end of the lever 54. The lever 54 carries a pair of rollers 57 and 58 which extend through a slot 59 in the plate 21 at the discharge end of the hopper 26. The rollers 57 and 58 are co-axial with the endmost sheet 21 in the stack 22 as shown in FIG. 4. A weight 60 pushes on the other end of the stack 22 to urge the stack 22 toward the discharge end of the hopper 26.

With reference to FIG. 7 for example, a drive shaft 61 is mounted for rotation in bearings 62 and 63 in the respective plates 25 and 40. A feed wheel 64 is secured to the drive shaft 61. The feed wheel 64 is of one-piece construction and includes wheels or wheel members 65 and 66 formed integrally with a hub 67. The feed wheel 64 is disposed partly between the wheel members 48 and 49 as best shown in FIGS. 4 and 7.

A pulley 68 is secured to the shaft 61 adjacent the rear surface of the plate 25. The pulley 68 is driven by a belt 69 driven by a pulley 70 (FIG. 4). The pulley 70 is secured to a shaft 71 of an electric motor 71. The electric motor 71 is suitably secured to the rear face of the plate 25. A pulley 72 also secured to the shaft 71 drives a belt 73 which in turn drives a pulley 74 secured to the drive shaft 44. The ratio of the diameters of the pulleys 68 and 70 and the diameter of the feed wheel 64 to the diameters of the pulleys 72 and 74 and the diameter of the feed wheel 47 is such that the peripheral speed of the feed wheels 47 and 64 is about the same. As the shaft 44 and the cam 52 which it carries continues to rotate, the pusher 53 will cause the stack 22 to be pushed away from the feed wheels 47 and 64. Whenever the roller 55 is on or near one of the high points 52a or 52b of the cam 52, the pusher 53 and its rollers 57 and 58 are in the counterclockwise position as viewed in FIG. 4. In FIG. 4 for example, in contact with endmost sheet 21 of the stack 22. Whenever the roller 55 is on or near one of the low points 52c or 52d of the cam 52, the feed wheels 47 and 64 will be in contact with the endmost sheet 21 in the stack 22, thereby causing the endmost sheet in the stack 22 to be fed out of the stack 22 past a gate 75 and between sets of rollers 77 and 78 and the feed wheel 47. The feed wheel 64 helps start endmost sheet 21 into feeding cooperation with the feed wheel 47. This is desirable in that the feed wheel 47 is positioned to frictionally engage only the leading marginal end of the endmost sheet 21. The gate 75 assures that only one sheet at a time can be fed out of the stack 22. Rolls 78 urge the sheet 21 against the wheel members 48 and 49 and rolls 77 are arranged to cause the sheet 21 to follow the contours of the wheel members 48 and 49. As the sheet passes the gate 75 it passes in front of spaced-apart feed heads 79 and 80. As the sheet continues to travel, it passes in front of spaced-apart feed heads 81 and 82. As viewed in FIG. 4, the feed head 80 is directly behind the feed head 79 and the feed head 82 is directly behind the feed head 81. If the data on the sheet 21 directly faces either the feed head 79 or the feed head 80, that one feed head will read the data. However, if the data on the sheet 21 directly faces either the read head 81 or the read head 82, that one read head will read the data. One of the read heads 79 through 82 controls the position of a gate generally indicated at 83. The gate 83 is illustrated as comprising a bell crank 84 pivotally mounted on a pin 85. The pin 85 is mounted by the plates 25 and 40. A solenoid 86 is secured to a wall 87 of a discharge chute generally indicated at 88. The solenoid 86 has an armature 89 which is connected to the bell crank 84 by a pin and slot connection 90. A tension spring 91, connected at one end to the armature 89 and at its other end to a post 92 mounted by the plate 25, urges the bell crank 84 and a roller 93 which it rotatably mounts into the solid line position as viewed in FIG. 4. Upon energization of the solenoid 86, the armature 89 moves against the force exerted by the spring 91, and the bell crank 84 and its roller 93 are urged into the position shown by phantom lines PL. When the roller 92 is in the position shown by solid lines in FIG. 4, the sheet 21 follows a line generally indicated at L1. The sheet 21 then enters the discharge chute 88 and, because of its momentum, can follow the curved wall 88 of the discharge chute 88 as best shown in FIG. 1. The tag then descends into the hopper 38. If the solenoid 86 had been energized, the roller 93 would cause the sheet 21 to follow a line as indicated at L2. In so doing the sheet 21 passes through a cutout 94 in the plate 36 sufficiently large to enable the sheet 21 to enter the hopper 32. If there are no sheets in the hopper 32, the sheet 21 which initially follows the line L2 will be fed between a weight 95 and a pair of spaced-apart rolls 96. When another sheet passes between the feed wheel 47 and the rolls 78 downstream of the wheel 93 it will move into contact with the preceding sheet in stack 97 and will pass generally upwardly as viewed in FIG. 4 in contact with the rolls 96. As the size of the stack 97 increases the rear face 98 of the weight 95 will contact a button 99 of an electrical switch 100 to prevent the feeding of additional sheets out of the stack 22 as will be described below in greater detail.

Means are provided to override the effect of the cam 52 to prevent feeding sheets 21 while the electric motor 72 is operating, as is sometimes desirable such as when the apparatus is being started and during times when the hopper 26 is being loaded. To accomplish this, solenoid 101 is energized, thereby pivoting the lever 54 clockwise (FIG. 4) to a position opposite the cam 52 so that rotation of the cam 52 has no effect on the pusher 53. So long as the solenoid 101 is energized, the rollers 57 and 58 hold the stack 22 away from the feed wheels 47 and 64 to prevent them from feeding any sheet 21 out of the stack 22.

With reference to FIG. 5, the rollers 77 and 78 are mounted on respective shafts 77a and 78a. The shafts are received in respective elongated radially extending slots 77b and 77c in respective plates 25 and 40. As shown in FIG. 5, each roller 77 and 78 is mounted by a ball bearing 77e and 78e. The rollers 77 and 78 are slightly narrower than the wheel members 48 and 49. The rollers 77 overlap the rollers 78 transversely to the direction of feed as shown in FIGS. 4, 5 and 6 and are disposed midway between the rollers 78. The rollers 78 are aligned with the respective wheel members 48 and 49 and springs 77f and 77g urge the shafts 78a and the rollers 78 toward the respective wheel members 48 and 49 so that the shafts 78a bottom at the ends of respective slots 78b and 78c which are closer to the axis of the drive shaft 44. Springs 77f and 77g urge the respective shafts 77a and the rollers 77 away from the axis of the
drive shaft 44 so that the shafts 77a bottom at the ends of respective slots 77a and 77c. The clearance between the rollers 78 and the wheel members 48 and 49 is less than the thickness of one of the sheets 21. The rollers 77 are disposed at a greater distance from the axis of the shaft 44 than the radius of the wheels 48 or 49 plus the thickness of a sheet 21. The rollers 77 are nonetheless beneficial in directing the sheet to follow the contour of the feed wheel 47 as the sheet makes the transition from one pair of rollers 78 to the next pair of rollers 78. Although only the springs 77g and 78g are shown in elevation and in detail in FIG. 6, the springs 77f and 78f are identical to the respective springs 77g and 78g.

FIG. 8 diagrammatically represents the arrangement of the operative components of the apparatus 20 in relation to its controls generally indicated at 90 from which data which has been read can be output as indicated at 91. The read heads 79 and 80 are shown spaced-apart in the direction of travel of the sheet 21, and the read heads 81 and 82 are shown spaced-apart in the direction of travel of the sheet 21 for clarity. However, read heads 79 and 80 lie in a plane transverse to the direction of feed and which passes through the axis of the shaft 44, and read heads 81 and 82 lie in another plane transverse to the direction of feed and which passes through the axis of the shaft 44. The read heads 81 and 82 are considered to be disposed in a gap in the feed wheel 47 and more specifically the read heads 81 and 82 are disposed in a gap provided by the spaced-apart wheel members 48 and 49. The read heads 79 and 80, and 81 and 82 are suitably mounted to the plate 25 by brackets 25'. In the illustrated embodiment, the read heads 79 and 81 lie in a plane P1 which is disposed between the feed wheel members 48 and 49 and which is perpendicular to the axis of the drive shaft 44. The read heads 80 and 82 lie in a plane P2 which is disposed between the feed wheel members 48 and 49, which is parallel to the plane P1 through the read heads 79 and 81, and which is perpendicular to the axis of the drive shaft 44. If the data is encoded in a row extending along one marginal side edge of the record sheet and faces outwardly toward the read head 79 as would be the case with the record sheet 21a in FIG. 1, then the data will be read by the read head 79. If the data is encoded in a row extending along the other marginal side edge of the sheet and faces outwardly toward the read head 80 as would be the case with the record sheet 21b in FIG. 1, then the data will be read by the read head 80. If the sheet is turned around so that the row of data faces inward either the read head 81 or the read head 82, then that respective read head 81 or 82 will read the data. Only one read head at a time will read the data of any one record sheet because of the gap between the trailing edge of one sheet and the leading edge of the next successive sheet. If the data is read successfully by one of the read heads 79 through 82, the sheet 21 will be discharged into the hopper 38. If the data on a sheet 21 is not read successfully, the controls 142 will operate the solenoid to cause that sheet to be stacked in the hopper 32. Immediately thereafter the solenoid 86 is automatically deenergized and the next successive ticket will either be discharged into the hopper 38 if successfully read, or the solenoid 86 will be energized again if that next sheet 21 is not successfully read to stack that sheet 21 in the hopper 32. When the face 98 (FIG. 4) of the weight 95 depresses the button 99 of the switch 100, the controls 90 operate the solenoid to prevent feeding of any additional sheets 21. Details of a control system for the apparatus 20 are disclosed in the above-mentioned patent application of Richard A. Harrison, the disclosure of which is incorporated herein by reference.

Both the feed wheels 47 and 64 are considered to be endless feed members. In the illustrated embodiment the endless feed members are feed wheels, yet they can be endless belts (not shown) trained over pulleys (not shown). More particularly, the wheels or wheel members 48 and 49 can instead be endless belts and such belts would be trained over pulleys disposed in the planes of the wheels 48 and 49.

Other embodiments and modifications of this invention will suggest themselves to those skilled in the art, and all such of these as come within the spirit of this invention are included within its scope as best defined by the appended claims.

We claim:
1. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the hopper to cooperate with the leading marginal end of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for mounting the feed wheel members, a cam carried by the shaft and disposed between the feed wheel members, means including an electric motor for continuously driving the shaft and the second feed wheel, a follower driven by the cam for contacting the sheet at the end of the stack for alternately moving the stack into and out of cooperation with the first and second feed wheels, and means including a read head disposed between the feed wheel members for reading data on the sheet as the sheet is being fed.

2. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the hopper to cooperate with the leading marginal end of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for mounting the feed wheel members, a cam carried by the shaft and disposed between the feed wheel members, means including an electric motor for continuously driving the shaft and the second feed wheel, a pivotally mounted lever driven by the cam, means carried by the lever and straddling the second feed wheel for contacting the sheet at the end of the stack at spaced apart locations in the plane of rotation of the second feed wheel for alternately moving the stack into and out of cooperation with the first and second feed wheels, and means including a read head disposed between the feed wheel members for reading data on the sheet as the sheet is being fed.

3. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the hopper to cooperate with the leading marginal end of a sheet at the end of the stack, the second feed wheel
being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for mounting the feed wheel members, a cam carried by the shaft and disposed between the feed wheel members, means including an electric motor for continuously driving the shaft and the second feed wheel, a pivotally mounted lever having a follower roller driven by the cam, a pair of rollers carried by the lever and straddling the second feed wheel for contacting the sheet at the end of the stack in the plane of rotation of the second feed wheel for alternately moving the stack into and out of cooperation with the first and second feed wheels, and means including a read head disposed between the feed wheel members for reading data on the sheet as the sheet is being fed.

4. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels cooperate with the end sheet in the hopper, the first feed wheel comprising spaced-apart feed wheel members, a drive shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, a cam mounted by the drive shaft between the feed wheel members, a follower operable by the cam for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, means carried by the follower for contacting the end sheet at spaced-apart locations, the sheet contacting means including a roller, means for continuously driving the drive shaft and the second feed wheel, and a selectively operable solenoid coupled to the follower for moving the follower to a position in which the end sheet in the stack is held out of feeding relationship with the first and second feed wheels.

5. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed between the feed wheel members but extending beyond the peripheries of the feed wheel members, a cam mounted by the shaft between the feed wheel members, a cam follower operated by the cam for moving the stack into and out of feeding cooperation with respect to the first and second feed wheels, the cam follower having spaced-apart means for contacting the endmost sheet in the hopper, means for reading data disposed on the sheets, and a second hopper disposed to cooperate directly with the first feed wheel for stacking sheets read by the reading means.

7. Record reading apparatus, comprising: a hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, and a pusher disposed between the feed wheel members in the plane of the second feed wheel for moving the stack into and out of feeding relationship with respect to the first and second feed wheels.

8. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, a pusher disposed between the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, and a second hopper disposed to cooperate directly with the first feed wheel for stacking the sheets.

9. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, a pusher disposed between the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, and a second hopper disposed to cooperate directly with the first feed wheel for stacking the sheets.
wheel being disposed between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, means disposed between the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, means for reading data disposed on the sheets, and a second hopper disposed to cooperate directly with the first feed wheel for stacking sheets read by the reading means.

10. Record reading apparatus, comprising: a hopper for holding a stack of sheets, a feed wheel cooperating with a sheet at the end of the stack, a cam, a drive shaft for drivingly mounting the feed wheel and the cam, means for continuously driving the drive shaft, a follower operable by the cam for moving the stack into and out of feeding relationship with respect to the feed wheel in response to rotation of the drive shaft, and a selectively operable solenoid coupled to the follower for moving the follower to a position in which the end sheet in the stack is held out of feeding relationship with the first and second feed wheels.

11. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal end of a sheet at the end of the stack, the second feed wheel being disposed relative to the first hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft for mounting the feed wheel members, a cam carried by the shaft and disposed between the feed wheel members, means including an electric motor for continuously driving the shaft and the second feed wheel, a follower driven by the cam for contacting the sheet at the end of the stack for alternately moving the stack into and out of cooperation with the first and second feed wheels, means including a read head disposed between the feed wheel members for reading data on the sheet as the sheet is being fed, second and third hoppers for receiving sheets directly from the first feed wheel, and a gate movable between one position in which the first feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel feeds the sheet directly into the third hopper.

12. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels cooperating with the end sheet in the first hopper, the first feed wheel comprising spaced-apart feed wheel members, a drive shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, a cam mounted by the drive shaft between the feed wheel members, a follower operable by the cam for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, means carried by the follower for contacting the end sheet at spaced-apart locations, the sheet contacting means including a roller, means for continuously driving the drive shaft and the second feed wheel, a selectively operable solenoid for moving the follower to a position in which the end sheet in the stack is held out of feeding relationship with the first and second feed wheels for holding a stack of sheets, and a second hopper disposed for receiving sheets directly from the first feed wheel, a gate movable between one position in which the first feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel feeds the sheet directly into the third hopper, and means upstream of the gate for reading data on sheets fed by the feed wheels.

13. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the first hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, a pusher disposed between the feed wheel members in the plane of the second feed wheel for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, second and third hoppers for receiving sheets directly from the first feed wheel, a gate movable between one position in which the first feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel feeds the sheet directly into the third hopper, and means upstream of the gate for reading data on sheets fed by the feed wheels.

14. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, a pusher disposed between the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, second and third hoppers for receiving the sheets fed directly by the first feed wheel, and a gate movable between one position in which the first feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel feeds the sheet directly into the third hopper.

15. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, first and second feed wheels, the first feed wheel being disposed relative to the first hopper to cooperate with the leading marginal edge of a sheet at the end of the stack, the second feed wheel being disposed relative to the hopper to cooperate with the sheet at the end of the stack between its leading and trailing ends, the first feed wheel comprising spaced-apart feed wheel members, a shaft drivingly mounting the feed wheel members, the second feed wheel having a substantially smaller diameter than the diameter of the first feed wheel, the second feed wheel being disposed in a plane between the feed wheel members but extending beyond the peripheries of the feed wheel members, means for driving the drive shaft and the second feed wheel, a pusher disposed between the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and second feed wheels, second and third hoppers for receiving the sheets fed directly by the first feed wheel, and a gate movable between one position in which the first feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel feeds the sheet directly into the third hopper.
feed wheel being disposed between the feed wheel members but extending beyond the peripheries of the
feed wheel members, means for driving the drive shaft and the second feed wheel, means disposed between
the feed wheel members for moving the stack into and out of feeding relationship with respect to the first and
second feed wheels, means for reading data disposed on the sheets, second and third hoppers for receiving
the sheets fed directly by the first feed wheel, and a gate movable between one position in which the first
feed wheel feeds the sheet directly into the second hopper and another position in which the first feed wheel
feeds the sheet directly into the third hopper.

16. Record reading apparatus, comprising: a first hopper for holding a stack of sheets, a feed wheel coop-
erable with a sheet at the end of the stack, a cam, a drive shaft for drivingly mounting the feed wheel and
the cam, means for continuously driving the drive shaft, a follower operable by the cam for moving the stack
into and out of feeding relationship with respect to the feed wheel in response to rotation of the drive shaft,
and a selectively operable solenoid coupled to the follower for moving the follower to a position in which the
end sheet in the stack is held out of feeding relationship with the first and second feed wheels, second and third
hoppers for receiving sheets directly from the feed wheel, a gate movable between one position in which
the feed wheel feeds the sheet into the second hopper and another position in which the feed wheel feeds the
sheet into the third hopper, and means upstream of the gate for reading data on sheets fed by the feed wheel.

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