

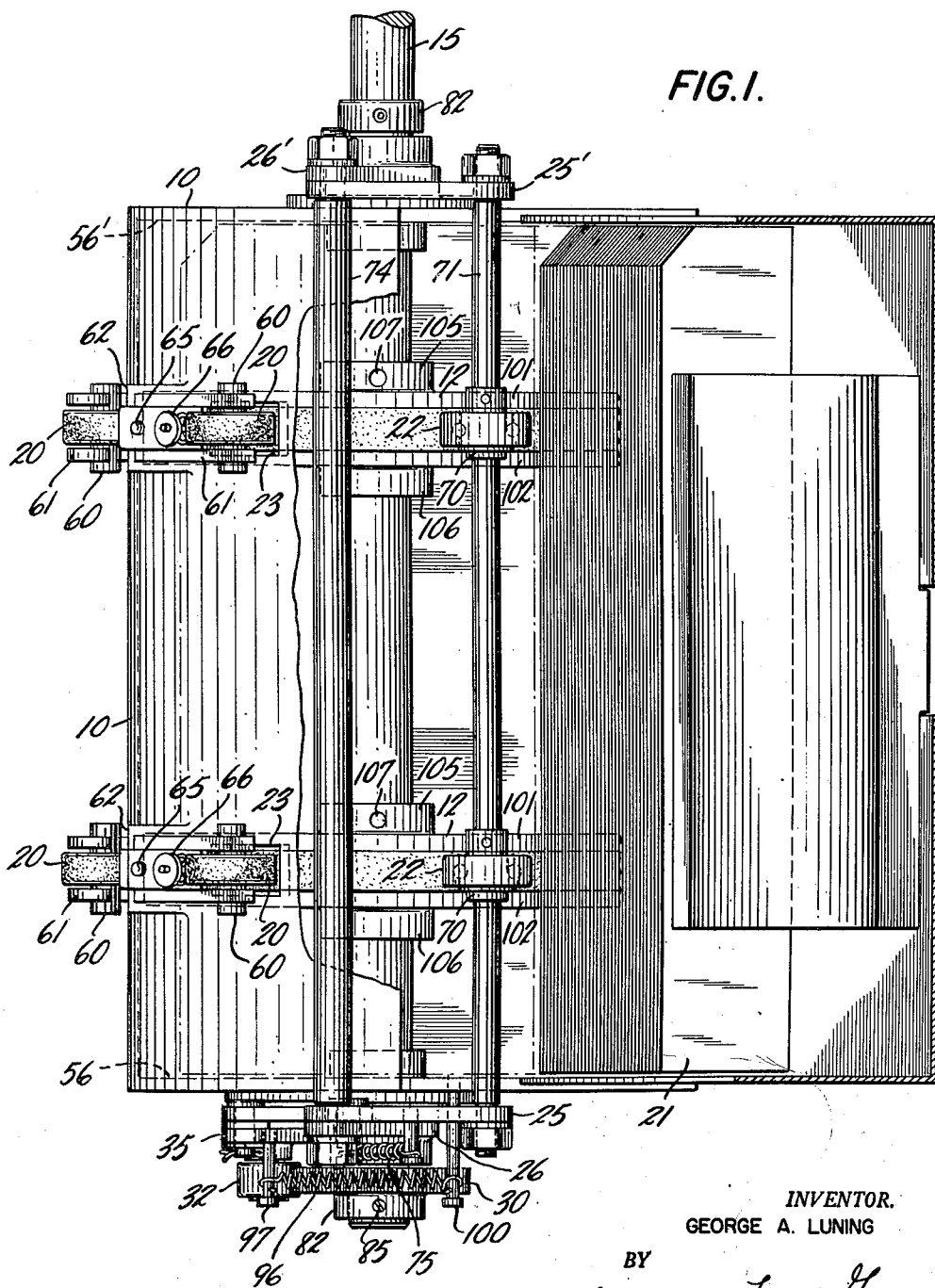
Feb. 4, 1958

G. A. LUNING
STACKER ARRANGEMENT

2,822,171

Filed Jan. 3, 1956

4 Sheets-Sheet 1



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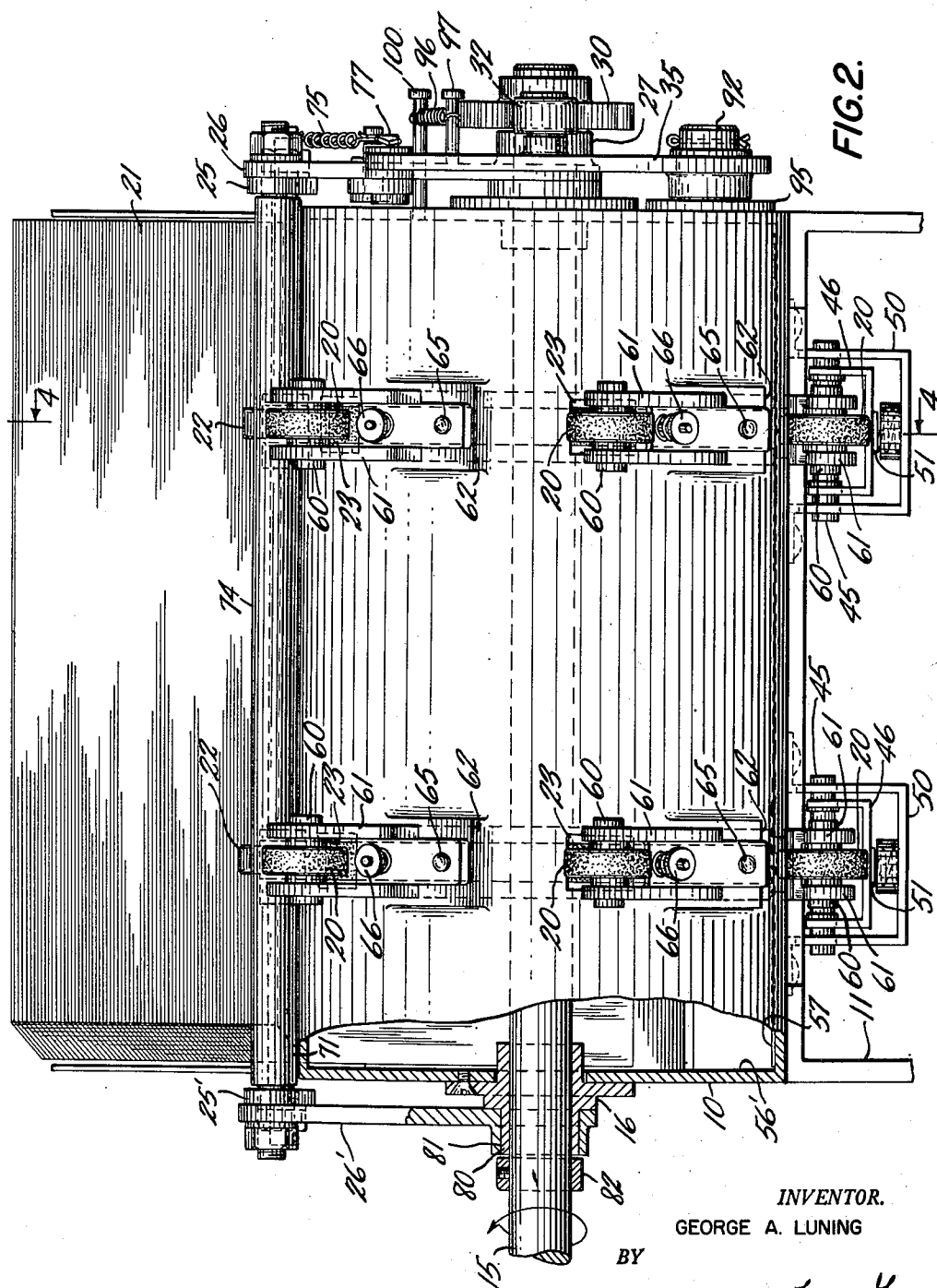
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4 Sheets-Sheet 3

FIG. 3.

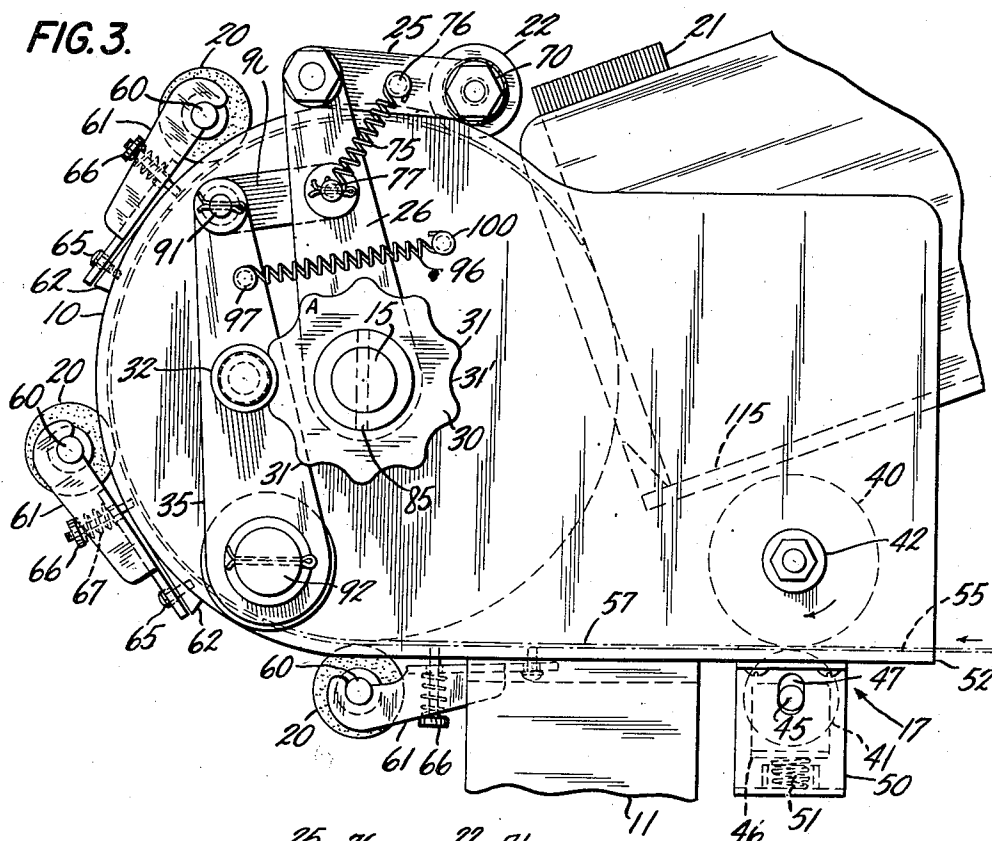
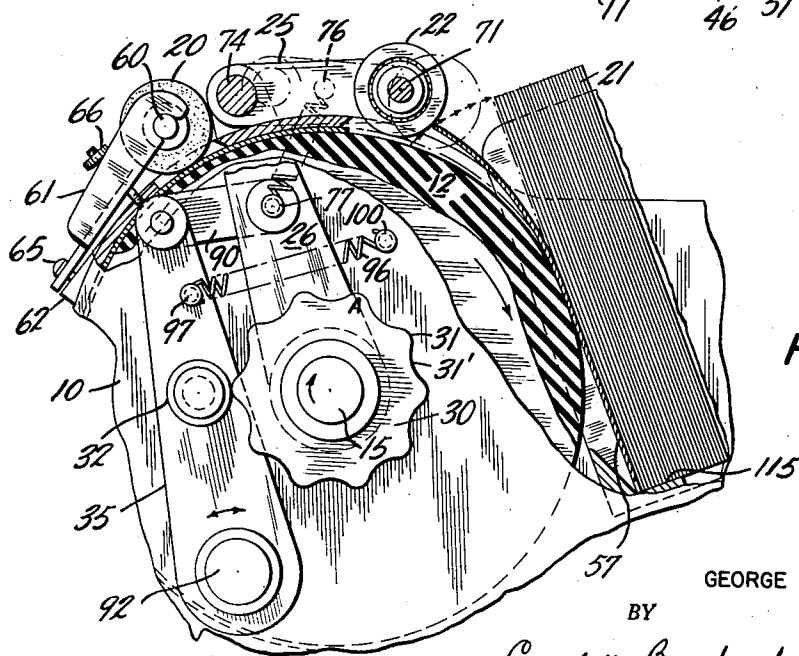


FIG. 5.

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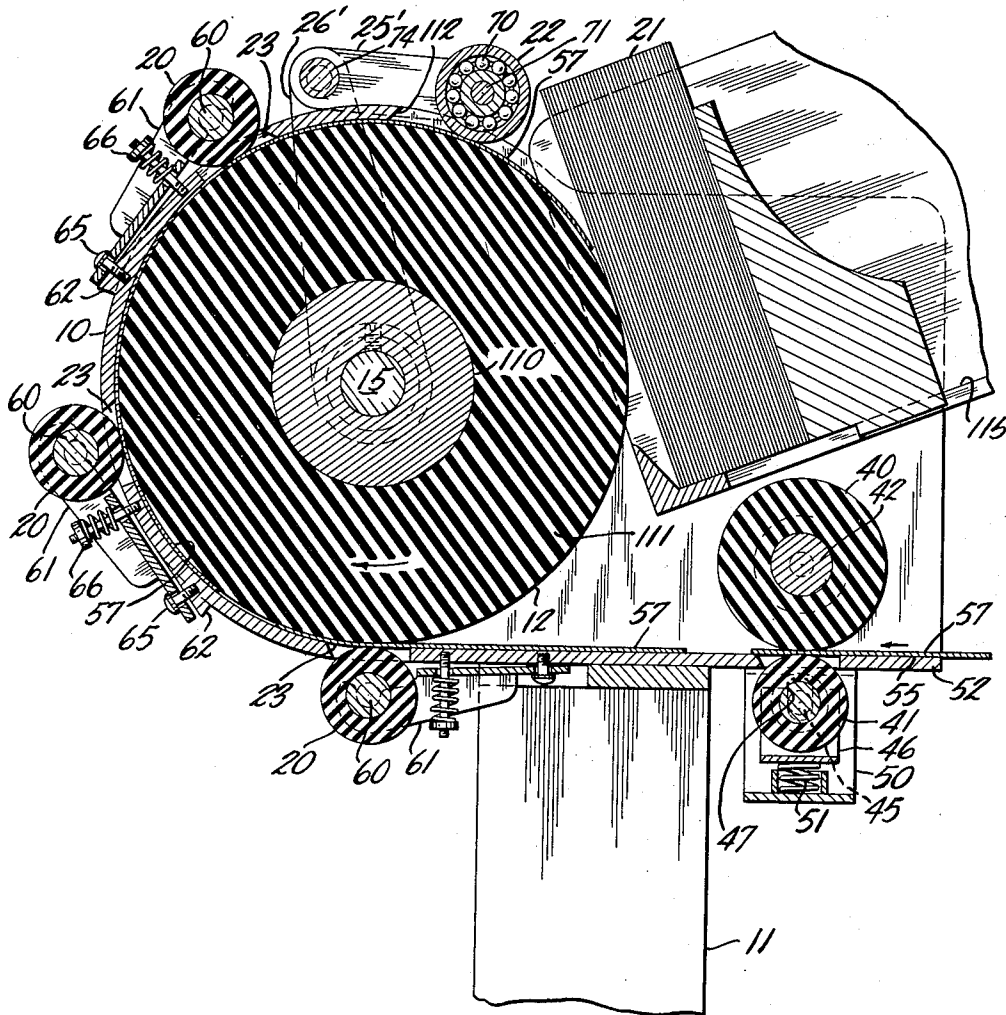


FIG. 4.

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1

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STACKER ARRANGEMENT

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10 Claims. (Cl. 271—71)

This invention relates to stacking devices for cards and similar articles.

In stacking cards discharged from business or accounting machines and similar devices, it is important that the cards be assembled and stacked rapidly and neatly without cutting, tearing or bending the cards. Heretofore, drum type stacking devices have been provided with edge pushers and/or fingers which engage the edges of the cards as they are fed to the drum, to move the cards around the periphery of the drum and deposit them in a hopper or other type receiver. Such devices have required accurate synchronizing and timing of the peripheral speed of the drum with the rate of feeding the cards thereto. Furthermore, the fingers and edge pushers frequently have caused damage to the cards.

An object of the invention is to provide a drum stacker for cards and similar articles which does not rely upon the use of fingers nor edge pushers to secure the cards to the drum periphery.

Another object is to provide a drum-type stacking device which does not require that the rate of feeding of cards to the drum periphery be accurately synchronized with the peripheral speed of the drum.

Still another object of the invention is to devise a stacking device which holds the cards securely against the drum periphery, thereby providing positive motion of the cards toward the stacking station.

Other objects and advantages of the invention will appear from the following description and the appended drawings, in which like reference numbers represent corresponding parts in the various figures.

Figure 1 is a view of the stacking device of the invention as seen from above.

Figure 2 is a view of the device as seen looking toward the right elevation view in Figure 1, with part of the housing and other elements of the apparatus broken away.

Figure 3 is an end view of the device as seen from the lower end of the drawing in Figure 1.

Figure 4 is a cross section taken on a plane represented by line 4—4 appearing in Figure 2 and looking in the direction of the arrows.

Figure 5 is a view similar to Figure 3 with portions of the housing and other apparatus broken away, to show the details of the construction and the operation.

Referring to all of the figures and especially Figure 1, the apparatus comprises in general a housing 10 which also serves as a card guide, secured to the machine frame 11 as shown in Figure 4. Two drums 12 are secured to and rotate with a driven shaft 15 within the housing. Feeding means, indicated generally at 17 in Figure 3, are provided to feed the individual cards in succession to the peripheries of the drums 12. Two series of spring-pressured rollers 20 are mounted on the exterior of the housing 10. Each roller extends through an opening 23 in the housing so as to press the cards against the drum periphery. The frictional contact between the drum periphery and the surface of the card therefore forces the card to move around the peripheries of the drums 12, it

2

being kept in alignment by the guide frame 10 with substantially no slippage.

A card-receiving station or hopper is indicated at 21 to receive and collect the cards from the peripheries of the drums 12, as they arrive in sequence at the hopper. Two oscillating guide rolls 22 are mounted near the hopper 21 and are actuated by rocker arms 26 and 26'. Rocker arm 26 in turn is connected to a cam roller 32. A cam 30, having a number of lobes 31, is keyed to the shaft 15 so as to rotate with the shaft. The cam roller or follower 32 is biased against the cam and oscillates responsive to the lobes 31 and recesses 31' of the cam 30, thereby actuating the rocker arm 26 and the guide rollers 22.

The oscillating action of guide rolls 22 is instrumental in guiding the cards into the desired stacked position in the hopper 21, and in releasing the cards from the peripheries of the drums 12 at just the right time. This will appear from the detailed description of the apparatus and the method carried out by the apparatus hereinafter presented.

Detailed description of apparatus

The feeding mechanism 17, shown most clearly in Figures 3 and 4, comprises a pair of rolls 40 and 41. Mounted in the housing 10 are bearings 42 which support an axle or shaft on which the roll 40 rotates. The roll 41 rotates on an axle 45, which extends at both ends of the roll through slotted bearings 47 in a supporting frame 50 which is secured to the machine housing 10. Engaging the axle 45 at opposite ends of the roll 41 and urging the roll upward toward the roll 40 is a yoke 46 which is pressed upwardly under the compression of a spring 51. The spring is seated on the frame 50, as shown. A plate 52, having an upper surface 55, provides a guiding surface for the cards as they are moved through the nip between the rolls 40 and 41 toward the peripheries of the drums 12. The distance between the inner opposite walls 56 and 56' of the housing 10 is only slightly greater than the length of the cards 57, so that these walls also serve as guides to keep the cards in alignment.

The forward motion of the cards around the peripheries of the drums is provided, as heretofore indicated, by frictional contact between the drums and the cards and the pressure exerted on the cards by each of the rolls 20. Each roll 20 is supported on an axle 60, which turns in bearings formed in the two arms of a yoke 61 which is secured by means of a pin 65 at its remote end to a boss 62 integral with the housing 10. The roll pressure may be varied by adjusting the thumb screw 66, thereby to change the compression in spring 67, which presses against the yoke 61.

The guide rolls 22 rotate on ball bearings 70 which are secured to a rod 71, which in turn is secured at its opposite ends to connecting links 25 and 25', as shown. The ends of the two connecting links are rotatably secured to the upper ends of the rocker arms 26 and 26' at the opposite ends of the housing 10. The guide rolls 22 and the connecting links 25 and 25' are held in their normal position adjacent the housing 10 by means of a coil spring 75, which is secured to the link 25 by a pin 76 and to the rocker arm at its opposite end by the pin 77. The lower end of each rocker arm is journaled to the shaft 15.

The shaft 15 is supported in the housing 10 by a bearing 16, which is shown most clearly in the broken-away section of Figure 2. A sleeve 80 extends outwardly away from the bearings 16 to provide a sliding bearing surface 81 on which the rocker arm 26' rotates in its reciprocating movement. A collar 82 is secured to the shaft to maintain the rocker arm 26' in position on its sleeve bearings 80. At the opposite end of the machine, similar bearings and other parts are provided for rocker arm

26, except that the cam 30, which is keyed to the shaft by a pin 85 rather than a collar such as shown at 82, serves to retain the rocker arm 26 in position at this end of the machine.

A link 90 is connected at one end to the rocker arm 26 by means of a pin 77 and at the other end to the upper end of the cam roller arm 35 by means of a pin 91. The lower end of the cam roller arm 35 is journaled to the housing 10 on a shaft 92 which is secured by a flange 95 to the housing 10. A tension helical spring 96, secured at one end to the arm 35 by means of a pin 97 and at the other end to the housing 10 by means of a pin 100, provides the force for biasing the cam roller against the cam 30. It will be observed that as shaft 15 rotates continuously and carries with it the cam 30, each of the lobes 31 on the cam and the recesses 31' between the lobes will engage in succession the cam roller 32 and cause it to move alternately to the left and to the right, respectively, thereby producing the oscillating motion of the roller arm 35, the rocker arms 26 and 26' and finally, the guide rolls 22. The oscillating motion is important in guiding each card in succession into the desired stacked position in hopper 21 and thereafter in releasing the card so that its after-edge may snap into position, as will be explained in greater detail in the description of the method.

A rod 74, shown in Figure 1, extends for the width of the machine and is rotatably connected at each end to the links 25 and 25' and to the upper ends of the rocker arms 26 and 26'. The rod 74 provides stiffness in the unit comprising the two links 25 and 25' and the two rods 71 and 74, and thereby assists in imparting the oscillating motion of the rocker arm 26 to the rocker arm 26'.

Each of drums 12 is formed of two plates 101 and 102, each having a hub 105 and 106, which encircles the shaft 15 and is secured to the shaft as by a set screw 107. Secured between the plates 101 and 102, and also encircling the shaft 15, are rings 110 shown in Figure 4. The two plates and the ring form a peripheral channel which contains rubber or other material 111 having the property of providing the desired frictional engagement with the surface of the cards. The material 111 extends radially outwardly at least as far as the plates 101 and 102 and preferably slightly beyond the edges of such plates, so as to maintain the desired engagement with the cards.

Description of the method

The cards to be stacked, which may, for example, have been discharged from a calculating machine or a computing machine, are fed to the guide surface 55 between the two vertical plates 56 and 56' at opposite sides of the machine, and into the nip between upper feed roll 40 and lower spring-pressured feed roll 41. Each card is then fed into the nips between the first rolls 20 and the peripheries of the drums 12, as at 57. The card slides along and is guided by the inner curved surface of the housing guide 10 and by the vertical side plates 56 and 56', and is thereby constrained to follow the desired path around the peripheries of the drums. Before the rear edge of the card has left the nips between the first guide rolls 20 and the drums 12, the forward edge of the card has been picked up by the nips between the second rolls 20 and the drums, so that continuous movement of the card is maintained. Likewise, the forward edge of the card is picked up between the nips of the third rolls 20 and the drums before the rear edge of that card leaves the nips between the second rolls and the drums.

The card will now have reached the third rolls 20 and be passing through the nips between them and the drums. The cam lobes 31 will have been engaging the cam roller 32 and causing oscillating motion of the feed rolls 22 forward and backward on the surface of the drums 12, as previously described. As the forward edge of the card advances toward the guide rolls 22, it will still be bowed by the inside guiding surface of the cylindrical housing 10. However, the cylindrical guide surface ends at 112, as

shown in Figure 4. As the card continues to advance beyond edge 112 it is held against the drums 12 by the pressure exerted by the guiding rolls 22 derived from the helical spring 75. Moreover, when the guide rolls 22 are in the advanced position corresponding with the location of the cam roll 32 in one of the recesses 31', the rolls bow the card and thereby guide it toward the stacked position, as shown in Figure 3. However, when the card has advanced to the position shown in Figure 5 so that its forward edge is near the bottom surface or stop plate 115 of the hopper or stacking station 21, the reverse motion of the guide rolls 22, corresponding with engagement of the cam roll 32 with one of the lobes 31, will permit the rear edge of the card to clear the peripheral surfaces of the guide rolls 22 so that it may and will snap into position parallel with the other stacked cards, as indicated by the small arrows in Figure 5.

With the foregoing principles of operation in mind, in one embodiment of the invention the guide rollers 22 are located so that in their forward position the distance between them and the plate 115 is less than the width of the card, but in their retracted position, the distance between them and the plate 115 is greater than the width of the card. The frictional contact between the card and the periphery of the drums 12, after the card has snapped into the parallel position, will be sufficient to carry the card any remaining distance to the point where its forward edge will contact the inclined surface 115 of the hopper 21. The way will then be clear for the next succeeding card to be advanced and released into stacked position.

Although the cam 30 has been shown as having ten knobs, this is not limiting since a larger or smaller number of knobs may be provided. Furthermore, the relative circumferential lengths of the knobs and the recesses is subject to variation; that is, the recesses may have a greater circumferential length than the intervening knobs or they may be relatively shorter than the knobs. Although as previously indicated, one of the advantages of the mechanism disclosed is that it is not necessary to synchronize the movement of the cards with that of the oscillating guide rolls 22, such synchronization may be provided within the scope of the invention by means known in the art, by so timing the feeding of the cards between the feed rolls 40 and 41 and their subsequent placement on the peripheries of the drums 12, and providing the requisite number of cam lobes, that there is only one complete oscillation of the guide roll for each card, and that the guide rolls remain in the forward position while the forward edge of each card in succession is advancing toward the stacked position in the hopper 21 beneath it, and then are withdrawn to the retracted position as shown in Figure 5 just in time to permit the rear edge of each card to snap into the parallel position. If desired or expedient, a larger or smaller number of drums 12 and cooperating guide rolls 20 and 22 may be provided on a driven shaft, such as the shaft 15.

It will be apparent to those skilled in the art that many other modifications may be made, and accordingly it is intended that the appended claims should cover not only the specific embodiments described, but also all modifications and equivalents within the spirit and teaching of the invention.

I claim:

1. In a card stacking device having an element moving in a curved path and means on the element to hold cards in succession to move them toward a stacking station, means associated with the element to engage each card in succession, and means to oscillate the card engaging means adjacent a portion of the curved path and said stacking station, said card engaging means having an advanced and a retracted position, to guide the forward portion of each card into the stacking station in the advanced position and to release the rear portion of each card in succession in the retracted position to permit

5

it to snap into the stacked position in said stacking station.

2. In a card stacking device having a rotatable drum and means on the drum periphery to hold cards in succession to move them toward a stacking station, means associated with the drum to engage each card in succession, and means to oscillate the card engaging means adjacent a portion of the drum and said stacking station, said card engaging means having an advanced and a retracted position, to guide the forward portion of each card into the stacking station in the advanced position and to release the rear portion of each card in succession in the retracted position to permit it to snap into the stacked position in said stacking station.

3. The apparatus described in claim 2 in which the card-holding means has a friction surface adapted to contact the cards and thereby move them toward the stacking station.

4. A card stacking device comprising a rotatable drum having a peripheral surface which resists frictional movement of the card surface thereon, means associated with the drum to engage each card in succession and means to oscillate the card-engaging means adjacent a portion of the drum periphery, said card-engaging means having an advanced and a retracted position, said card-engaging means holding the cards in frictional contact with the drum periphery so as to cause movement of the cards with the drum periphery, means to guide said cards to keep them in alignment during their travel around said periphery, a stacking station having a stop plate adapted to arrest peripheral movement of said cards, said card-engaging means being so disposed that in its advanced position the distance between the oscillating means and the plate is less than the peripheral dimension of the card so that the oscillating means guides the forward part of each card toward the plate, and in its retracted position the distance between the oscillating means and the plate is greater than the peripheral dimension of the card so that the rear portion of each card may snap into a position parallel with the other cards in the stack.

5. The apparatus described in claim 4 in which the card-engaging means is a rotatable roll mounted on an axis parallel with the axis of said drum.

6. The apparatus described in claim 5 having a driven cam and a cam follower biased against the cam, the follower being connected with the card-engaging means to produce the oscillation thereof.

7. A card stacking device comprising a rotatable drum having a peripheral surface which resists frictional movement of the card surface thereon, means to hold at least a portion of the surface of the cards against said periphery

6

so that they travel around said drum toward a stacking station at substantially its peripheral speed, means to guide said cards to keep them in alignment during their travel around said periphery, said card-holding means comprising a card-engaging element, means to oscillate said card-engaging element adjacent a portion of the drum periphery and said stacking station, said card-engaging element having an advanced and a retracted position, so that in its advanced position it guides the forward part of each card into the stacking station and in its retracted position it permits the rear portion of each card to snap into a position parallel with the other cards in the stack.

8. The apparatus described in claim 7 in which the card holding means comprises at least one rotatable roll disposed around the periphery of the drum and are mounted on axes parallel with the axis of said drum.

9. A card stacking device comprising a drum adapted to be rotated continuously and having a peripheral surface which resists frictional movement of the card surface thereon, means for feeding the cards tangentially to the periphery of said drum, a series of rotatable rolls mounted around the periphery of said drum on axes parallel to the axis of said drum to hold at least a portion of the surface of the cards against said periphery so that they travel around said drum toward a stacking station at substantially its peripheral speed, means to guide said cards to keep them in alignment during their travel around said periphery, said stacking station having a stop plate adapted to arrest peripheral movement of said cards, a roll oscillating in the peripheral direction between an advanced and a retracted position adjacent the periphery of said drum and adjacent said stacking station, said oscillating roll holding the cards in frictional contact with the drum periphery so as to cause continued movement of the cards with the drum periphery, said oscillating roll being so disposed that in its advanced position the distance between the oscillating roll and the plate is less than the peripheral dimension of the card so that the oscillating roll guides the forward part of each card toward the plate and in its retracted position the distance between the oscillating roll and the plate is greater than the peripheral dimension of the card, so that the rear portion of each card may snap into a position parallel with the other cards in the stack.

10. A card stacking device as described in claim 9 having a driven cam and a cam follower biased against the cam, the follower being connected with the oscillating roll to produce the oscillation thereof.

No references cited.