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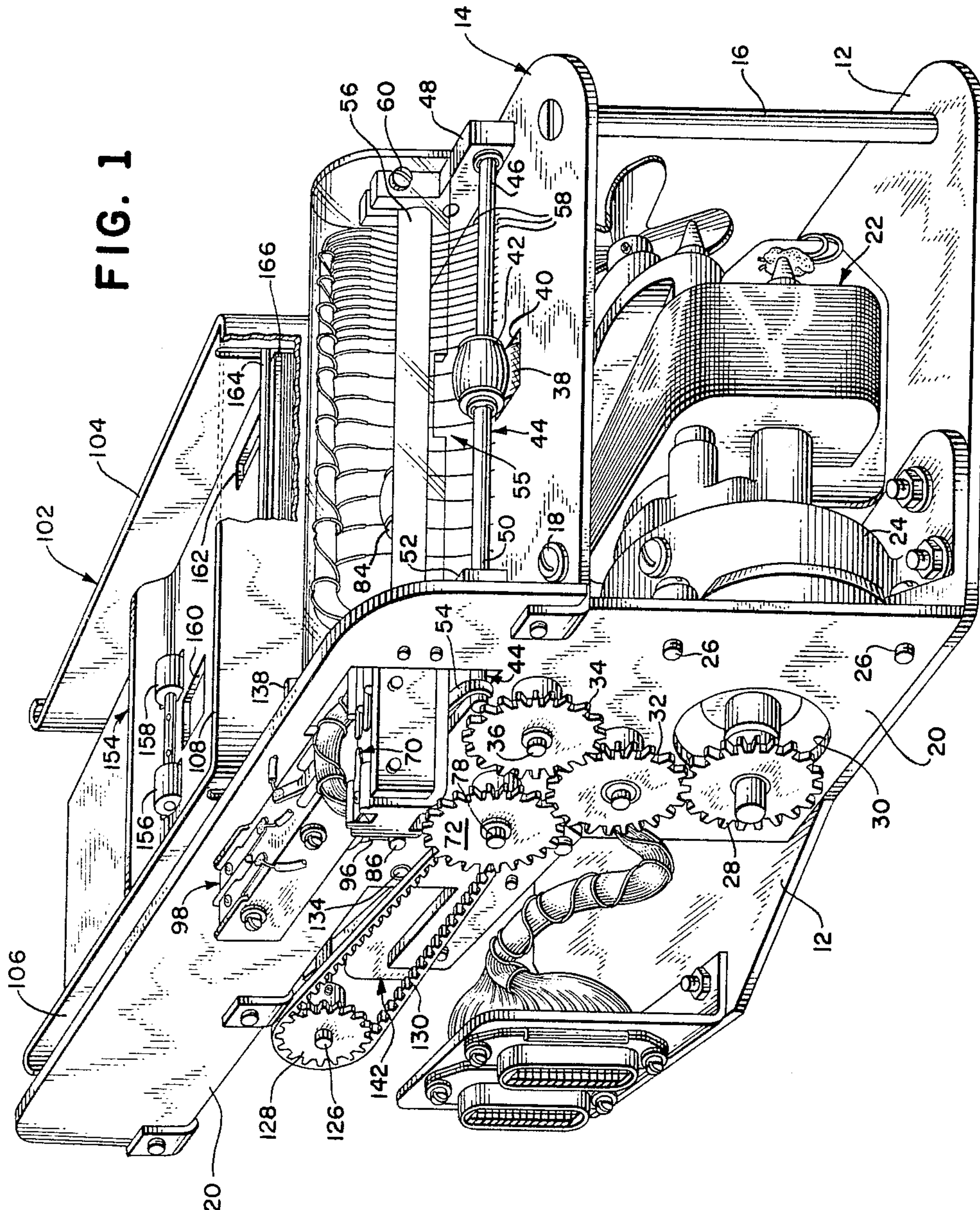
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3,232,604

CARD FEED MECHANISM

Filed Jan. 14, 1963

3 Sheets-Sheet 1



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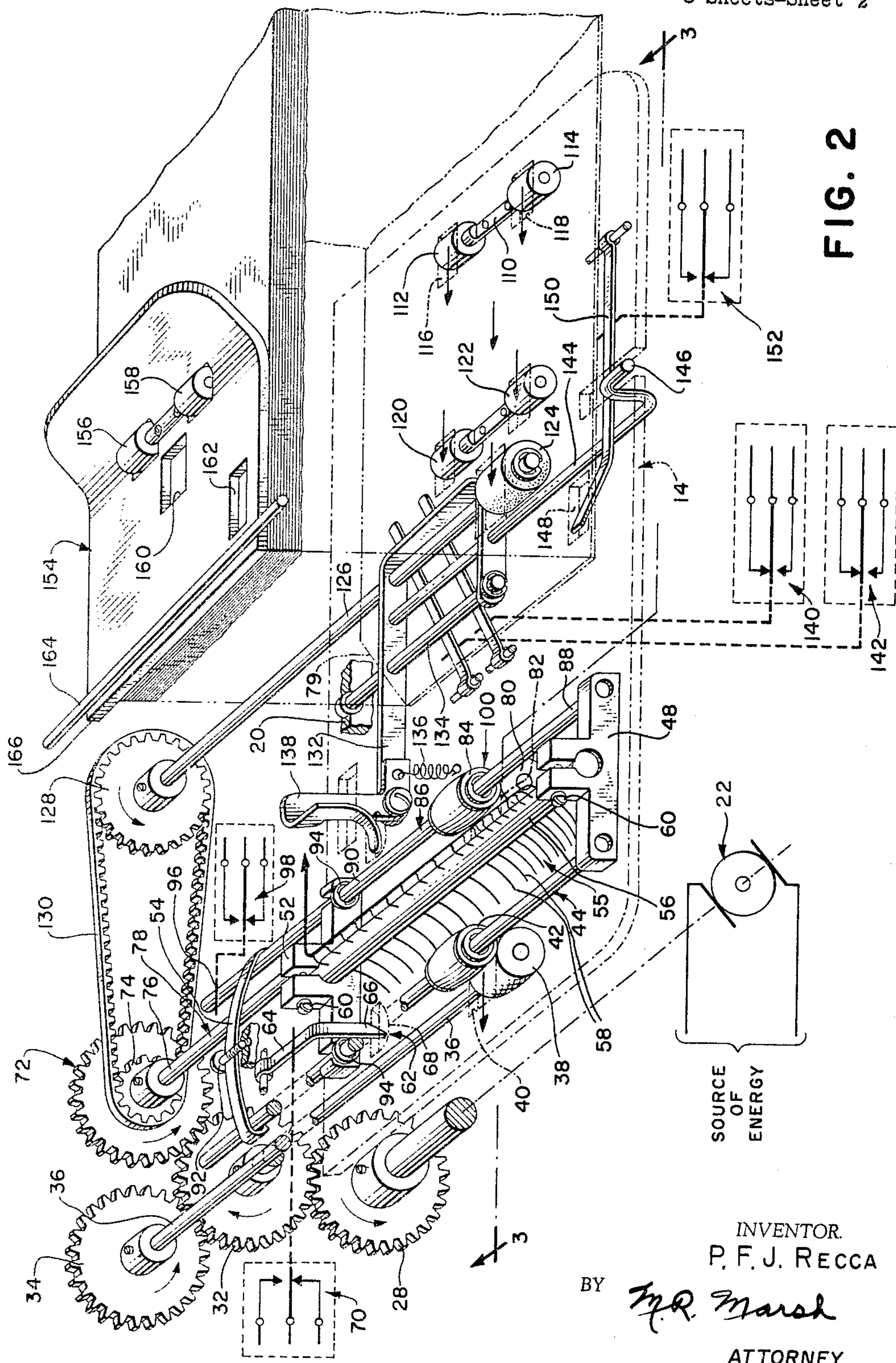
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CARD FEED MECHANISM

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SOURCE
OF
ENERGY

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CARD FEED MECHANISM

3 Sheets-Sheet 3

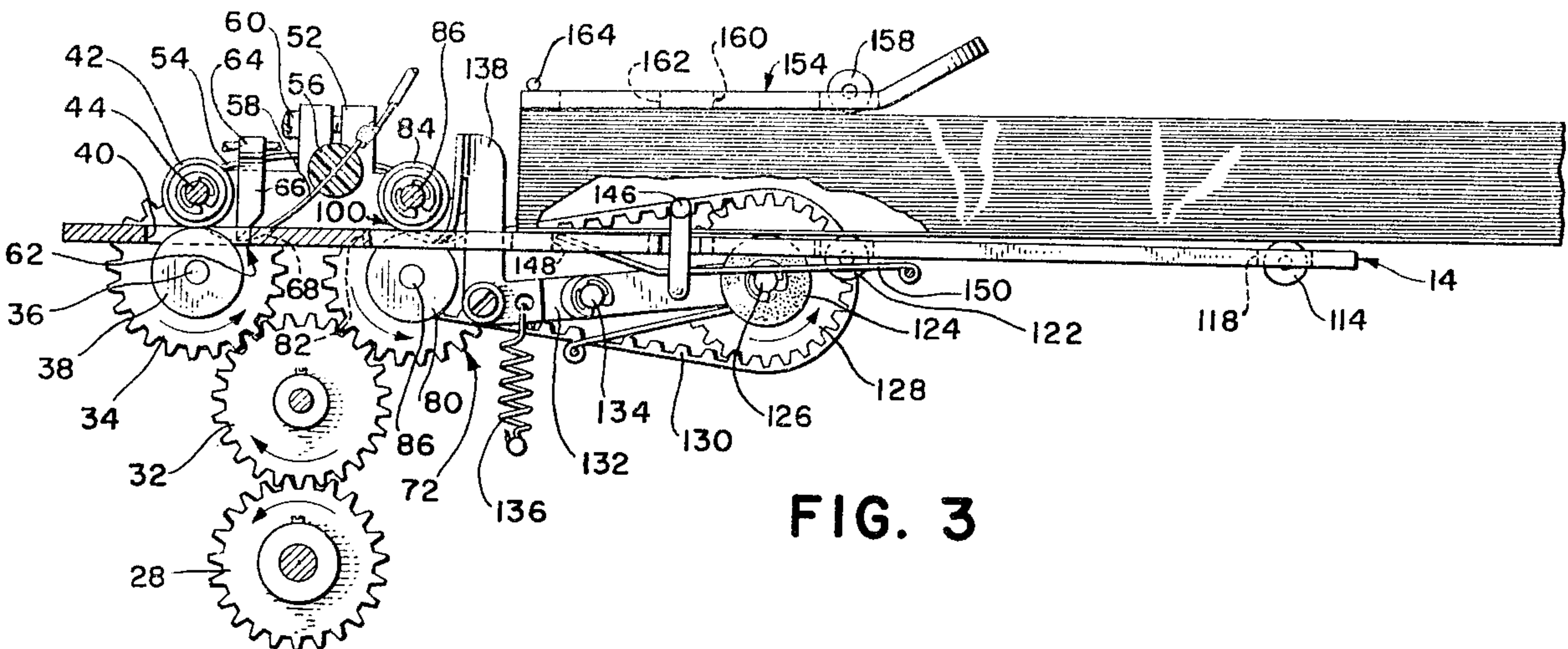


FIG. 3

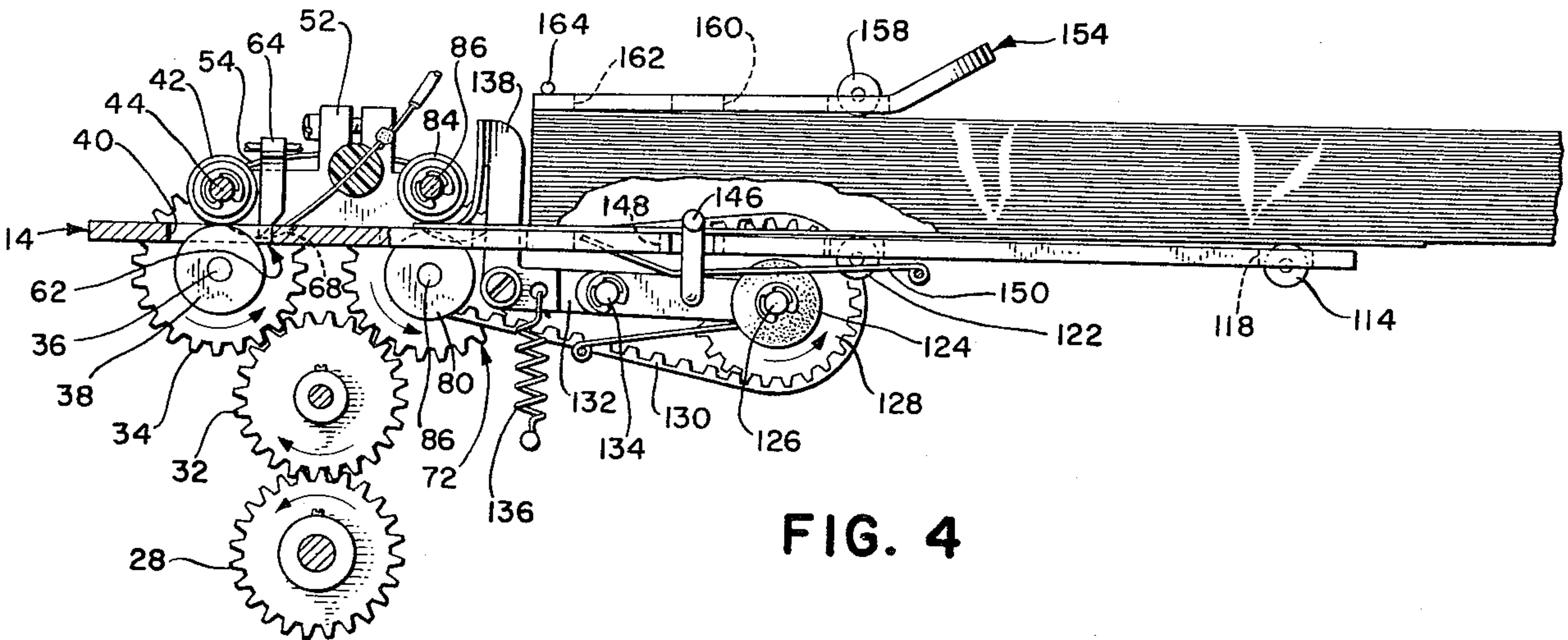


FIG. 4

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1

3,232,604

CARD FEED MECHANISM

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5 Claims. (Cl. 271-4)

This invention relates generally to a card feed mechanism and more particularly to a device which feeds cards from a stack serially past a given point.

It is an object of this invention to provide a device which can feed, serially, cards from a stack past a sensing position.

It is another object of this invention to provide a device which will cease operation after the last card of the stack of cards has been fed past a sensing position.

It is still another object of this invention to provide a device which will stop operating if two or more cards are fed through the device simultaneously.

It is also an object of this invention to provide a device which reduces the wear and abrasion of the feeding mechanism.

It is an additional object of this invention to provide a device which indicates the presence and absence of a card at a sensing position.

It is a further object of this invention to provide a device which is reliable in operation and economical to build.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the apparatus becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is an isometric view of structure in accordance with the principles of this invention;

FIG. 2 is an electrical and mechanical diagrammatical view of structure in accordance with the principles of this invention;

FIG. 3 is a view along the line 3-3 of FIG. 2 showing a stack of cards positioned in the hopper ready to be fed to the card reading means; and

FIG. 4 is a view along the line 3-3 of FIG. 2 illustrating the feeding of a card from the bottom of the stack towards the card reading means.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Briefly, in this invention, a stack of business machine cards are placed in a hopper which contains a pressure sensitive means to indicate the presence or absence of cards and a selectively activated drive means positioned to urge the lowermost card of the stack out of the hopper. A control means driven by the card emerging from the hopper urges the selectively activated drive means to its inactive state—it being driven out of engagement with the bottom card of the stack. Immediately prior to disengagement of the driven card by the selectively activated drive means, the card is engaged by an intermediate drive means and counter means. The counter means examines the cards being fed from the hopper to prevent the inadvertent feeding of two or more cards simultaneously. The intermediate drive means engages the card as it emerges from the hopper to urge it towards a sensing means. Emerging from the sensing means, the card activates a card detecting means just prior to being engaged by a final drive means. The card detecting means indicates the passage of a card from the sensing means and the final drive means urges the card out of the device for delivery to a storage bin.

With reference to FIG. 1, there is shown an isometric view of structure in accordance with the principles of

2

this invention illustrating in detail the drive train and the final drive means.

A bottom member 12 composed of sheet steel, aluminum or the like is positioned parallel with and secured rigidly to a top member 14 also composed of sheet steel, aluminum or the like by means of spacer rods 16 and holding screws 18. A side plate 20, also composed of sheet material such as steel, aluminum, plastic or the like forms a side member with the bottom member 12 and the top member 14; and is secured rigidly to the bottom and top members by means of mounting brackets and screws.

A fractional horsepower electric motor 22 coupled to the input shaft of a reduction gear drive 24, forms a unit which is secured to the side plate 20 by means of mounting screws 26. A drive gear 28 which is supported by and locked to the output shaft of the reduction gear drive in the usual way extends through a cutout 30 in the side plate 20 for engagement with an idle gear 32. A gear 34 driven by idle gear 32 is coupled securely to a shaft 36 by means of a set screw or the like, the shaft being supported rotatably in a cantilever manner at the gear end by a bearing member in the side plate 20. A drive wheel 38 composed of rubber or knurled steel or plastic or the like is secured rigidly to and driven by the shaft 36. The drive wheel 38 is positioned to extend through and slightly beyond an access opening 40 located within the top member 14. An idle roller 42 positioned to contact the drive wheel 38 is rotatably supported by a shaft 44 which is pivotally secured at one end 46 in a support member 48; and is slidably supported at the other end 50 in a support member 52. The end 50 of shaft 44 is urged downward by a spring 54 which pivots the shaft 44 about the end 46 to drive the idle roller 42 into the drive wheel 38. The support members 48 and 52 are secured rigidly to the top member 14 by means of mounting screws.

Referring now to FIG. 2, together with FIG. 1, a sensing means 55 comprising an insulative support member 56 supports a plurality of conductive electrical brushes 58. The support member is secured rigidly to maintain a fixed preset position by means of split openings in the support members 48 and 52, the openings being urged to a closed position by clamping screws 60.

Positioned between the sensing means 55 and the final drive means is a card detecting means 62 comprising an arm member 64 pivotally secured to the side plate 20. The arm member operates in a vertical plane, the free end 66 of the arm being aligned with and urged into a cutout 68 in the top member 14 by spring loaded movable contact of an electrical switch 70. The very tip of the end 66 of the arm 64 is beveled, the bevel extending above the top surface of the top member 14 to enable the arm 64 to be pivoted upward about the pivot bearing by wedge type action between the brush and an advancing card.

A second driven gear 72, driven by idler gear 32, incorporates a small diameter belt drive gear 74 and is secured rigidly by means of a set screw or the like to one end 76 of a shaft 78. The end 76 of the shaft is supported rotatably in a cantilever manner by a bearing member in the side plate 20. A drive wheel 80 composed of rubber or knurled steel or plastic or the like is secured rigidly to and driven by the shaft 78. The drive wheel 80 is positioned to extend through and slightly beyond an access opening 82 located within the top member 14. An idle roller 84 positioned to contact the drive wheel 80 is rotatably supported by the shaft 36 which is pivotally supported at one end 88 to the support member 48; and is slidably supported at its other end 90 by the support member 52. The leaf type spring 54 which urges the idler roller 42 against the drive wheel 38 also urges the idler roller 84 against the drive wheel 80. A pin projection 92 secured rigidly to the side plate 20 maintains the

spring 54 in compression. The two slots in the support member 52—one for the shaft 44 and the other for the shaft 86 permit the shafts to pivot in a vertical plane, shaft 44 pivoting about its end 46 and shaft 86 pivoting about its end 88. Four collars 94, two on each shaft—one on each side of the support member—are secured rigidly to the shafts by solder, pins, setscrews or the like to prevent the shafts from moving longitudinally along their axis.

The drive wheel 80 and the idle roller 84 comprise the intermediate drive means.

The movable arm 96 of a set of electrical contacts 98 engages the end 90 of the shaft 86 and operates as the card counting means 100. From FIG. 2 it can be ascertained that the intermediate drive means is positioned to the right of or in front of the sensing means while the final drive means is positioned to the left of or behind the sensing means.

A channel member 102 (FIG. 1) having two side members 104, 106 and a front member 108 composed of any desired material is positioned on its side edges and secured to the top member 14 by mounting screws or the like. The channel member, together with the top member 14 forms a hopper having an open top and an open end. All cards that are to be fed through this device are first placed into the hopper.

In this invention the cards are fed sequentially from the bottom of the stack. To reduce to a minimum the friction between the bottom of the stack of cards and the top member 14, four friction reducing rollers are provided to support the stack.

A shaft 110 secured rigidly to the bottom surface of the top member 14 by screws or the like rotatably supports two rollers 112, 114, one at each end of the shaft. The roller 112 extends through a cutout 116 in the top member 14 to project into the magazine area, and the roller 114 extends through a cutout 118 in the top member 14 to project into the magazine area. A second set of rollers 120, 122 similar in construction and assemblage to rollers 112, 114 is positioned to contact and support the forward end of the cards in the hopper.

Located within the hopper and behind the rollers 120, 122 is a clearance window through which a drive roller 124 extends. The drive roller is secured rigidly to one end of a shaft 126 by pins, keying, solder or the like and contains a high friction surface such as rubber or the like. The other end of the shaft 126 is secured rigidly to and driven by a gear 128. A belt 130 engages the gear 128 and is driven by the belt drive gear 74. The shaft 126 is rotatably supported at one end of a member 132 supported pivotally by shaft 134 having one end secured to the side plate 20 and its other end secured to a support means. The other end of the member 132 is connected to a spring 136 which is connected to urge the drive roller 124 up into the hopper area. An offset U-shaped member 138 in combination with the spring 136 functions as a hopper drive control. A leg of the U-member 138 is positioned to extend down through a cutout in the top member 14 and is secured rigidly to the end of the member 132 adjacent to the spring 136. The remainder of the member 138 is located above the top member 14. The other leg of the member 138 is bent along a generous radius, sloping in the direction of travel of a moving card, its end being positioned within a cutout area in the top member 14 located external to the hopper area.

Normally, through the action of the spring 136 acting on the pivot member 132, the drive roller 124 is urged upward through its clearance window into the hopper area. However, as a card is urged forward out of the hopper its leading edge will contact the curved leg of the member 138 and urge it to move upward. This movement which is transferred to the spring end of the member 132 is against the action of the spring and, as the member pivots around the shaft 134, the drive roller 124 is moved downwards through its clearance window and out of the hopper area.

A lever 144 having an offset end is coupled to the member 132 to permit manual withdrawal of the drive roller from the hopper area by pressing the offset end 146 of the lever down. Two electrical switches 140 and 142 coupled to the pivot member 132 indicate the manual withdrawal of the driver roller 124 from the hopper area.

A clearance cutout 148 located within the top member 14 permits a pressure sensitive means to extend into the hopper area to indicate the presence or absence of a card. A bar member 150 is pivotally coupled to the bottom surface of the top member 14 at one end, the other end being offset and extending through the clearance contact 148 into the hopper area. A spring loaded electrical switch 152 contacts the bar member 150 and urges it to rotate about its pivotally coupled end to position the offset end within the hopper area. The weight of a single card plus the hold down plate 154 within the hopper area urges the end of the bar member 150 down into the clearance contact 148, and the switch 152 is activated to indicate the presence of a card within the hopper.

A hold down plate 154 composed of relatively heavy material such as $\frac{3}{16}$ or $\frac{1}{8}$ inch sheet steel is placed on top of the stack and is used as a weight to press the bottom card down against the drive roller. The hold down plate can support two rollers 156, 158 which project through two cutouts to contact the top card of a stack of cards. Also located within the hold down plate 154 are two clearance cutouts 160, 162—the cutout 160 being positioned to avoid engagement of the plate with the drive roller 124; and the cutout 162 being positioned to avoid engagement of the plate with the offset projecting end of the bar member 150. A rod 164 is secured rigidly to the top end 166 of the plate 154, the ends of the rod extending beyond the side edges of the plate. The rod ends are positioned within vertical slots, one in each side member 104, 106, which permit the plate to move freely up and down.

In operation, a stack of business machine cards are positioned within the hopper area, information side up, leading edge of the cards abutting the front member 108 of the hopper, and the hold down plate 154 positioned to contact the topmost card and press down on the stack.

Initially, with reference to FIGS. 2, 3, and 4, it shall be assumed that a stack of cards is positioned properly within the hopper and the hold down plate 154 is positioned on top of the stack. The weight of the stack plus hold down plate 154 urges the bar member 150 downward to operate switch 152 which indicates the presence of cards in the hopper.

Now, electrical energy is fed to the motor and the device begins to operate. The motor shaft transmits power through the gears 28, 32, 72, and 74 to the belt 130, to the gear 128 to drive the shaft 126, and drive roller 124. The drive roller 124 contacts the bottom surface of the lowermost card of the stack and urges it out of the hopper through a slot located between the bottom of the front member 108 and the top member 14. As the card is urged forward its leading edge is positioned between the idle roller 84 and drive wheel 80. At the same instant the edge of the corner cutout 79 of the card contacts the curved leg of the "U" member 138 and urges it to move upward against the action of the spring 136 to pull the member 132 in a clockwise direction about the shaft 134. The drive roller 124 being coupled to the other end of the member 132 is urged downward to move the drive wheel out of contact with the bottom card of the stack.

Thus, as soon as the leading edge of the card is positioned between idle roller 84 and drive wheel 80, the drive roller 124 is moved out of engagement with the bottom card of the stack, and not only is wear to the card and the drive roller 124 reduced to a minimum, but the possibility of cards being fed out of the hopper in an overlapping position is practically eliminated.

The positioning of the card between the idle roller 84 and drive wheel 80 urges the shaft 86 to pivot about its

end 88. Thus, the end 90 of the shaft 86 moves upward against the spring 54. The movable arm 96 of an electrical switch is coupled to the end 90 of the shaft 86 and is adjusted to indicate whether or not the displacement of the end 90 of the shaft 86 exceeds a predetermined value. Naturally, if two cards were fed simultaneously between the idle roller 84 and the drive wheel 80, the end 90 would experience a greater displacement than if there were only one card present. The electrical switch is adjusted to detect a displacement of the end 90 of shaft 86 which would occur if more than one card were fed simultaneously to the idle roller 84 and drive wheel 80. Additionally the same switch can also indicate the absence of a card between the roller 84 and the wheel 80.

The drive wheel 80 is driven continuously and urges the contacting card forward past the sensing means 55 for engagement with the drive wheel 38 and associated idle roller 42. Now, as the intermediate drive means consisting of idle roller 84 and drive wheel 80 and final drive means consisting of drive wheel 38 and idle roller 42 urge the card forward, the edge of the corner cutout 79 of the card contacts and raises, through wedge action, the arm member 64. The electrical switch 70, coupled to member 64, indicates the raised position of the arm and, therefore, the presence of the leading end of a card immediately beyond the sensing means. Naturally, switch 70 also indicates the passing of the rear edge of the card.

At the same instant, as the card is advanced, the rear edge of the card moves past (out from under) the curved leg of the U member 138 and, through the action of the spring 136, the drive roller 124 is urged upward into contact with the bottom surface of the lowermost card of the stack, and the card is driven out of the hopper towards the intermediate drive means. In the meantime, the card previously removed from the hopper has been urged out of the device by the final drive means, and the card detecting means assumes its down condition to indicate the absence of a card. The lever 144 permits the operator to manually urge the drive roller 124 out of engagement with the bottom card of the stack of cards within the hopper.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A card feed mechanism comprising a hopper to support a stack of cards, selectively activated drive means coupled to frictionally engage and urge the bottom card of the stack of cards out of the hopper, a sensing means to read a card, a frictional member coupled to a shaft pivotally coupled at one end and slidably coupled at its other end interposed between said hopper and said sensing means to engage the card from the hopper and urge it past said sensing means for reading, said slidably coupled end of said shaft experiencing displacement proportional to the thickness of the card being fed, means sensitive to the displacement of said slidably coupled end of said shaft to indicate the urging simultaneously of more than one card to said sensing means, final drive means coupled to receive the card fed to the sensing means and urge it further along its path, and card detecting means interposed between said final drive means and said sensing means to indicate the presence of a card.

2. A card feed mechanism comprising a hopper to support a stack of cards, selectively activated drive means coupled to frictionally engage and urge the bottom card of the stack of cards out of the hopper, a sensing means to read a card, a frictional member rotatably coupled to a shaft pivotally coupled at one end and slidably coupled at its other end interposed between said hopper and said sensing means, a drive roller frictionally engaging said frictional member to provide an intermediate drive means to engage the card from the hopper and urge it past said

sensing means for reading, said slidably coupled end of said shaft experiencing displacements proportional to the thickness of the card being fed, means sensitive to the displacement of said slidably coupled end of said shaft to indicate the urging simultaneously of more than one card to said sensing means, and final drive means coupled to receive the card fed to the sensing means and urge it further along its path.

3. A card feed mechanism comprising a hopper to support a stack of cards, selectively activated drive means coupled to frictionally engage and urge the bottom card of the stack of cards out of the hopper, a sensing means to read a card, a frictional member rotatably coupled to a shaft pivotally coupled at one end and slidably coupled at its other end interposed between said hopper and said sensing means, a drive roller frictionally engaging said frictional member to provide an intermediate drive means to engage the card from the hopper and urge it past said sensing means for reading, said slidably coupled end of said shaft experiencing displacements proportional to the thickness of the card being fed, and means sensitive to the displacement of said slidably coupled end of said shaft to indicate the urging simultaneously of more than one card to said sensing means.

4. A card feed mechanism comprising a hopper to support a stack of cards, selectively activated drive means coupled to frictionally engage and urge the bottom card of the stack of cards out of the hopper, a sensing means to read a card, a frictional member rotatably coupled to a shaft pivotally coupled at one end and slidably coupled at its other end interposed between said hopper and said sensing means, a drive roller frictionally engaging said frictional member to provide an intermediate drive means to engage the card from the hopper and urge it past said sensing means for reading, said slidably coupled end of said shaft experiencing displacements proportional to the thickness of the card being fed, means sensitive to the displacement of said slidably coupled end of said shaft to indicate the urging simultaneously of more than one card to said sensing means.

5. A card feed mechanism comprising a hopper to support a stack of cards, selectively activated drive means coupled to frictionally engage and urge the bottom card of the stack of cards out of the hopper, a pressure sensitive means activated by the weight of said stack of cards and a hold down plate to indicate the presence of cards in said hopper, a sensing means to read a card, a frictional member rotatably coupled to a shaft pivotally coupled at one end and slidably coupled at its other end interposed between said hopper and said sensing means, a drive roller frictionally engaging said frictional member to provide an intermediate drive means to engage the card from the hopper and urge it past said sensing means for reading, said slidably coupled end of said shaft experiencing displacements proportional to the thickness of the card being fed, means sensitive to the displacement of said slidably coupled end of said shaft to indicate the urging simultaneously of more than one card to said sensing means, and final drive means coupled to receive the card fed to the sensing means and urge it further along its path.

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