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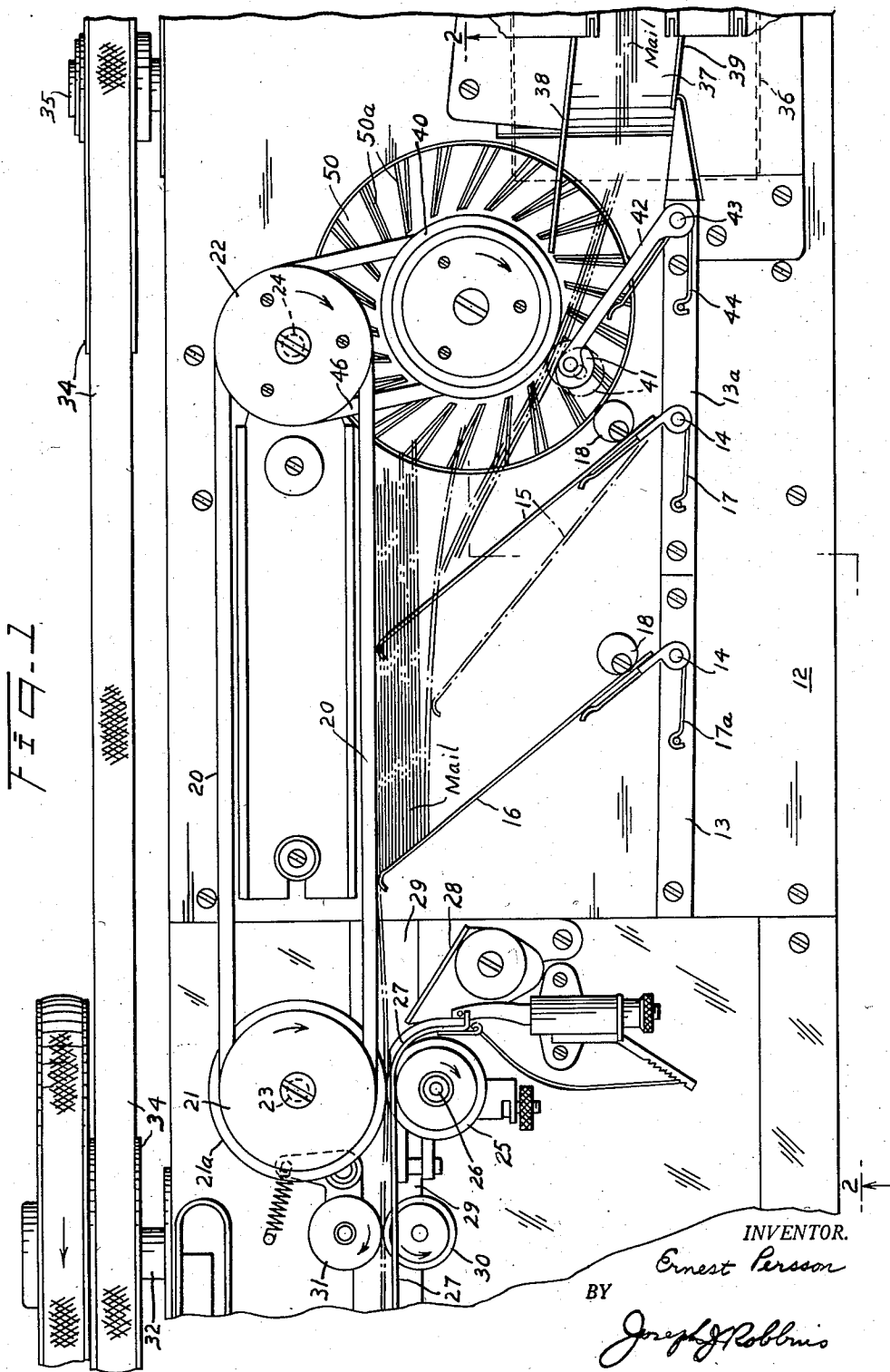
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MAIL HANDLING EQUIPMENT

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MAIL HANDLING EQUIPMENT

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This invention relates to equipment for handling letter or card mail or other thin flat work pieces such as envelopes or record strips or the like, irregular or uniform in size.

The invention deals especially with a mail handling machine having a receiving station into which letter or card mail are inserted on edge by forward movement from the rear and angularly deflected by an intercepting baffle to a side of the station at which mail feed means operates to transfer the mail pieces in succession to a single-file course for treatment by postage canceling means or other operating means. Mail pieces or mail bunches follow one another into the station in varying quantities and at a random rate while the mail feed means for transferring the pieces to the single-file course operates at a constant rate, so that mail may accumulate in the station in general side-by-side array, awaiting transfer to the single-file mail course.

The present invention is directed to improvements in such mail handling machine with the object of providing for flow of mail into and through the receiving station to the single-file mail course more efficiently, rapidly and smoothly than before. To this end, the invention provides means for facilitating the entry of mail into the receiving station, clearing just entered mail rapidly out of the way of following mail, and improving the working relation between the mail feed means at the side of the station and each particular mail piece reaching this feed means in order that the feed means may function with maximum effect on the mail piece to transfer it rapidly and smoothly to the single-file mail course.

An object of the invention is to provide means extending into the mail receiving station to shift just-entered mail sidewise away from following mail and toward mail feed means at a side of the station. According to the invention, entered mail pieces will be swung about their front ends from angular relation with the feed means toward parallel relation. More specifically, the invention provides a large horizontal disk rotating horizontally with a smaller-diameter mail entering feed roller and underlying the bottom edges of entering and entered mail in the station for assisting full entry of the mail into the station and for urging and shifting entered mail sidewise at the rear away from the input path of following mail and toward parallelism with feed belting running forwardly along a mail exit side of the station, whereby each mail piece reaching the belting will have substantial flat-sided engagement with flat vertical friction facing of the belting and will be in substantial alignment with a single-file course extending forwardly of the belting. The belting thereby will be able to apply optimum feeding force to each engaged mail piece and the mail piece will be able to enter the single-file course with minimum resistance. Further, as the mail pieces are continually urged and shifted into parallel relation within the station, there will be minimum tendency for mail pieces to jam at the exit end of the station.

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Other objects and advantages of the invention will appear from the following detailed description, from the claims, and from the drawings.

Fig. 1 is a plan view of the pertinent portion of a mail handling machine embodying the invention.

Fig. 2 is a section substantially along line 2—2 of Fig. 1.

The machine frame includes an I-beam 10 and a hollow casting 11 on both of which is suitably fastened a horizontal, smooth surface plate 12 which affords a fixed bottom section for a mail receiving and temporary storing station. Upright-positioned mail, such as letters or cards, are inserted into the station, usually on their long edges, by forward movement from the rear. At the rear side of the station, as seen in Fig. 1, plate 12 mounts bars 13 and 13a carrying vertical hinge pins 14 for baffles 15 and 16. Relatively weak and strong springs 17 and 17a respectively urge baffles 15 and 16 clockwise to limit positions set by adjustable eccentric stops 18. Baffle 15 is a vertical plate inclined forwardly toward the far side of the station and acting as a readily yieldable front and near side wall of the station adapted to intercept incoming mail at their front ends to deflect the mail angularly toward the far side of the station. Baffle 16 is a similar angularly disposed vertical plate more firmly held in position by relatively strong spring 17a. Bunched mail passing the free end of baffle 15 are intercepted by baffle 16 and echeloned toward the far side of the station. Located at the far side of the station is mechanism to feed the mail pieces successively from the station to a single-file mail course extending forwardly of the far side of the station.

The mail feed mechanism at the far side of the mail receiving station comprises upper and lower twin V-belts 20 with vertical, flat friction faces. Belts 20 extend between front and rear pulleys 21 and 22 on vertical shafts 23 and 24 suitably supported by the frame. The pulleys rotate clockwise so that the active belt lengths travel forwardly along the far side of the station and serve by friction to feed an engaged mail piece to the mouth of the single-file course. In effect, the coplanar vertical faces of the active belt lengths serve as a continuously forwardly moving far side of the mail receiving station. The mouth of the single-file course is defined by a rubber-tired central feed roller section 21a of pulley 21 and a coating separator roller 25. Roller 25 is fixed to a vertical shaft 26 rotated clockwise, in the same direction as 21—21a. The feed roller 21a projects outwardly beyond the belt loops around the pulley portions and is of larger diameter than the separator roller 25. The feed roller is effective to feed an engaged mail piece into the single-file course, while the separator roller bars entry of more than one mail piece at a time. A vertical guide plate 27 is curved at the rear behind the separator roller to aid in guiding mail pieces into the mouth of the single-file course. A similar purpose is served by a deflector plate 28. A straight portion of guide plate 27 flanks the single-file course which is bottomed by a horizontal smooth surface strip 29. The mail pieces travel upright, one after another, along the single-file course, with their long edges gliding along the surface strip 29. Each mail piece entering the course is advanced by feed roller 21a to feed rollers 30 and 31 which continue the advance of the mail piece to operating means having no part in the present invention.

For further explanation of the action of the separator roller 25 and of the means mounting this roller and the guide plate 27, reference may be had to Patent 2,737,885.

The pulley-feed roller 21—21a, the separator roller 25, and the feed rollers 30 and 31 are suitably geared, for drive in the indicated directions, to a shaft 32 belt-

driven by a motor (not shown). Clockwise rotation of pulley 21 is transmitted by feed belts 20 to rear pulley 22. Through belt-and-pulley means 34, main drive shaft 32 rotates a shaft 35 to which is fixed a drive drum 36 for a horizontal conveyor belt 37, only the front end of which appears in the drawings. Mail, usually in bunches, are stacked on their long edges at successive locations along the conveyor belt and fed between side guides 38 and 39 to a horizontally clockwise rotating feed roller 40 and coacting pressure roller 41. The pressure roller is on a plate-like arm 42 hinged on a vertical pin 43 and urged clockwise by a spring 44. Feed roller 40 rotates about a vertical shaft 45 located at the rear of the station and fixed at its lower end to the top of the I beam 10. A belt 46 between an intermediate section of the pulley 22 and a pulley section 40a of feed roller 40 effects clockwise rotation of the feed roller. The feed roller and coacting pressure roller provide a restricted mail entrance laterally distant from the feed belts 20. Mail delivered by conveyor 37 to this station entrance are seized between feed roller 40 and pressure roller 41 and advanced by the feed roller along an insert path within the station inclined relative to the intercepting baffle 15 and acutely angular to the path of the active lengths of the feed belts 20. Baffle 15 by front end engagement with the incoming mail tends to deflect the mail angularly and forwardly toward the feed belts.

Secured by screws 48 to the bottom of the hub of feed roller 40 is a horizontal disk 50 rotating within a closely encircling opening in the surface plate 12. The upper face of disk 50 is formed with helically radiating ribs 50a but is otherwise flush with the surface of plate 12. Ribs 50a are short in height and have beveled sides to permit the front lower corners of mail pieces to ride freely over them into the receiving station. Disk 50 is much larger in diameter than the feed roller 40 with which it rotates clockwise. The disk intrudes into the station, its intruding segment serving as a movable bottom section of the station moving across the insert path of mail in the station and transversely toward and past the overlying active lengths of the feed belts 20, the span of the intruding segment exceeding the full effective width of the station.

As the disk 50 rotates clockwise, its section underlying the mail input between the feed roller 40 and coacting pressure roller 41 has a large component of forward motion and aids full entry of the mail into the station. The disk segment inside the station has a predominantly transverse component of motion toward the feed belts 20, reaching a maximum at about the midpoint of the arc of the disk inside the station. Thus, as the mail pieces advance further into the station, the disk applies force against their bottom edges to urge them sidewise toward the feed belts. When a mail piece has entered into the station far enough to free its lagging end from the restraint of feed roller 40, the disk becomes effective to bodily transport the rear portion of the piece sidewise toward the feed belts. In effect, with the front end of a mail piece restrained by engagement with the baffle 15 or by engagement with other mail, the disk by friction against the bottom of the mail piece and by bodily transport serves to swing the mail piece sidewise about its restrained front end from angularly entered and angularly deflected relation with the feed belts toward increasingly parallel relation.

Since the disk 50 rotates across the insert path of incoming mail and past the overlying active lengths of feed belts 20, its action on a mail piece can be continuous from the moment the mail piece enters the station until the moment it is at the active belt lengths. Ribs 50a are pitched to abet the action of the disk on the mail, occasional engagement of rib sides with rear edges of entering mail aiding their full entry into the station and occasional engagement of rib sides with sides of entered mail im-

parting a positive sidewise push of the mail toward the feed belts.

As now understood, the disk 50 continually shifts the mail in the receiving station sidewise toward the feed belts 20 while swinging the mail at the rear about their restrained front ends laterally toward the feed belts and thus reducing their angular disposition. One result, particularly important when successive mail bunches are automatically conveyed to the receiving station as is done here by conveyor belt 37, is that the lagging end of a just-entered mail bunch is swung aside from the station entrance and out of the way of a following mail bunch, so that successive mail bunches may follow one another uninterruptedly and rapidly into the station. Another result is that the mail pieces are compacted more closely together, increasing the mail storing capacity of the station. A third, most important result is that by shifting the mail into parallelism with the feed belts, the disk brings each mail piece in turn into substantial flat-sided engagement along the entire length of a flat side thereof with the flat vertical friction faces of the forwardly traveling, active lengths of the feed belts. This gives the most advantageous working relation of the feed belts to each particular mail piece, enabling the feed belts to apply force most effectively to each mail piece in turn, to feed it endwise to the single-file course. The feed belts therefore can be run at a high speed and transfer the mail pieces at a high rate of flow from the station to the single-file course. Since the mail piece will be in alignment with the single-file course while being transferred thereto, its entry into the course will take place smoothly, with minimum reluctance. Further, with the mail pieces being compacted by disk 50 into truer side-by-side formation adjacent the feed belts, the possibility of the pieces jamming between the belts and the free end of baffle 15 is minimized. In the absence of the disk, each mail piece would reach the feed belts at an appreciable angle, so that only the leading end or a small side area at the leading end of the mail piece would be pressed by baffle 15 into engagement with the feeding faces of the belts. Such small area of interengagement would not make for efficient utilization of the feeding power of the belts on a mail piece, and to compensate for this the belts would have to be given more time to feed the mail piece effectively from the station to the single-file course. Further, in the absence of the disk, as the mail pieces converge at a sharp angle in the space between the free end of baffle 15 and the feed belts, the tendency of the mail pieces to jam and double on themselves would increase. Other disadvantages overcome by the provision of disk 50 are feed of a mail piece in a non-linear path across the free ends of baffles 15 and 16, with resultant tendency for the piece to acquire an undesired curvature, and the transfer of the mail piece to the single-file course while the mail piece is out of alignment with the course.

It should be noted that instead of providing the disk 50 with ribs 50a, the disk may be provided with an equivalent irregular or friction face such as may be afforded, for instance, by covering the disk face with friction material. Further, the twin belts 20 may be replaced by a single belt or by equivalent mail feed means such as, for example, a horizontal row of small feed rollers on vertical axes. It is also clear that while the disclosed machine is particularly suited to handling mail pieces or other thin flat work pieces which may vary in height and length, the principle of the invention can be applied to the handling of thin flat work pieces of uniform dimensions.

While there have been shown and described the fundamental novel features of the invention as applied to a preferred embodiment, it is understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the

spirit of the invention. It is intended, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In mail handling equipment or the like, a receiving magazine with an associated transverse intercepting member in front of a rear entrance through which upright-positioned thin flat work pieces such as letter mail or cards or the like are inserted on edge in touching contiguity alongside one another and alongside an exit side of the magazine by forward movement along an insert path into front end engagement with said intercepting member, feed mechanism operating effectively in a vertical plane at said exit side for engaging the contiguous upright face of one after another of the inserted work pieces to feed them on edge from the magazine to a single-file course, and continually running means moving across and past said insert path and transversely toward said exit side for engaging the inserted work pieces to shift them sidewise, while standing on edge, away from said magazine entrance and crowd them laterally together against the feed mechanism for effective feed receiving coaction with said feed mechanism.

2. In mail handling equipment or the like, a receiving magazine into which thin flat work pieces such as letter mail or cards or the like are inserted in upright positions in touching contiguity alongside one another and alongside an exit side of the magazine, feed mechanism operating along a substantially vertical feeding plane at said exit side for engaging the contiguous upright face of one after another of the work pieces in the magazine to feed them on edge from the magazine to a single-file course, and continually running means moving along the bottom of the magazine transversely toward said exit side and engaging the bottom edges of the inserted work pieces to urge them, while standing on edge, constantly sidewise toward said feed mechanism.

3. In mail handling equipment or the like having a receiving station into which thin flat work pieces such as letter mail or cards or the like are inserted in upright positions alongside one another and an exit side of the station; feed mechanism operating at said exit side for transferring the work pieces from the station to a single-file course, a horizontal disk rotatable about a vertical axis at the rear of the station and having a segment intruding into the station as a movable bottom section underlying the inserted work pieces, and means rotating the disk in a direction such that the intruding segment has a substantial component of motion toward said exit side and by engagement with the bottom edges of the inserted work pieces urges them constantly sidewise toward the feed mechanism.

4. In mail handling equipment or the like, a receiving magazine through a rear entrance of which upright-positioned thin flat work pieces such as letter mail or cards or the like are inserted by forward movement along an insert path, a baffle inclined relative to said insert path and tending by front end engagement with incoming work pieces to deflect them angularly toward an exit side of the magazine, feed mechanism having a path of action within a vertical feeding plane along said exit side for engaging the contiguous upright face of one after another of the inserted work pieces to feed them on edge to a single-file course, and continually running means having motion inside the magazine transversely across said insert path and toward said exit side for engaging the work pieces to turn them, while standing on edge, sidewise about their front ends away from the magazine entrance and into reduced angular relation with the path of action of said feed mechanism.

5. In mail handling equipment or the like, a receiving magazine to accumulate in touching contiguity alongside one another upright-positioned thin flat work pieces such as letter mail or cards or the like inserted through a rear entrance by horizontally forward movement along

an insert path acutely angular to an exit side of the magazine, feed belting running horizontally forward within a vertical feed path along said exit side for engaging a contiguous upright face of one after another of the inserted work pieces to feed them on edge from the magazine to a single-file course extending forwardly of the feed path of the belting, and continually running means providing a rear bottom magazine of the station moving transversely across said insert path and toward the feed belting for acting on the inserted work pieces at their bottom edges to urge the work pieces sidewise toward the feed belting while biasing them from angularly entered relation to the exit side of the magazine and the path of the feed belting along said exit side toward parallel relation with the exit side and the path of the feed belting, thereby to displace just-entered work pieces at their rear laterally away from said magazine entrance and bring each inserted work piece in turn into substantial flat-sided engagement with the belting.

6. In mail handling equipment or the like having a receiving station into which thin flat work pieces such as letter mail or cards or the like are inserted alongside one another and an exit side of the station; feed belting running along said exit side for engaging a contiguous face of one after another of the work pieces to feed them from the station to a single-file course aligned with and continuing forwardly from the feed path of the belting, rotating driving and mounting pulleys for the feed belting including a pulley mounting the leading end of the belting and formed with an exposed feed roller section at the mouth of the single-file course for engaging and feeding the work pieces into the single-file course, and separator means coacting with said feed roller section to enable the feed roller section to feed into the single-file course only one work piece at a time of a plurality of work pieces simultaneously at the mouth of the single-file course.

7. In mail handling equipment or the like having a receiving station into which upright-positioned thin flat work pieces such as letter mail or cards or the like are inserted from the rear into initially acutely angular relation to an exit side of the station; feed mechanism having a path of action along said exit side for transferring the work pieces from the station to a single-file course, and means for inserting the work pieces into the station and shifting them sidewise from angular relation to the exit side toward parallel relation with the exit side and the path of action of the feed mechanism along said exit side, said means comprising a horizontally rotating feed roller at the rear of the station and a horizontal disk rigidly associated with the feed roller for rotation therewith and of larger diameter than and located below the feed roller in engagement with the bottom edges of work pieces entering and entered into the station.

8. In mail handling equipment or the like having a receiving space for accumulating alongside one another upright-positioned thin flat work pieces such as letter mail or cards or the like inserted forwardly into front end engagement with a baffle inclined to the direction of insertion so as to deflect the incoming pieces angularly forward toward an exit side of the receiving space; feed belting running forwardly along said exit side for engaging the work pieces one after another to feed them endwise from the receiving space to a single-file course disposed forwardly of said exit side, means to insert the work pieces into the receiving space including a feed roller rotating about a vertical axis at the rear of the receiving space, and a horizontal disk of larger diameter than the feed roller rigidly associated therewith for common rotation about said vertical axis, said disk being located below the feed roller within a plane coextensive with the bottom of the receiving space and providing a segment intruding into the receiving space as a bottoming section for rear portions of inserted work pieces and

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rotating toward the feed belting for acting on the bottom edges of inserted work pieces to shift them side-wise toward the belting while turning them from angular relation with the feed belting toward parallel relation therewith.

9. In equipment as set forth in claim 8, said disk being provided on its upper face with ribs radiating from the disk center and pitched to abet the action of the disk upon the work pieces.

10. In mail handling equipment or the like having a receiving station to accumulate alongside one another upright-positioned thin flat work pieces such as letter mail or cards or the like inserted through a rear entrance by horizontally forward movement along an insert path acutely angular to an exit side of the station; feed belting running horizontally forward along said exit side for transferring the inserted work pieces from the station to a single-file course extending forwardly of the feed path of the belting, and continually running means providing a rear bottom section of the station moving transversely across said insert path and toward the feed belt-

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ing for acting on the inserted work pieces at their bottom edges to urge the work pieces sidewise toward the feed belting while biasing them from angularly entered relation to the exit side of the station and the path of the feed belting along said exit side toward parallel relation with the exit side and the path of the feed belting, thereby to displace just-entered work pieces at their rear laterally away from said station entrance and bring each inserted work piece in turn into substantial flat-sided engagement with the belting, said continually running means comprising a horizontal disk turning about a vertical axis at the rear of the station and having a segment intruding into the station as a bottom section rotating transversely toward the path of the feed belting.

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