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Nelson et al.

[11] **3,709,482**

[45] **Jan. 9, 1973**

[54] HIGH SPEED DOCUMENT FEEDER

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[52] **U.S. Cl.** **271/37**, 271/34, 271/39

[51] **Int. Cl.** **B65h 3/06**

[58] **Field of Search**.....271/34, 36, 39, 37, 38, 40, 271/41

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[57] **ABSTRACT**

A document feed mechanism of the friction type for delivering single sheets in spaced relationship by means of synchronous operation wherein the sheets are spaced at a constant nose-to-nose distance regardless of the length of the document. The mechanism includes a feed belt and a retard or restraining belt, the feed belt being mounted on a feed wheel carrier which is adapted to be radially movable in relation to the axis of the feed wheel so that the periphery of the feed belt continuously coincides with the periphery of the feed wheel. The feed belt is also continuously indexed by means of an eccentric and one-way clutch arrangement for the purpose of distributing feed belt wear over a larger surface. The feed mechanism includes means for stopping the flow of documents without stopping rotation of the feed wheel, wherein an interposer, mounted concentric with the feed wheel and rotatable independent thereof, is placed in the path between the feed belt and the retard belt to prevent the feed belt from contacting the documents.

15 Claims, 6 Drawing Figures

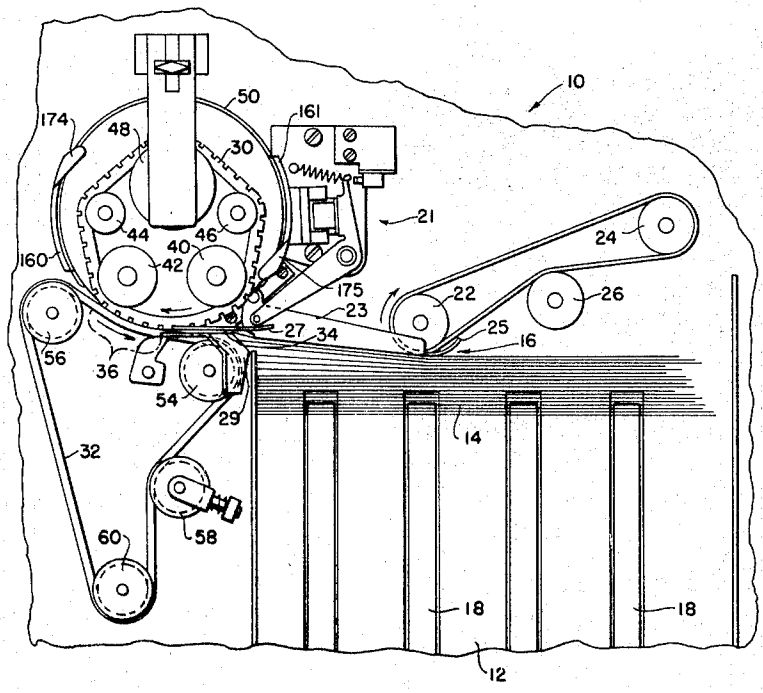


FIG. 1

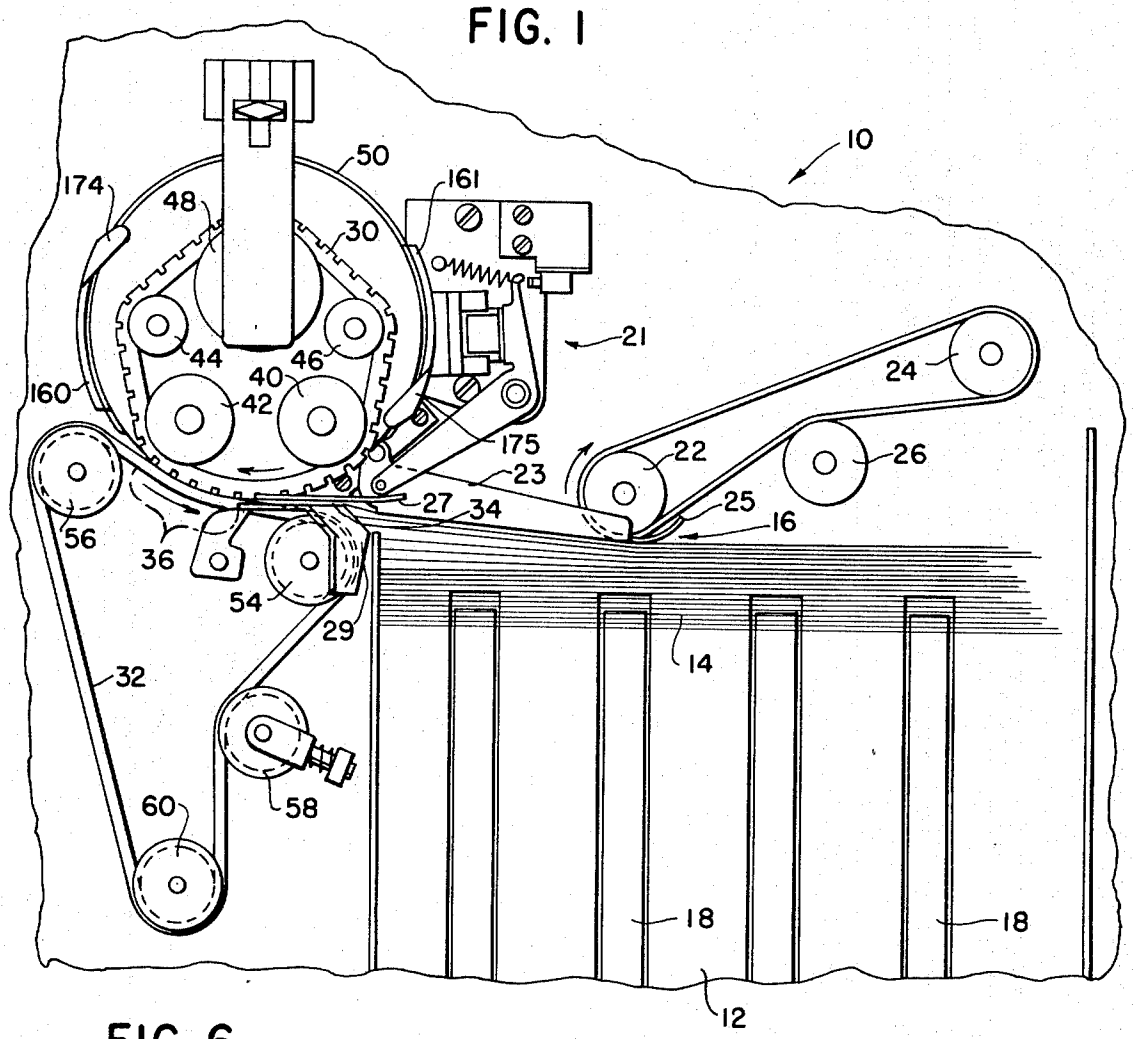
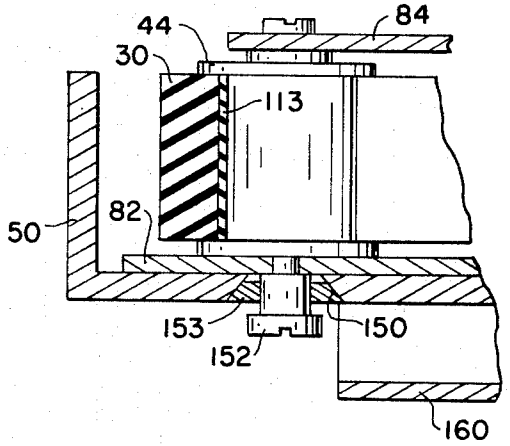


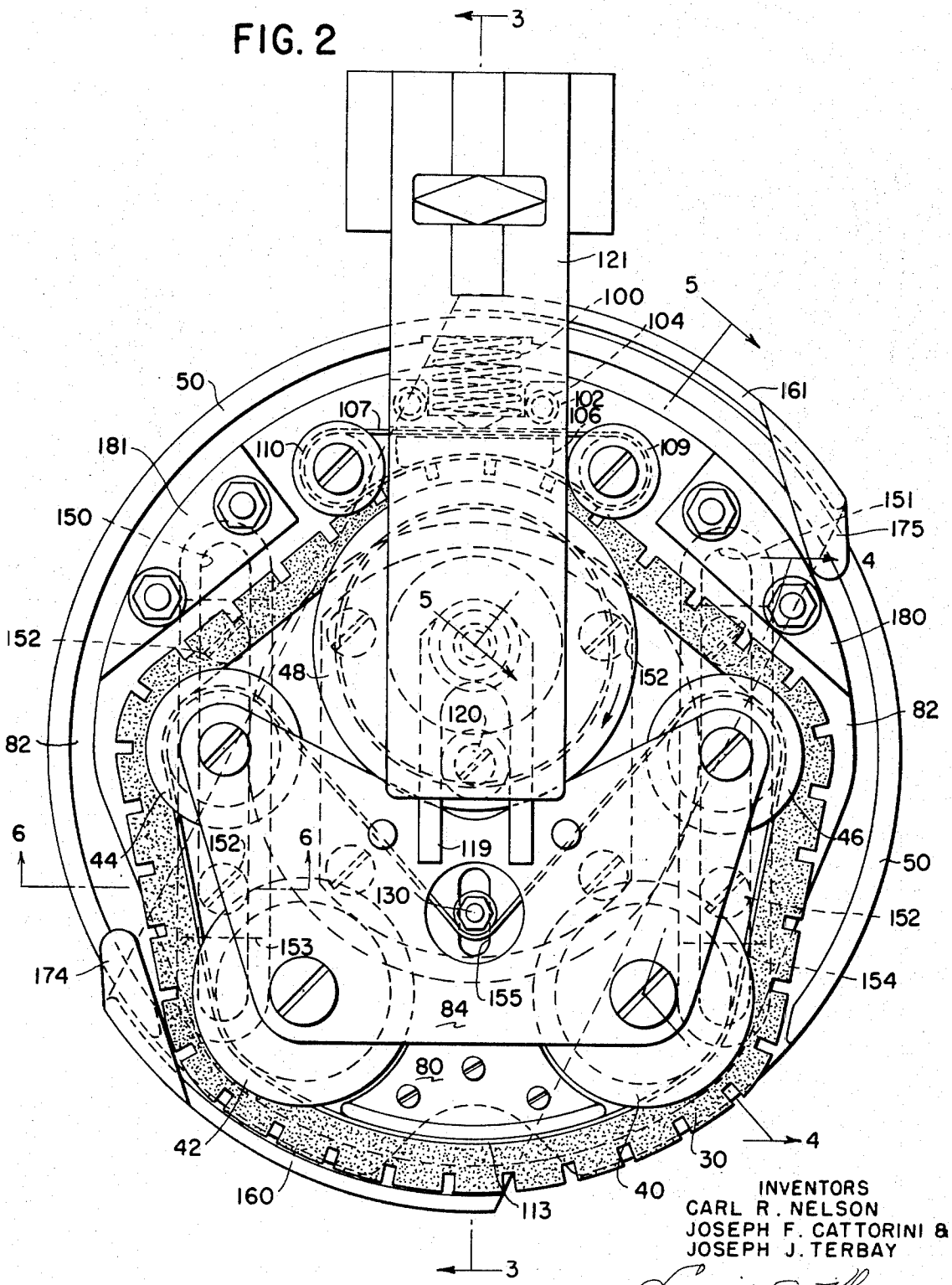
FIG. 6



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FIG. 2

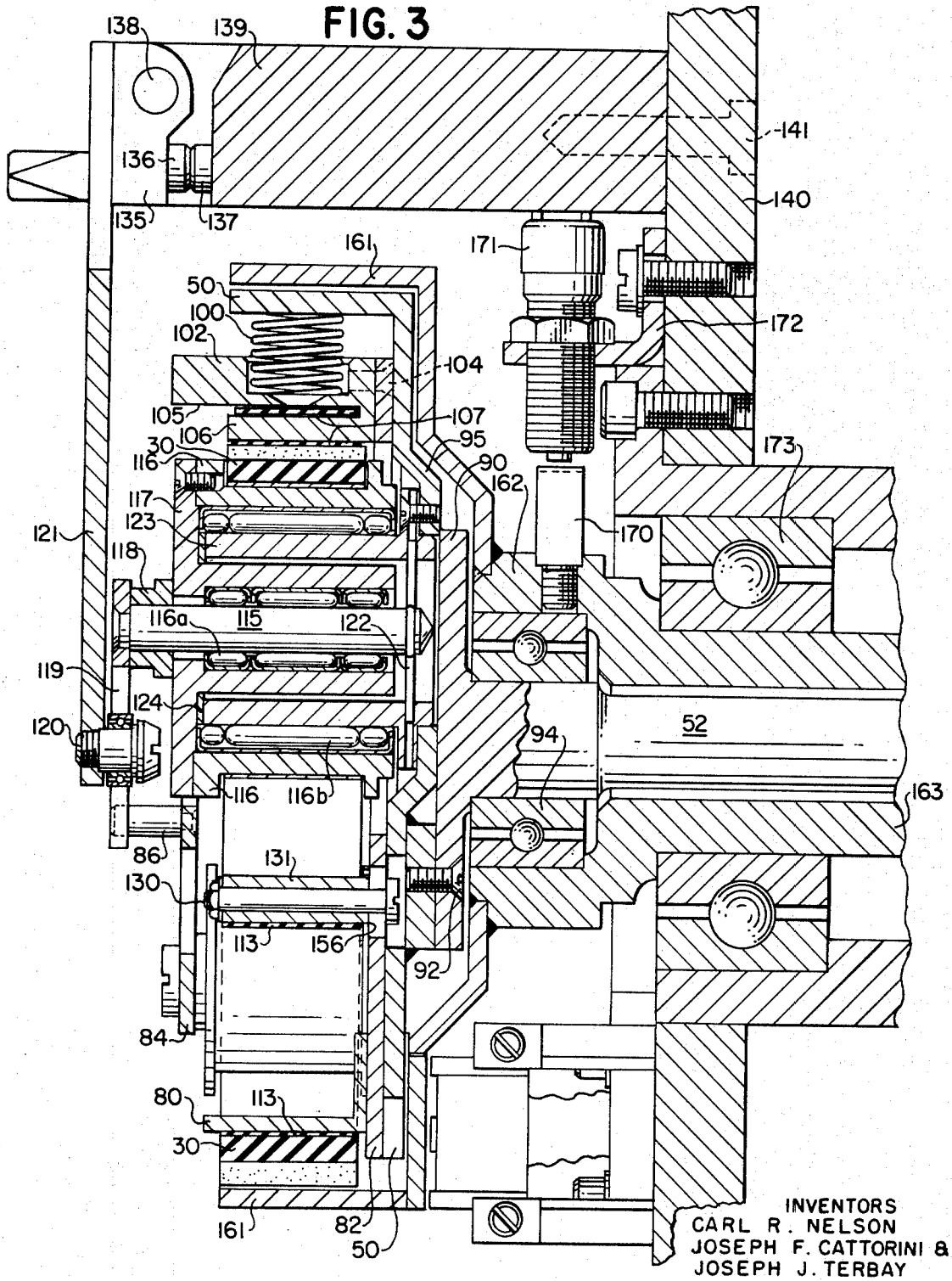


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FIG. 3



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FIG. 4

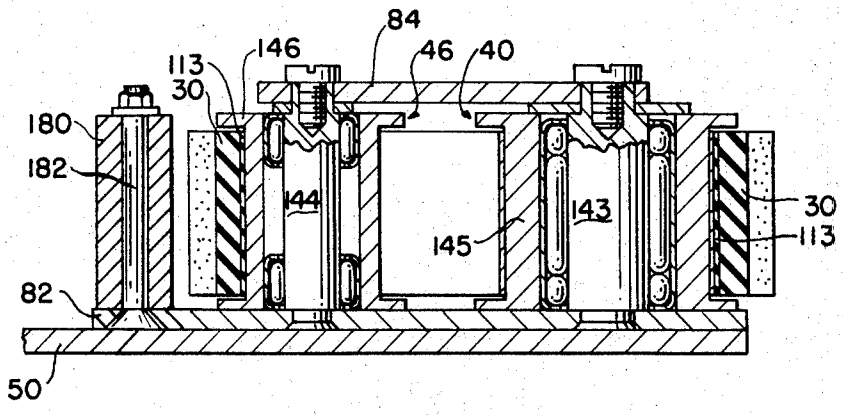
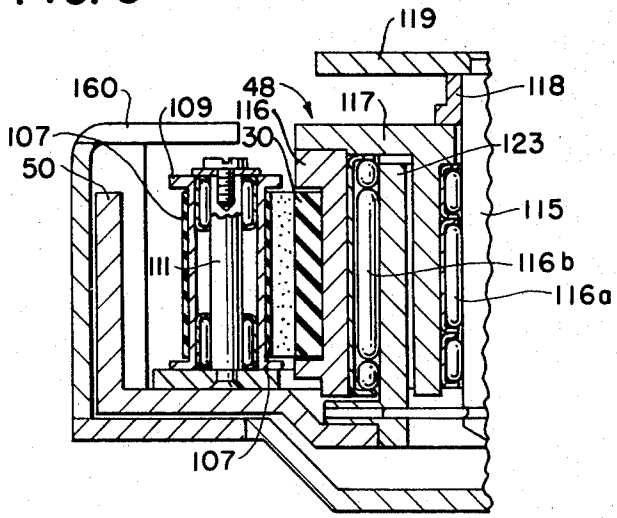


FIG. 5



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HIGH SPEED DOCUMENT FEEDER

BACKGROUND OF THE INVENTION

In the art of document feeding and sorting, wherein it is desired to singly and successively select a document from a stack or pile, various ways and means have been heretofore utilized so that each selected document is properly carried or transported to the desired location. Generally speaking, a stack of documents, such as bank checks, cards, or the like are placed upon a table in a position wherein the documents may be atop each other, or they are fed along a table into a position where the documents are on edge, and preferably aligned at one end, either of the positions being suitable for selective pickup or each document for transport to a bin or pocket. The checks are, in effect, mechanically sorted according to a coding on each check, which coding determines the proper one of several pockets into which the individual check is to be deposited.

Since these bank checks are of different sizes, shapes, and forms, the stack pickoff and feed mechanism must be extremely versatile to select only one check at a time, thus it is axiomatic that the design of such mechanism must include features which will handle checks of varying size, shape, form, and texture, as feeding two documents at once (doubles) or failing to feed (skip feeds) in the separating operation will tend to defeat the mechanization of sorting. Because of these differences in the checks, the feeding and separating mechanism is considered a very important part of the sorting machine since the separating mechanism must contend with the surface conditions of the items passing therethrough. The surface of a check may be creased, crumpled, frayed at the edges, torn, or otherwise damaged so it is evident that a reliable high speed feeding operation will result from the high degree of effectiveness of the feeder and separator to successfully encounter these conditions.

In the past, the use of a vacuum feeder has been tried and proven under certain conditions, however a friction feed is normally superior in high speed operations where the problem of feeding two or more documents simultaneously is critical. It is, of course, a matter of design and preference as to whether the checks are to be picked off the stack and separated in either synchronous or asynchronous manner. As generally understood, a frictional feeder is usually more applicable in the asynchronous operation where there is maintained a constant distance between the rear edge of one check and the front edge of a succeeding check, however, in this regard, the difference in length of the checks accounts for the fact that there may be more problems in gating, stacking, endorsing, or in pocketing the checks. In contrast to the asynchronous operation, a synchronously operated mechanism, provides an arrangement wherein the feeder delivers the checks spaced at a constant nose-to-nose distance regardless of the document length so that less demand is placed upon the gating, stacking, and similar operations, and therefore the synchronous feeder is basically more desirable than an asynchronous feeder.

The prior art teaches the use of a frictional feeder having a feed and a retard belt, the retard belt running at a less velocity than the feed belt for the purpose of distributing wear, and the belts being juxtaposed to provide a throat therebetween and having open and closed positions wherein the retard belt is retractable from the feed belt, all as shown in U.S. Pat. No. 3,027,161, on the application of E. R. Solyst.

Another example of the prior art shows the use of a high-friction flexible belt to feed the sheets off a stack in overlapping fashion, and a pair of co-acting endless belts, running in opposition at the area of contact for the purpose of separating the sheets as they are further transported and to distribute belt wear, as taught in U.S. Pat. No. 3,048,393, on the application of R. J. Furr and E. M. Valehrach.

In U.S. Pat. No. 3,070,368, on the application of R. C. Adams, the feed and separator rollers are driven in peripheral opposition to feed flat mail or like documents through a throat, the separator roller being supported from a carriage and being slidably adjustable by means of a cramping linkage including a coil spring biasing the carriage and the roller to compensate for the peripheral wear of the separator roller.

A further example of the prior art includes a picker belt for driving the sheets off a stack, a high friction feed belt and a low friction restraint belt running much slower than the feed belt, and in peripheral opposition thereto, so as to present a changing surface, thereby distributing wear evenly over the outer surface of the restraint belt, as seen in U.S. Pat. No. 3,173,681, on the application of B. F. David and R. L. Dimenna.

Finally, U.S. Pat. No. 3,173,684, on the application of E. M. Binzoni, E. W. Rosenthal, G. T. Gonzalez and G. D. Cerf, shows a feeder with removal and restraining rollers driven in peripheral opposition, and spacially varied by means of a triangular plate and a slightly eccentric cam track cooperating with an asymmetrical flange. Acceleration rollers are provided to clear each document past the separation station, so as to operate independently of document length. Register rollers engage the face of the forward document to start removal thereof, there being a scythe-shaped interposer to disengage the documents from contact by the rollers without stopping the drive train. An alternative type of gate and interposer includes a cam and track arrangement for interrupting the document removal mechanism.

SUMMARY OF THE INVENTION

The present invention relates to feeder and separator mechanism for a document sorter and, more particularly, to a high speed friction feeder of the synchronous type for separation and delivery of documents of various size and thickness. The separating mechanism is normally positioned at the end of a feed table wherein the documents are placed on edge and driven or propelled along the table by known means such as belts, paddles, etc. to a pickup station where the documents are selected one-by-one by the separating mechanism to be fed into a transport system for delivery into the desired sorting pockets.

As mentioned above, the present invention covers a synchronous feeder of the friction type so that a very positive drive mechanism is essential for the feeding apparatus. Because of the high reversing forces imposed on the documents by the restraining belt, a high degree of slippage of documents is present in the feeding area and consequently this slippage discourages application of a frictional feeder for synchronous operation. How-

ever, a synchronous feeder is basically more desirable, so with the improved drives and arrangements utilized in the feeding mechanism, it is readily applicable for the constant nose-to-nose distance relationship or synchronism in document feeding operations.

Generally speaking, the documents near the end of the feed table are initially moved in a lateral direction from the stack by means adjacent the pickup station, each document then being directed along a path through the separating mechanism. The initial action by the pickup station starts movement of the foremost document toward the separating mechanism, but such action is not sufficient to synchronously feed one document at a time into the transport system so the separating mechanism, by means of the frictional surfaces, engages the leading edge of such foremost document and separates it from other documents and propels said document toward the transport or delivery system. The engagement of the document by the frictional surfaces causes selective feeding of the document by reason of the higher coefficient of friction between the frictional surface and the surface of the document than that between adjacent documents. Of course, the texture of adjacent documents may vary greatly but usually the documents are of such nature as to readily slide with respect to each other. If the texture of adjacent documents results in low frictional characteristics, the feed mechanism includes retard or restraining means which help to separate the documents so that only one document passes through the feed mechanism at any one time.

There are several problems associated with the frictional-type synchronous operation, one of which is that as the frictional surfaces wear, the outer peripheral surface falls within the periphery of the carrying member and therefore becomes ineffective at times so that documents will not be continuously fed through the mechanism with the result being skip feeding. A second problem generally encountered arises in the contact area between the frictional surface and the document wherein the area of contact will have an abnormally high wear rate. It is understood, of course, that if successive documents are engaged upon rotation of the feed member at generally the same area on the periphery thereof, the frictional surface of the feed member will wear faster at that one point. The third and probably most difficult problem is that of stopping and starting the feeding mechanism, because it is desirable at times to stop the flow of documents through this mechanism without stopping the entire machine. Since the feed member must be directly coupled to the sorter transport system for synchronous operation, stopping the entire machine may take several seconds and consequently, a number of documents would be fed into the transport system without the transport being at the necessary full operating speed. Finally, a fourth problem includes feeding synchronously with an all friction system which needs high coefficients to feed slick surfaced documents to inhibit double feeding thereof. Solutions to these problems are within the teachings of the present invention.

The feeding and separating mechanism of the present invention includes a feed or separator wheel which houses a feed belt carrier having a feed belt thereon, the belt peripheral surface being the dominant driving force feeding the documents from the pickup station to the transport system. Opposite the feed belt and juxtaposed thereto is a second peripheral surface of a restraining or retard belt which is driven at a slower speed than the feed belt to exert a force on the document less than that of the feed belt, however, the retard belt adds a greater driving force than the metal portion of the feed wheel. The feed wheel is a continuously rotating drum which is synchronously driven by belts or gears in cooperation with the remainder of the sorting machine, and the wheel is designed so that each revolution of the wheel will cause only one document to be fed in succession at any one time. The design features a feed mechanism for delivering checks spaced at a constant nose-to-nose distance regardless of the length of the document. The intermittent operation of the feed belt in synchronous manner provides for such constant distance between checks.

The design and construction of the feed mechanism provides for the feed belt to be mounted on the feed belt carrier, which carrier is automatically moved during the document feeding and separating operation so that the outer peripheral surface of the belt always coincides with the periphery of the feed wheel. Additionally, the feed belt is indexed to move in its path during the separating operation so as to continuously distribute wear over a larger belt surface, the indexing means being supported from the feed wheel assembly. Another feature of the feed mechanism includes means for stopping the feeding operation of the documents at any time during machine operation, this means comprising an interposing member, mounted concentric with and rotatably independent of the feed wheel, and capable of being positioned between the retard and feed belts to prevent flow of or to terminate feeding of the documents through the throat between the feed and the retard belt. When it is desired to again feed documents, the interposing member is rotated out of the throat and normal feeding is resumed. The stop feeding feature is controlled independently from the conveying, transporting or sorting operation so as to terminate the flow of documents without interrupting total machine operation.

In accordance with the above discussion, the principal object of the present invention is to provide a synchronous friction-type feeder for a sorting machine.

Another object of the present invention is to provide a feed mechanism which automatically compensates for feed belt wear by movement of the feed belt on its carrier to maintain the feed belt radius equal to the radius of the feed wheel.

An additional object of the present invention is to provide a feed mechanism which automatically compensates for abnormally high feed belt wear by indexing the belt so as to distribute wear over a larger surface of the belt periphery than the actual feed surface.

A further object of the present invention is to provide a feed mechanism which controls the flow of documents through the throat between the belts without interfering with operation of the remainder of the sorting machine, this control being accomplished by interposing a member into the throat passageway.

Additional advantages and features of the present invention will become apparent and fully understood

from a reading of the following description taken together with the annexed drawings, in which:

FIG. 1 is a plan view, in diagrammatic form, of a portion of a sorting machine incorporating the present invention;

FIG. 2 is an enlarged view of the feed wheel mechanism of the present invention;

FIG. 3 is a sectional view of the feed wheel taken on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 2;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 2; and

FIG. 6, on the sheet with FIG. 1, is a sectional view taken on the line 6—6 of FIG. 2.

Referring now to FIG. 1, there is shown a portion of a sorting machine **10**, this portion being shown in diagrammatic form to orient the subject matter of the present invention in relation to the associated parts. A feed table **12** extends in a direction from the lower to the upper part of the drawing, the table normally being sloped in an upwardly fashion and supporting a plurality of documents **14**, such as bank checks or the like. The documents are stacked on edge and are carried in this attitude up the inclined table to a pickup station where the forward check is selected and picked off the stack in succession to be carried by transport mechanism (not shown) to a further station or into bins or pockets. The pickup station is defined by a zone **16**, at the upper extent of the table and adjacent the transport mechanism, wherein the documents are ultimately positioned on the table at the end of their upward travel and prior to being picked off in successive fashion. In this manner, a stack of checks is placed or loaded on the feed table and the stack is caused to be driven or propelled by belts **18** up the table to the pickup station for subsequent sorting of each check into its proper channel or pocket according to the desires of the system.

The apparatus for propelling the documents along the table is specifically shown and described in U.S. patent application of Carl R. Nelson, Ser. No. 833,554, filed June 16, 1969, entitled "Document Input Mechanism" now U.S. Pat. No. 3,598,400, and assigned to the same assignee as the subject application. The belts **18** and the pickup apparatus work together to uniformly advance the documents to maintain them in planar attitude as they travel toward the pickup station. A picker belt **20**, in the form of an O-ring, is driven by means of pulley **24** in a clockwise direction over idler pulleys **22** and **26** wherein a portion of the belt **20** around pulley **22** makes contact with the leading document and initiates lateral movement of such document in a leftwardly direction. Suitable sensing mechanism, generally designated as **21**, controls movement of an arm **23** having a shoe **25** for directing the documents along a plane of the arm to a guide member **27** for entry of successive documents into the throat formed by cooperating guide element **29**. The sensing means, of suitable biased bell crank and switch arrangement, responds to pressure of the advancing documents at the end of feed table **12**.

Positioned adjacent and left of the picker belt **20** is the separator mechanism including a feed belt **30** and a retard or restraining belt **32** engageable with the feed belt and cooperating therewith to advance the documents in singular fashion along the path to a transport system (not shown) for depositing in respective bins or pockets (also not shown). Feed belt **30** is driven in a clockwise direction, as indicated by the arrow, as is the retard belt **32**, the retard belt traveling in a counter direction of feed at the area **36** of conjoint operation and at a lower velocity than that of the feed belt. The position and path of these belts forms a throat **34** therebetween for passage of each document in successive manner during its travel to a sorting pocket. Feed belt **30** is carried on rollers or pulleys **40**, **42**, (see also FIG. 2) these being the forming rollers to direct the belt in proper position to define a path into an arcuate side of the throat **34**, and additionally, the belt is carried on rollers **44**, **46** positioned to train the belt from a main roller **48** to the forming rollers **40**, **42**. Although the items are referred to as rollers **40**, **42**, **44**, **46**, and **48** thus far in the description, specific parts of these items will be further described in the document separating mechanism.

A feed wheel **50** is continuously rotated by reason of being secured to a feed wheel pulley shaft **52** (FIG. 3), the shaft being driven by belts or gears (not shown) in synchronous manner with the sorting machine. The feed wheel **50** is designed to cooperate with and to drive the feed belt **30** so that each revolution of the feed wheel will cause one document to be fed through the throat **34** of the separating mechanism. The retard belt (FIG. 1) is carried on forming rollers or pulleys **54**, **56** to direct the belt in a path to define the other side of the throat **34**, and it is trained over an idler roller **58** and around a drive roller **60** which propels the belt **32** at a lesser velocity than that of the feed belt **30**.

Belt **30** is enclosed by the periphery or rim of the feed wheel except for a portion of the wheel which is open and which defines the limits of the effective wheel drive surface **36**. The periphery or rim of the feed wheel is smooth metal and can not drive paper. In this respect, the separating mechanism synchronously moves the checks through the throat and into the transport system. The guide element **27** is fixed, however, element **29** is pivotable a slight amount to enable entry and passage of different thickness and textured checks into the throat **34**.

An enlarged view of the feed wheel mechanism is shown in FIG. 2 with a sectional view of same in FIG. 3, wherein the rotating feed wheel **50** carries the feed belt **30** on rollers **40**, **42**, **44**, **46** and **48**, the belt being trained on an arc between the forming rollers **40** and **42** by means of a belt guide **80** secured to a slide plate **82**. The feed belt rollers **40**, **42**, **44** and **46** are journaled between the slide plate **82** and a support plate **84** to adequately retain these rollers in integral position with relation to each other, to insure the proper tension in the belt **30**, and to uniformly place the periphery of the belt in a plane to provide the feeding surface.

As best seen in FIG. 3, feed wheel shaft **52** includes a flange **90** secured thereto, the flange being fixed to the feed wheel **50** by means of screws **92** so that shaft **52** and wheel **50** turn as a unit, the shaft being journally carried adjacent the flange of a bearing **94**. Feed wheel **50** is pan-shaped with an offset portion **95** set to receive the screws **92** of flange **90**, the periphery or rim of the wheel having a portion omitted therefrom (FIG. 2) for

the belt **30** to be exposed, thus forming the feed surface of the wheel.

A spring **100**, (FIG. 3) engageable with the wheel rim, continuously exerts force in a direction toward the wheel center and against a pressure pad **102** secured to the slide plate **82** with screws **104**, the pad having a slot **105** therein separating the outer portion from an inner portion **106**, which inner portion has a curved surface, as seen in FIG. **2**, corresponding to the radius of the belt **30** as it passes over roller **48**. A slide belt **107** rides in the slot **105**, is carried around rollers **109** and **110** (FIG. **2**), and is in contact with the curved surface of the pressure pad inner portion **106** and with the surface of the feed belt **30**. The purpose of the slide belt is to provide reduced frictional drag in the area where belt **30** slides over pressure pad **102**. Rollers **109** (FIG. **5**) and **110** are journaled on suitable bearings on bearing shafts **111** secured to the feed wheel **50**. A second slide belt **113** is trained over rollers **40**, **42**, **44**, and **46** and occupies the space between belt **30** and the rollers, and also the space between belt **30** and the arcuate portion of the belt guide **80**. The slide belt **113** follows a path between rollers **44** and **46** in a direction toward the belt guide **80** and under a tensioner stud **130** secured to the slide plate **82** for a similar purpose as belt **107**. Tensioner stud **130** carries a rotating roll **131** to reduce drag on slide belt **113**.

A bearing shaft **115** is centrally located in roller **48** (FIG. **3**), there being a suitable bearing journaled on the shaft **115**, these parts being encompassed by a roller clutch **116** (see also FIG. **5**) and contained by a bearing cap **117** secured to the clutch by suitable screws. An eccentric spacer **118** is fitted on shaft **115** and an eccentric pawl **119** (see also FIG. **2**) is placed on the shaft adjacent the spacer. A shoulder stud **120** (FIG. **3**) is secured to an eccentric clamp arm **121** extending to a position radially of the feed wheel **50**, the stud **120** being journaled in a suitable bearing and capable of moving in to-and-fro fashion in the bight of the pawl **119**. A spring clip **122** fits into a groove near one end of bearing shaft **115** to retain the shaft in desired position in relation to a clutch bearing shaft **123**, there being a thrust washer **124** occupying the space between the bearing cap **117** and the shaft **123**. Roller clutch **116** carried on shaft **115** includes an inner bearing member **116*a*** and an outer bearing member **116*b*** which together with pawl **119** operates as a one-way indexing mechanism wherein member **116*a*** advances clockwise in intermittent manner and member **116*b*** is a lock to prevent rotation in the opposite direction. Referring again to FIG. **4**, feed belt **30** is carried over rollers **40** and **46** which include bearing shafts **143** and **144** secured at one end thereof to slide plate **82**, and bearing rolls **145** and **146** journaled on suitable bearings, the bearing shafts being supported at the other end, by means of suitable screws, to the support plate **84**.

Continuing with the discussion covering the pawl **119** and the eccentric arm **121**, an eccentric pivot block **135** (FIG. **3**), having a stop stud **136** engageable with a leveling stud **137**, is carried on a lever pivot shaft **138**, all mounted on support **139**, secured to a frame member **140** by suitable screws or studs **141**. Pivot action of the arm **121** is for the purpose of replacing a feed belt **30**. As mentioned above, the eccentric arm **121** extends from the pivot block **135** carried on the shaft **138**, the arm being connected to the pawl **119** through the shoulder stud **120**. It is seen from FIGS. **2** and **3** that the drive shaft **52** is offset from the bearing shaft **115** and also from the centerline of the stud **120** so that the pawl **119** is driven in indexing fashion by the stud **120**.

It should be noted from FIG. **6** that the feed wheel **50** has elongated bevel-edged slots **150** and **151** (FIG. **2**) therein which accommodate four locating slide screws **152** for retaining mating bevel-edged locating slides **153** and **154** which slides are secured to the slide plate **82** so that the plate **82** can move to-and-fro in relation to the feed wheel **50**. In other words, the slide plate with the feed belt **30** moves across the face of the wheel as demanded by the wear of the belt. Belt **30** wear is measured by the pad **102** which allows the belt carrier to advance the belt in the direction toward the throat **34** by an amount exactly equal to the wear on the belt. Wheel **50** also has a centrally located slot **155** in which the tensioner stud roll **131** rides for carrying the slide belt **113** in a path between rollers **44** and **46**, there being a mating slot **156** (FIG. **3**) in the slide plate **82**.

An interposer assembly houses the feed wheel and includes a rotatable member having two portions **160** and **161** (FIG. **2**) extending in bowl-shaped fashion from a bearing housing **162** (FIG. **3**), which housing is secured to a card stop shaft **163** encircling the feed wheel shaft **52**. The card stop or interposer is rotatable independently from the shaft **52** so that the feeding and separating of the cards or checks can be stopped and started without affecting the total machine operation. The bearing housing **162** has four equally spaced pick-up studs **170** which equate with a magnetic pick-up **171** secured by means of a bracket **172** to the frame member **140**. The interposer bearing housing **162** is journaled in the frame of the machine by a suitable bearing **173**, and the interposer portions **160** and **161** have ears **174** and **175** (FIG. **2**) for insuring separation of the checks from the feed and retard belts, the ears being formed to counteract certain conditions of checks such as turned-over edges, or the like. Counterweights **180** and **181** (FIGS. **2** and **4**) are carried on pins **182**, secured to slide plates **82**, to provide balance to the rotating feed wheel and belt assembly.

In the operation of the feeding and separating mechanism, the checks are fed one-by-one by the picker belt **20** in the direction of the throat **34** where the successive checks are engaged by the continuously rotating feed belt **30** and the retard belt **32**. Since the feed belt is exposed for a distance of approximately **20** per cent of the circumference of the feed wheel, and since the belt is driven in synchronous manner, it is therefore effective to feed and separate the checks for a portion of each revolution. By reason of the spring **100** exerting force on the pressure pad **102**, there is a constant bias imposed on the feed belt carrier or slide plate **82** in relation to the feed wheel **50**, the plate **82** being slidable along the bevel slots **150** and **151** to maintain the periphery of the belt in a plane slightly beyond the rim of the feed wheel. At the same time, the pawl **119** cooperating with the eccentric arm **121** through the stud **120** permits advancement of the feed belt **30** and its carrier in indexing manner by means of the one-way roller clutch **116** carried on bearing shaft

115 wherein for each revolution of the feed belt, the clutch roller advances the belt a predetermined increment of travel to distribute belt wear over a larger surface.

It is thus seen that herein shown and described is a document feeding and separating mechanism for a sorting machine which operates in synchronous manner and which accomplishes all the objects and advantages as mentioned above. While only one embodiment has been disclosed, certain variations on the above may occur to those skilled in the art, so it is contemplated that all such variations have these features are within the scope of the invention.

What is claimed is:

1. Mechanism for feeding and separating documents in singular synchronous fashion from a stack thereof, comprising

means initiating the flow of individual documents from the stack,

feed means including a continuously rotating drum and carrying a frictional belt member positioned adjacent the initiating means to receive and to move each document along a feed path,

means retarding the movement of each document along the path, said feed and retard means cooperating to form a throat opening therebetween, and

belt member carrier means including a plate mounted on the drum and slidable radially across the drum toward the retard means to automatically maintain a predetermined throat opening.

2. The mechanism of claim 1 wherein the feed means comprises a feed wheel and a feed belt, said plate being carried on the wheel and movable toward the retard means to maintain the throat opening and to compensate for wearing of the belt.

3. The mechanism of claim 1 wherein the feed means comprises an endless belt and includes indexing means to compensate for peripheral wearing of the frictional belt member.

4. The mechanism of claim 3 wherein the indexing means comprises a one-way roller clutch connected and operable to advance the belt member a predetermined amount for each revolution of the wheel.

5. Document feed mechanism comprising a continuously rotating drum, a

carrier plate in the drum, a feed belt mounted on the carrier plate, said carrier plate being biased and slidably supported to be linearly movable across the drum, and a

retard belt positioned in relation to the feed belt to define an engageable surface area therebetween, the feed and retard belts having frictional surfaces thereon and rotatable to move individual documents in successive fashion upon each revolution of the drum whereby a predetermined distance is maintained between successive documents.

6. The mechanism of claim 5 including clutch means for indexing the feed belt in the same direction as the rotation thereof to distribute belt wear over a larger surface.

7. The mechanism of claim 5 including interposing means carried on the drum and rotatable independent thereof for stopping the flow of documents.

8. A feeding and separating mechanism for selecting documents singularly from a stack and for moving the documents along a defined path, said mechanism comprising

picker means adjacent the stack for engaging one side of the foremost document and for initiating its travel a long the path,

feed means including a rotating wheel and a friction belt thereon positioned subsequent to the picker means along said path for frictionally propelling each document in synchronous manner,

retard means cooperating with the feed means for permitting movement of only one document at a time, said feed and retard means being positioned to form a common engageable surface therebetween, and

compensating means including plate means connected with said feed means and slidably supported to be linearly movable across the rotating wheel for maintaining the common surface by reason of radial movement of the feed means in relation to the retard means.

9. The mechanism of claim 8 wherein the compensating means comprises a feed wheel and a carrier plate having a plurality of rollers driving an endless belt engageable with each document to propel it along said path, the carrier plate being radially movable on the feed wheel to at least maintain coincidence of the belt periphery with that of the feed wheel.

10. The mechanism of claim 8 including interposing means carried on the feed means and rotatable thereon for stopping and starting the flow of documents along said path.

11. The mechanism of claim 8 including clutch indexing means for advancing the position of the feed means during its propelling motion to present changing frictional surfaces for each document.

12. The mechanism of claim 11 wherein the indexing means comprises an eccentric arm and a one-way roller clutch cooperating with the arm for advancing the position of the feed means.

13. In separating and feeding apparatus for frictionally feeding documents from a stack in one-by-one synchronous manner, the combination of a

continuously rotating drum driven in a direction to propel the documents along a desired feed path, a

feed belt carrier housed in the drum, a

feed belt mounted on the carrier, a belt periphery coinciding at least with the periphery of the drum and adapted to engage one side of each document, a

retard belt positioned adjacent the feed belt and cooperable therewith, the feed and retard belts forming a predetermined throat opening therebetween, the retard belt being driven in a direction to restrain movement of the document along the feed path, and

means including a spring-biased plate connected with the feed belt carrier and with the rotating drum for radially moving the carrier in relation to the drum across the face thereof whereby the belt periphery is at least coincident with the periphery of the drum to maintain the throat opening between the feed and retard belts.

14. The combination of claim 13 including clutch means connected with the rotating drum drive for indexing the feed belt a predetermined amount for each revolution of the belt so as to present a changing contact surface for each successive document.

15. The combination of claim 13 including interposing means supported from the drum and independently rotatable thereof for stopping the flow of documents by rotation of the interposing means into the throat opening.

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