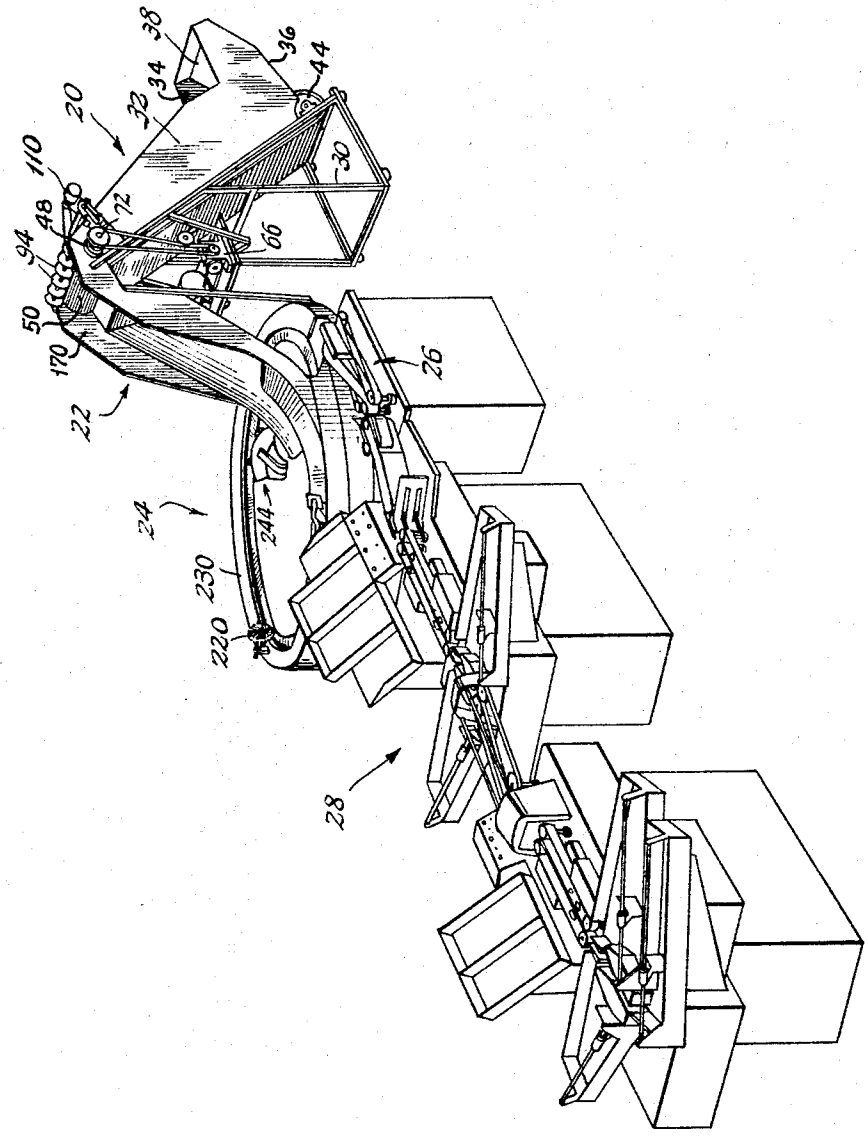
Oct. 18, 1966 M. G. BARNARD ET AL 3,279,598

MAIL ASSORTING DEVICE

Original Filed Dec. 21, 1961 4 Sheets-Sheet 1

Fig. 1.



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MAIL ASSORTING DEVICE

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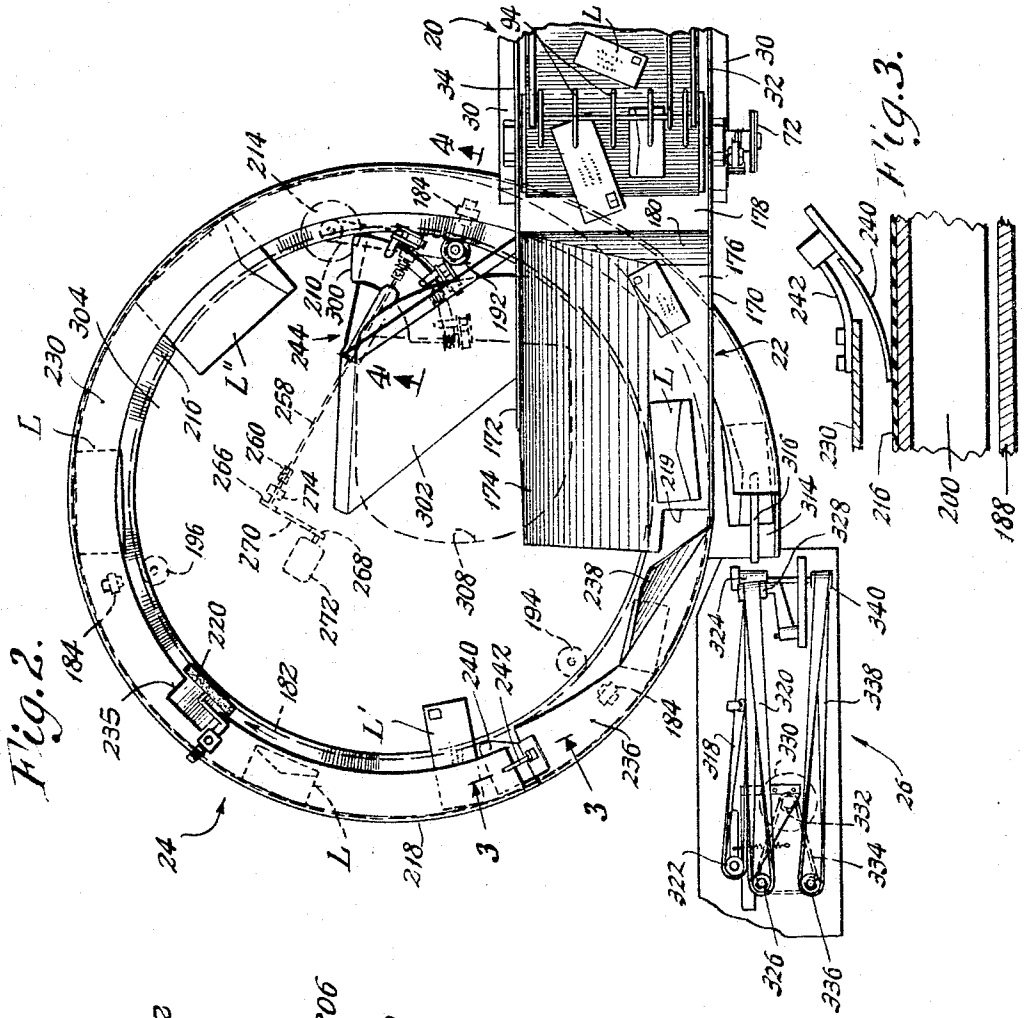


Fig. 2.

Fig. 3.

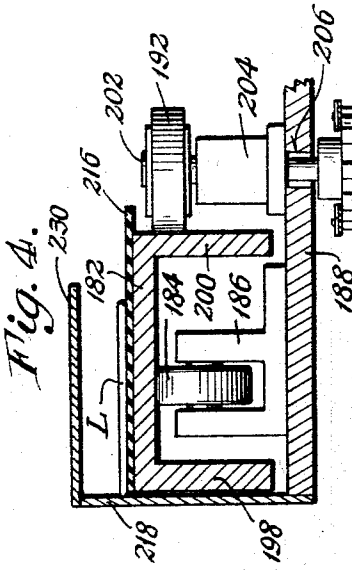


Fig. 4.

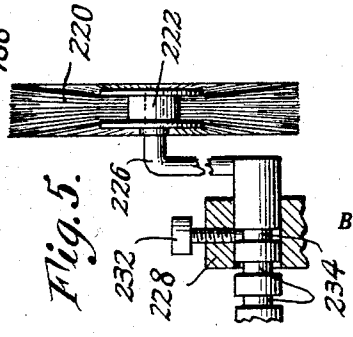


Fig. 5.

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MAIL ASSORTING DEVICE

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Fig. 6.

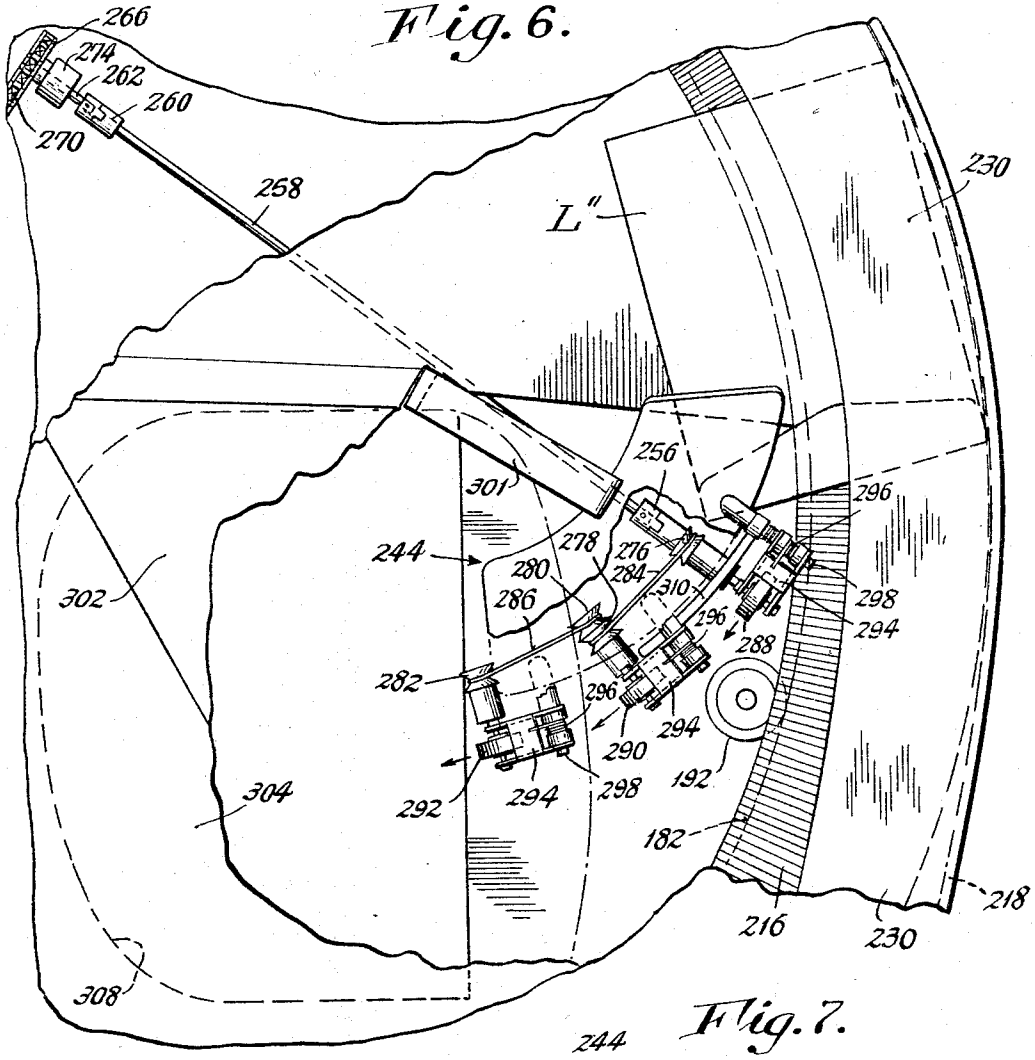
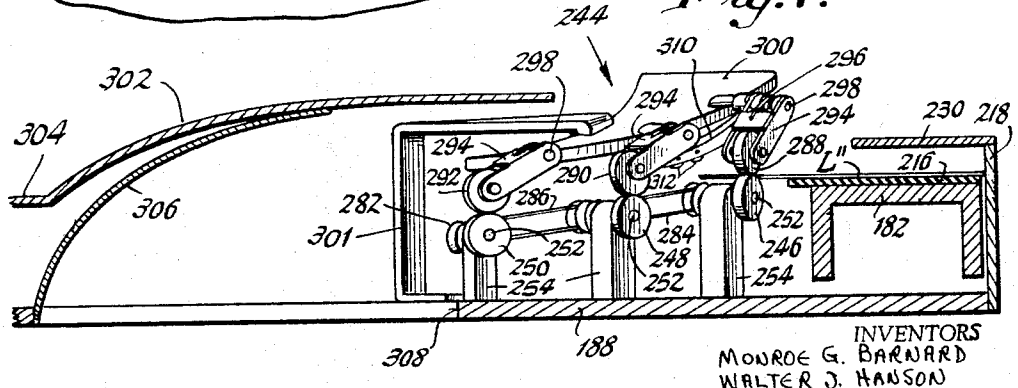


Fig. 7.

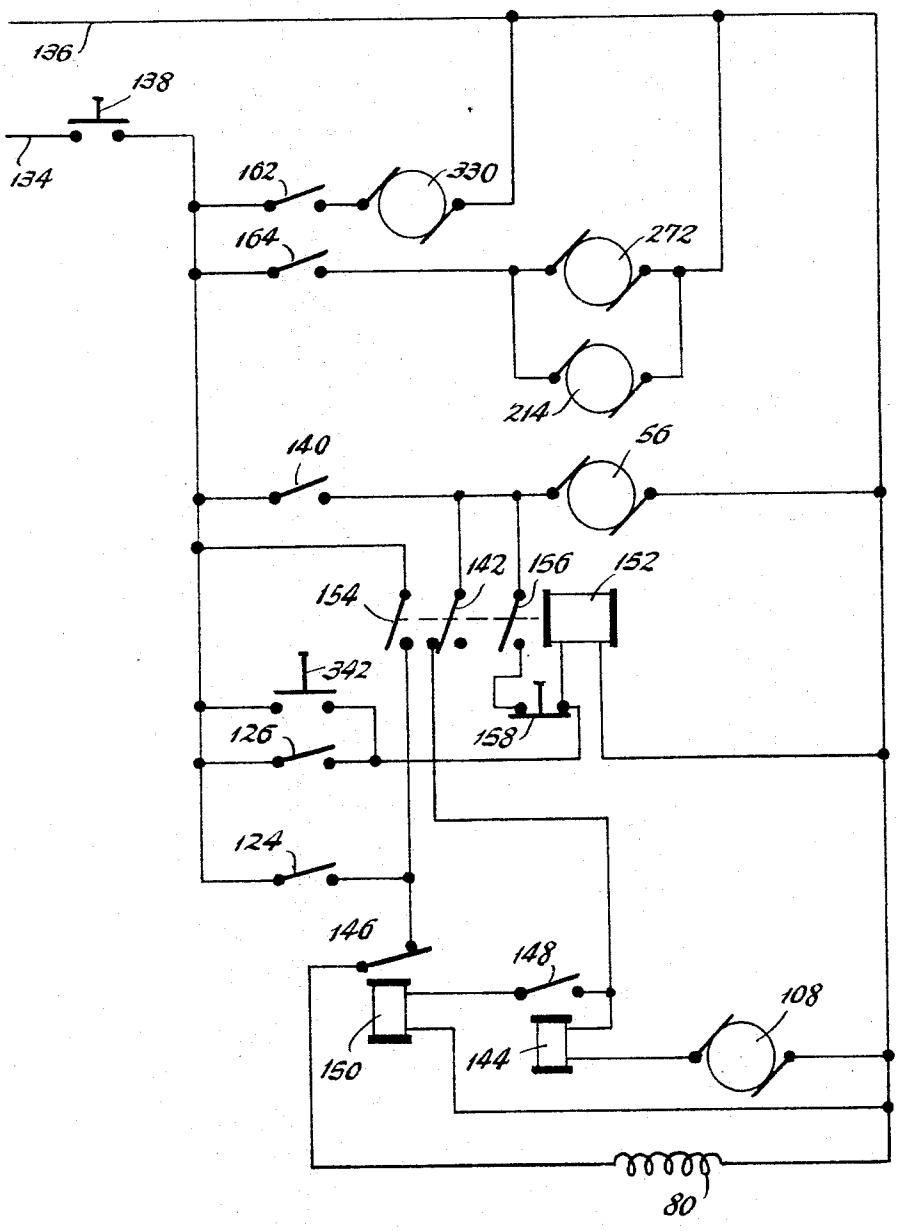


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Fig. 8.



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3,279,598

MAIL ASSORTING DEVICE

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Original application Dec. 21, 1961, Ser. No. 161,117, now Patent No. 3,236,355, dated Feb. 22, 1966. Divided and this application May 17, 1965, Ser. No. 470,283

4 Claims. (Cl. 209—72)

This is a division of application Ser. No. 161,117, filed Dec. 21, 1961, now Patent No. 3,236,355 for an apparatus for handling pieces of letter mail to orient the latter preparatory to performing operations thereon such as any one or more of facing, stamp cancelling and sorting.

Mail, when picked up and delivered to a post office for transmittal is, in large part, non-oriented and includes packages, newspapers and other articles along with letter mail. After culling out all but the letter mail, the latter (which includes post cards as well as filled envelopes) is ordinarily faced (arranged in groups with all of the stamps facing in one direction and located at one corner), cancelled (by overprinting the stamps with a cancellation mark) and sorted (according to class and destination). With the apparatus of the present invention, the non-oriented pieces of letter mail are oriented by causing them to flow in a roughly regulated stream, then de-clumping the letter mail pieces of this stream, then causing the letter mail pieces to be edged and further streamed by acting upon them to bring one of their longer edges against guide means and accelerating their rate of flow, and then delivering the pieces of letter mail in the proper attitude for stacking or farther processing; all this being preparatory to said facing, cancelling and sorting operations.

Accordingly, an object of this invention is to provide a new and improved apparatus useful in handling pieces of letter mail for orienting the same.

Further objects of the invention include providing such as apparatus which incorporates means for causing pieces of batch mail which have been de-clumped and streamed the de-clumped pieces of the stream to be edged and further streamed.

Another object is to provide an improved apparatus for edging and streaming pieces of letter mail. Further objects are to provide such an apparatus which is effective to turn letter mail pieces from edged condition at one of their respective shorter edges to edged condition at one of their longer edges, which is effective to withdraw so-called flats from the stream, and which is effective to deliver a stream of edged pieces of letter mail in the proper attitude for stacking or further processing.

Further objects and advantages will become apparent as the description proceeds.

An embodiment of the invention is shown in the accompanying drawing wherein:

FIG. 1 is a perspective view of a letter handling apparatus according to the invention, this view including an inclined conveyor unit, a chute, a rotary edging and streaming unit, a letter turning unit and a tandem facer-canceller unit;

FIG. 2 is a top plan view of a portion of the inclined conveyor unit, the chute, the rotary edging and streaming unit and the letter turning unit;

FIGS. 3 and 4 are fragmentary sectional views taken along the lines 3—3 and 4—4, respectively, in FIG. 2;

FIG. 5 is a fragmentary elevational view of a presser member;

FIG. 6 is a fragmentary top plan view of a portion of the rotary edging and streaming unit which includes a flat-snatcher;

FIG. 7 is a fragmentary elevational view of the structure shown in FIG. 6; and

FIG. 8 is a schematic wiring diagram for the mail handling apparatus.

Referring to FIG. 1, an apparatus embodying the present invention is shown as including an inclined conveyor unit, a chute, a rotary edging and streaming unit, a letter turning unit and a tandem facer-canceller unit generally designated at **20**, **22**, **24**, **26** and **28**, respectively. These respective units will be described in the order in which they operate upon the pieces of letter mail to orient the same.

With reference to FIG. 1, the inclined conveyor unit **20** represents an improvement over the feeding unit disclosed in copending U.S. patent application Ser. No. 15,336, filed on Mar. 16, 1960 by F. J. Liberty et al., now U.S. Patent No. 3,061,067, dated Oct. 30, 1962. The unit **20** includes a frame **30** which supports a guideway having upstanding sides **32**, **34** and a flat bottom **36**. The lower end of the guideway takes the form of a hopper **38** for receiving batches of non-oriented pieces of letter mail of mixed widths, lengths and thicknesses.

Endless belt **50** passes around rollers **44** and **48** and is driven through a conventional speed reduction unit **66** connected by belt to pulley **72** on roller **48**.

Pieces of letter mail are carried up and driven off the upper end of the inclined endless belt **50** under rollers **94**, in a regulated stream by the inclined conveyor unit **20**. The successive pieces drop into a chute **22** from the inclined conveyor unit **20**. As shown in FIGS. 1 and 2, the upstanding sides **32**, **34** of the guideway of the unit **20** are forwardly extended to form respective portions of the chute **22**. The extension **170** of the guideway side **32** stands substantially vertically, the extension **172** of the guideway **34** is integral with a downwardly and inwardly inclined section **174** which joins, as does the vertical extension **170**, one side of a downwardly and forwardly inclined bottom chute section **176**. As can be seen in FIG. 2, a forwardly and downwardly inclined section **178** extends between the extensions **170** and **172**, and connects with a forwardly and more steeply downwardly inclined section **180**. The section **180** extends between the section **174** and the extension **170**, and also joins with the bottom chute section **176**. The successive pieces of letter mail, after they fall into and slide along the chute **22**, tend to arrive at the discharge end of this chute with one of their shorter edges foremost; this being due, in part, to the transverse dimension of the bottom chute section **176** which is greater than the width but smaller than the length of most pieces of letter mail.

Under the impetus of sliding down the chute **22**, the successive pieces of letter mail move onto the upper surface of an annular disc **182** of the rotary edging and streaming unit **24**. This unit **24** represents an improvement over the rotary edging and streaming unit disclosed in the above-cited U.S. patent application Ser. No. 15,336, now U.S. Patent No. 3,061,067, dated Oct. 30, 1962. The annular disc **182** is supported for rotation about a vertical axis and in the clockwise direction as viewed in FIG. 2 by three substantially equally spaced rollers **184**. Each of the rollers, as shown in FIG. 4, is supported for free rotation about a horizontal axis by a yoke bracket **186** fixed to the upper surface of a circular supporting table **188**. The table **188** is supported, in turn, by a plurality of legs, not shown.

Stability of the annular disc **182** against horizontal shifting is effected by three rollers **192**, **194** and **196** (FIG. 2). The annular disc **182** is fixed to or integral with a pair of downwardly extending rigidifying flanges **198** and **200**, respectively, and each of the rollers **192**, **194** and **196** bears against the radially inner surface of the flange **200** to provide this horizontal stability. The annular disc **182** is rotatably driven by the roller **192**. As shown in FIG. 4, the roller **192** is fixed to a shaft **202** supported for rotation by a bearing bracket **204**. The bearing

bracket **204** is mounted on the table **188** directly over an aperture **206** in the table. The shaft **202** extends through the aperture **206** and fixedly carries a sprocket wheel **208** at its lower end. A sprocket chain **210** meshes with the sprocket wheel **208** and with another sprocket wheel **212** fixedly carried by the shaft of a motor **214** (FIG. 2). The motor **214** is supported by the table **188** and, when energized, rotatably drives the annular disc **182** through the sprocket chain **210** and roller **102**. The rollers **194** and **196** are supported in a manner similar to that of the driving roller **192** except that each of the rollers **194** and **196** is a freely rotatable idler roller rather than being a driving roller.

The upper surface of the annular disc **182** is formed by an annular strip **216** of friction material such as rubber whereby the coefficient of friction between the upper surface of the annular disc and a piece of letter mail is greater than that between two pieces of letter mail.

Disposed about a substantial portion of the periphery of the annular disc **182** is an upstanding arcuate guide **218**. The arcuate guide **218** is formed of a plurality of tandem sections and is secured along its length to the outer periphery of the table **188**. As pieces of letter mail move onto the upper surface of the annular disc **182** from the chute **22**, these pieces are moved by the disc **182** in the direction of rotation thereof and are urged by centrifugal force against the arcuate guide **218**. Being so urged, against the guide **218**, these letter mail pieces are "edged," that is, one of the respective edges of each of the pieces moves into engaging registration with the arcuate guide. The speed of rotation of the annular disc **182** is sufficient that the letter mail pieces slip or lag relative to the disc throughout all or at least a substantial portion of the arcuate path followed by these pieces. Since the coefficient of friction between two pieces of letter mail is less than that between the friction surface of the annular disc **182** and a piece of letter mail, the tendency is for the lowermost one of two or more overlapping pieces to be driven out from under and forwardly of the remaining piece or pieces. In this manner, not only is additional edging of the letter mail pieces accomplished but so also is additional streaming effected. It will be understood by those skilled in the art that the term "streaming" refers to separating, in the direction from lead edge to lead edge, articles being fed along a feed path.

As previously noted, most of the letter mail pieces leave the chute **22** with one of their respective shorter edges foremost due, in part, to the bottom chute section **176** being of a width greater than the width of most pieces of letter mail but smaller than the length of these pieces. Another feature that aids in effecting this result lies in the provision of a cut-out **219** (FIG. 2) at the discharge end of the bottom chute section **176**. This cut-out **219** has little or no effect on a piece of letter mail which moves therepast with one of its shorter edges foremost. When, however, a piece of letter mail approaches the location of the cut-out **219** with one of its longer edges foremost, the tendency is for one of the respective shorter edges thereof to ride against the chute section **174** in elevated location relative to the other shorter edge of that piece; this other shorter edge ordinarily riding at or close to the junction of the side wall **170** and the bottom chute section **176**. As a consequence this latter shorter edge rides onto the upper surface of the annular disc **182** at the location below the cut-out **219** while the elevated shorter edge thereof is in engagement with the chute section **174**. The tendency is for the shorter edge engaging the upper surface of the annular disc to be driven forwardly of the elevated shorter edge whereby the piece of letter mail is turned to bring the driven shorter edge foremost. Occasionally, however, one of the letter mail pieces will have one of its shorter edges register with the guide **218** as shown, for example at L' in FIG. 2. The manner in which this condition is accommodated by the unit **24** will now be described.

A presser member **220** is provided which includes a hub **222** supporting a circular brush **224** formed of flexible bristles which extend radially outward from the hub **222** (see FIGS. 2 and 5). The hub **222** along with the brush **224** is rotatable freely about one end of a crank arm **226**. The opposite end of the crank arm **226** is retained for free rotation by a bearing block **228** mounted on a circular cover plate **230** later to be described in detail. As shown in FIG. 5, the presser member **220** can be set in adjusted position transversely of the upper surface of the annular disc **182** by loosely inserting the end of a set screw **232** in a selected one of a plurality of grooves **234** in the crank arm **226**. By setting the presser member **220** in a transverse position such that it lies a distance from the guide **218** slightly greater than the maximum width of the letter mail pieces to be handled (this will be less than the length of the shortest pieces to be handled), a letter mail piece in the attitude of the letter L' in FIG. 2 will be swung or turned in a horizontal plane to bring its leading longer edge into edged condition against the guide **218**. In this regard, the presser member **220** acts in the same manner as its counterpart in said copending U.S. patent application Ser. No. 15,336, now U.S. Patent No. 3,061,067, dated Oct. 30, 1962, in the respect that under the weight of its parts, the presser member urges each piece of letter mail passing thereunder into firmer driven engagement with the annular disc. Since each piece of letter mail slips or lags behind the annular disc, the effect of the downward urging of the presser member is to cause the annular disc to drive the portion of the letter mail piece pressed thereagainst, ahead and about the leading corner of that piece at the guide **218**. The resulting counterclockwise turning (as viewed in FIG. 2) of the letter mail piece brings the leading longer edge of the piece into edged condition against the guide **218**; all this as the piece continues to move along the arcuate path defined by the guide **218**.

The previously mentioned cover plate **230** extends along a substantial portion of the length of the arcuate path followed by the pieces of letter mail as they move into edged condition against the arcuate guide **218**. The cover plate **230** provides a cut-out portion **235** to accommodate radial adjustment of the presser member **220**. The cover plate **230** is preferably formed in separately connected sections and is preceded by a cover plate **236** attached to the arcuate guide **218** in the same manner as the cover plate **230**. The lead-in end of the cover plate **236** is formed with an inclined portion **238** which acts to deflect pieces of letter mail toward the annular disc **182** from the chute **22**.

When the annular disc **182** rotates, the air directly thereabove tends to be urged radially outwardly by centrifugal force just as are the pieces of letter mail. Since the cover plates **230, 236** extend radially inwardly from the guide **218**, the air directly above the annular disc **182** is substantially confined by the guide **218** and the cover members **230, 236** against radially outward movement. As a consequence, the air directly above the annular disc **182** is substantially confined for movement in the direction of movement of the annular disc. This acts to decrease the "planing" effect of letter mail pieces. In this regard, the pieces of letter mail, particularly those with an upwardly bent leading end, tend to lift off the friction surface of the annular disc as they move past the air thereabove. With this air moving in the same direction as the letter mail pieces, however, this tendency is decreased.

Another presser member **240** is provided as shown in FIGS. 2 and 3. The presser member **240** takes the form of a flap formed of a flexible material such as rubber. The flap **240** is supported by a bracket **242** secured to the cover plate **230**. The flap **240** extends from the bracket **242** through a space between the cover plates **230, 236** into converging relation with the upper surface of the annular disc **182** in the direction of movement of the latter. The presser member **240** acts, as do its counterpart presser members in the above-cited U.S. patent application Ser.

No. 15,336, now U.S. Patent No. 3,061,067, dated Oct. 30, 1962, to urge the successive pieces of letter mail into firmer driven engagement with the disc **182** thereby to increase the edging and streaming efficiency of the unit **24**.

It sometimes occurs that so-called "flats" or oversize pieces of letter mail such as that shown at L' in FIG. 2 are delivered by the unit **20** and chute **22** to the unit **24**. Such pieces are greater in width than the maximum to be handled, and a "flat-snatcher" generally designated at **244** in FIGS. 2, 6 and 7 is provided to discharge such pieces from the system automatically. The flat-snatcher **244** includes a series of three driven rollers **246, 248** and **250**, each of which is similarly fixed on a respective shaft **252** rotatably mounted in a respective bearing block **254** secured to the table **188**. An enlarged diameter portion of the shaft **252** on which the roller **246** is fixed, is driven through a universal joint **256**, a drive shaft **258**, a universal joint **260**, a shaft **262**, and a pair of pulley wheels **266, 268** about which an endless belt **270** is entrained; the pulley wheel **268** being driven by an electric motor **272**. The shaft **262** is rotatably supported by a bearing block **274**. The bearing block **274** and the motor **272** are supported by respective brackets (not shown) which are carried by the table **188**.

As best shown in FIGS. 6 and 7, a pulley wheel **276** is fixed on the shaft **252** mounting the roller **246**, a pair of pulley wheels **278** and **280** is fixed on the shaft **252** mounting the roller **248**, and a pulley wheel **282** is fixed on the shaft **252** mounting the roller **250**. An endless belt **284** drives the pulley wheel **278** from the pulley wheel **280** and an endless belt **286** drives the pulley wheel **282** from the pulley wheel **280**. Each one of three idler rollers **288, 290** and **292** opposes and is resiliently biased toward a respective one of the three driven rollers **246, 248** and **250**. In this regard, each one of the idler rollers **288, 290** and **292** is rotatably supported by a yoke member **294** which is resiliently biased downwardly by a torsion spring **296** in conventional fashion about a pivot pin **298** secured to a contoured plate **300**. The plate **300** is carried by a bracket **301** mounted on the table **188**.

Each pair of rollers **246** and **288, 248** and **290**, and **250** and **292**, diverges, as best shown in FIGS 2 and 6, at an angle from the feed path of pieces of letter mail on the annular disc greater than that at which the respectively preceding one of these pairs of rollers diverges. Also, the bite between the pair of rollers **246, 288** is disposed radially inwardly of the annular disc **182**. This roller bite will be located at a distance from the arcuate guide **218** slightly greater than the maximum width of letter mail pieces to be handled. As a consequence, a so-called flat which is being impositively driven by the annular disc **182** will enter the bite between the rollers **246, 288** and will be positively withdrawn thereby from the annular disc and into the bite between the rollers **248, 290**. From the rollers **248, 290**, the flat will be directed into the bite between the roller pair **250, 292** from which the flat will be directed under a hood **302** provided by a cover plate **304**, against a deflector **306**, and downwardly through an opening **308** in the table **188**. To aid in directing the lead edge of each flat into the bite between the rollers **248, 290**, an arm **310** is provided that is carried in cantilever fashion by the pivot pin **298** about which the roller **288** pivots. A pair of idler rollers **312** carried by the arm **310** act as an anti-friction means for downwardly deflecting the leading edges of the flats as the latter approach the rollers **248, 290**. A container (not shown) may be placed under the table **188** in position to receive the flats withdrawn from the annular disc.

As can best be seen in FIG. 2, the arcuate guide **218** diverges away from the periphery of the annular disc **182** from a point adjacent the flat-snatcher **244** to the discharge end of the arcuate guide. A horizontal, curved plate **314** is supported by the table **188** at a level just below the annular disc. The plate **314** extends radially outwardly from under the annular disc to the arcuate guide **218**.

The successive pieces of letter mail slide off the annular disc **182** onto the plate **314** while remaining in edged condition against the arcuate guide **218**. The cover member **230** terminates short of the discharge end of the plate **314** and supports adjacent its end a flexible finger **316** similar to the flap **240** in FIG. 3. The finger **316** urges each successive piece of letter mail downwardly against the plate **314** as the successive pieces move off the plate **314**.

From the rotary edging and streaming unit **24**, the pieces of letter mail can be directed to a horizontal stacker as disclosed in said U.S. patent application Ser. No. 15,336, now U.S. Patent No. 3,061,067, dated Oct. 30, 1962. Alternatively, the successive pieces can be directed through a letter turning unit **26** to a tandem facer canceller unit **28**. Such a tandem facer canceller unit is disclosed, for example, in U.S. Patent No. 2,947,406 granted on August 2, 1960, to H. S. Hazelton, Jr.

The letter turning unit **26** is similar to the one depicted in said U.S. patent to H. S. Hazelton, Jr., in that the former turns each successive piece of letter mail 90° about a horizontal axis whereas the latter turns the pieces 180°. The letter turning unit **26** includes two endless belts **318, 320**. The belt **318** is entrained about two rollers **322** and **324**, and the belt **320** is entrained about two rollers **326** and **328**. The rollers **322, 324, 326** and **328** are positioned so that the two inner reaches of the belts are in face-to-face engagement with each other. As can be seen in FIG. 2, the rollers **322, 326** are mounted for rotation about vertical axes and the rollers **324** and **328** are positioned so that the two inner reaches of the whereby the face-to-face engagement of said inner reaches of the belts **318, 320** gradually changes from horizontal at the input of the unit **26** to vertical at the output thereof. The belts **318** and **320** are driven in the respective directions to move the inner reaches thereof in the direction from the input to the output (right-to-left in FIG. 2) of the unit **26**. As can be seen in FIG. 2 the roller **328** is mounted for rotation about a horizontal axis canted slightly from parallelism with the rotational axis of the roller **324**. This provides a tendency for the belt **320** to be urged in the direction of the deflector **238** but the effect is to balance and thereby overcome an inherent tendency for lateral shifting of the mutually engaging surfaces of the belts **318** and **320**. The belts **318** and **320** are driven by a motor **330** which, through a pulley wheel **332**, drives a belt **334**. The belt **334** drives a pulley wheel fixed to the shaft which mounts the roller **326** thereby to drive the belt **318**. The belt **334** also drives a pulley wheel fixed on a shaft which also mounts a roller **336**. A twist belt **338** is driven by the roller **336** and drives a roller **340**. The roller **340**, being mounted on the same shaft as the roller **324**, drives the belt **320**.

Each successive piece of letter mail moves off the discharge end of the edging and streaming unit **24** into the bite between the belts **318, 320** and is turned from a horizontal to a vertical attitude for discharge into the tandem facer-canceller **28** where the pieces are faced and the stamps thereon are cancelled.

The motor **214** for driving the rollers **94**, the motor **272** for driving the annular disc **182** and the motor **330** for driving the letter turning belts **318, 320** are electrically connected as shown in FIG. 8. Ordinarily, the switch **140, 162** and **164** will be closed prior to closing of the main switch **138** to begin operation of the mail handling apparatus. A normally open, manually operable stop switch **342** is disposed in parallel relation with the switch **126** and operates, when momentarily closed, in the same manner as that when the switch **126** is closed. That is, the relay **152** is energized and the relay contactor **154** is closed to energize the solenoid **80** to stop the drive to the endless belt **50**, the relay contactor **142** is opened to de-energize the motor **108** which drives the rollers **94**, and the relay contactor **156** is closed to provide a hold-in circuit for maintaining the relay **152** in energized condition. In this manner the feeding of letter mail pieces to

the chute **22** is stopped and remains so until the manual reset switch **158** is momentarily opened.

Since many changes can be made in the embodiment of the invention as particularly described and shown herein without departing from the scope of the invention, it is intended that this embodiment be considered as exemplary and that the invention not be limited except as warranted by the following claims.

What is claimed is:

1. An apparatus for handling pieces of letter mail comprising:

(a) an annular disc having a circular periphery;

(b) the proper surface of said annular disc being formed of a material providing a coefficient of friction between said surface and a piece of letter mail greater than the coefficient of friction between two pieces of letter mail;

(c) an arcuate guide extending about and adjacent to a substantial portion of the periphery of the annular disc;

(d) means operatively connected for rotatably driving said annular disc at a sufficient velocity that pieces of letter mail deposited on said disc are urged in the direction of rotation of the disc and into edged condition against said arcuate guide;

(e) and means for withdrawing oversize pieces of letter mail from said disc;

(f) said last-named means including a pair of opposed endless feed members providing a bite therebetween disposed radially inwardly of said annular disc;

(g) and means operatively connected for rotatably driving said endless feed members in opposite directions for feeding radially inwardly of said annular disc any pieces of letter mail having a portion projecting radially inwardly of said annular disc into the bite between said endless feed members.

2. An apparatus for handling pieces of letter mail comprising:

(a) a disc having a circular periphery;

(b) the upper surface of said disc being formed of a material providing a coefficient of friction between said surface and a piece of letter mail greater than the coefficient of friction between two pieces of letter mail;

(c) an arcuate guide extending about and adjacent to a substantial portion of the periphery of the disc;

(d) means operatively connected for rotatably driving said disc at a sufficient velocity that pieces of letter mail deposited on said disc are urged in the direction of rotation of the disc and into edged condition against said arcuate guide;

(e) and a cover member extending from said guide radially inwardly of the latter and overlying a substantial portion of the radially outer margin of said disc thereby to confine a substantial amount of the air between the cover member and the disc for movement in the direction of rotation of the disc as opposed to radially outward of the disc.

3. An apparatus for handling pieces of letter mail comprising:

(a) a disc having a circular periphery;

(b) the upper surface of said disc being formed of a material providing a coefficient of friction between said surface and a piece of letter mail greater than the coefficient of friction between two pieces of letter mail;

(c) an arcuate guide extending about and adjacent to a substantial portion of the periphery of the disc;

(d) means operatively connected for rotatably driving said disc at a sufficient velocity that pieces of letter mail deposited on said disc are urged in the direction of rotation of the disc and into edged condition against said arcuate guide;

(e) and means for driving one of the longer edges of each piece of letter mail into edged condition against said arcuate guide when the respective pieces of letter mail approaches said last-named means with one of its shorter edges in edged condition against the arcuate guide;

(f) said last-named means comprising a presser member;

(g) means mounted said presser member for yieldable urging of the presser member against said disc at a location along the radially outer margin thereof;

(h) said location being spaced radially inwardly of said arcuate guide a distance slightly greater than the maximum width of letter mail pieces to be handled whereby letter mail pieces having one of their shorter edges in edged condition against said arcuate guide are urged into increased driven engagement with said disc at said location to propel the leading longer edge thereof into edged condition against said arcuate guide.

4. An apparatus as set forth in claim **3** wherein said presser member comprises a roller whose outer periphery is defined by the radially outer ends of a plurality of radially projecting flexible brush bristles.

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