July 6, 1965 R. L. SPEAKER 3,193,080

MULTIPLE STATION FEEDING MEANS

Filed April 8, 1963

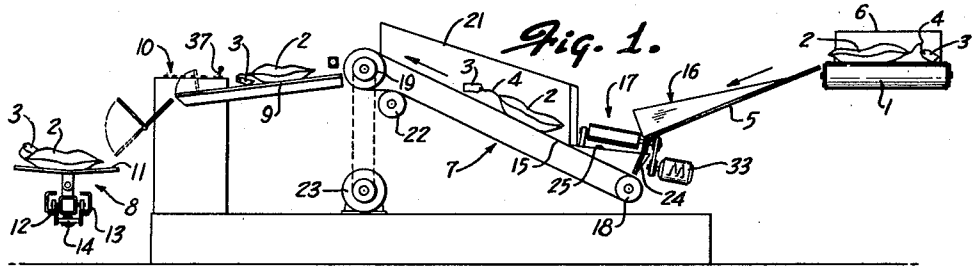


Fig. 1.

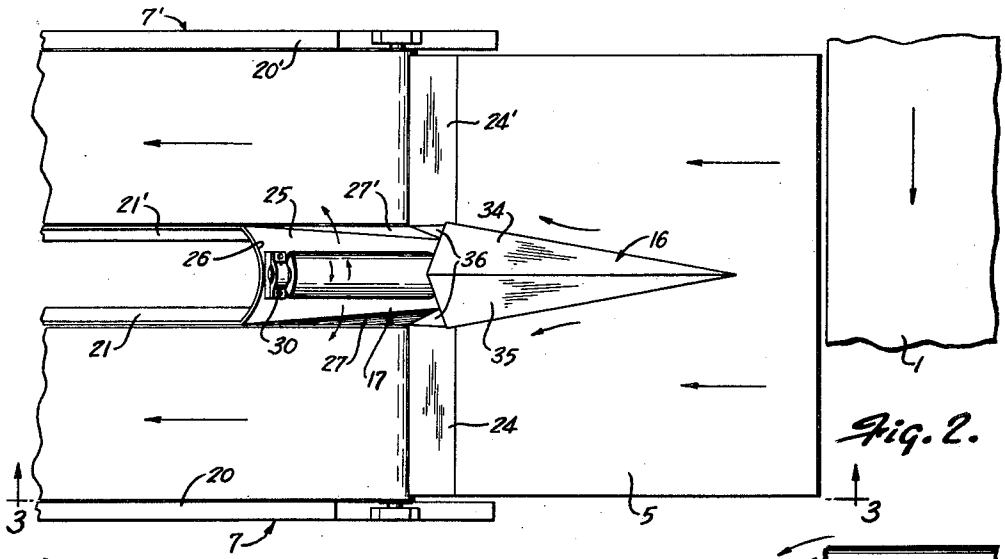


Fig. 2.

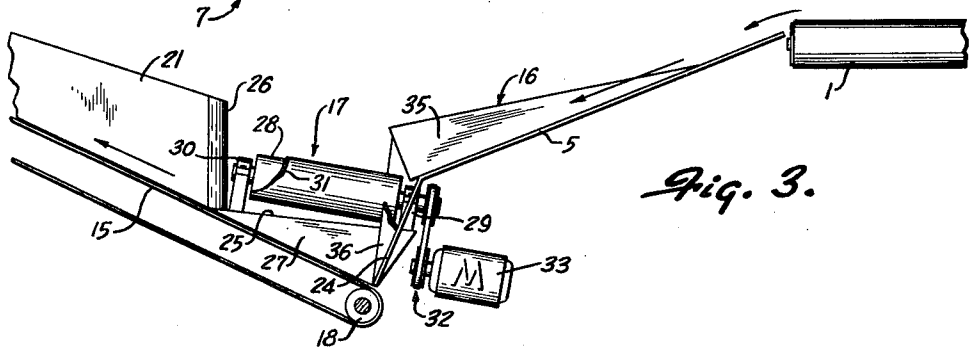


Fig. 3.

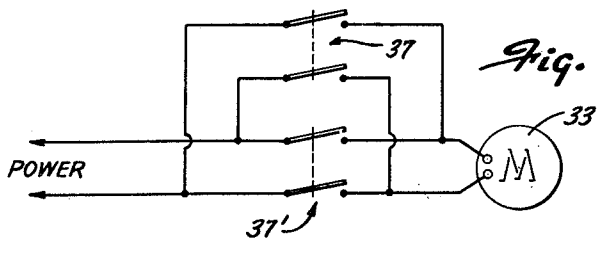


Fig. 4.

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MULTIPLE STATION FEEDING MEANS

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11 Claims. (Cl. 198—31)

This invention relates to a chute apparatus for feeding articles to a plurality of laterally spaced side-by-side operating stations.

In the sorting of a large number of articles into various classifications or groups, automatic sorting means have been employed for selectively discharging of the articles at corresponding stations for the several classifications. The incoming articles may be fed through one or more operational stations where the final destination of the article is either automatically or manually determined and the sorting means actuated to deliver the article in accordance with this determination. For example, the copending application of Howard A. Milhaupt entitled Semi-Automatic Transferring Apparatus which was filed on October 16, 1962 with Serial No. 230,857 and assigned to a common assignee herewith discloses a plurality of laterally spaced transferring devices used for sorting of articles. The particular embodiment shown therein discloses sorting of mail bags which are supplied in random fashion to the sorting stations at which the destination is read and the automatic sorting conveyor unit is properly keyed to separate the articles at the proper unloading stations. As shown therein, the incoming mail bags or other articles can be distributed onto a continuous chute which slants downwardly into a plurality of transferring mechanism arranged in side-by-side spaced relation for feeding of the articles in sequence to a plurality of correspondingly located orienting and reading tables. The spacing is required in such systems to allow room for the operator and the necessary controls.

The present invention is particularly directed to an improved means to positively prevent jamming of articles at the infeed end of the lines where a continuous chute is employed to carry the articles into the operating stations. Although particularly described in connection with sorting of mail bags and the like, the invention is equally applicable to any other feed chute for articles.

In accordance with the present invention, a diverter surface or means forms a part of the chute in alignment with the space between the transfer stations. Generally, the diverter will cause the articles to move to the opposite sides thereof and into the adjacent transfer mechanism. However, at times, the diverter may not be completely effective to prevent jamming of the articles at the infeed end of adjacent stations. In accordance with the present invention, a positively driven roller diverting means is mounted immediately adjacent the terminal end of the diverter means. The roller means is adapted to be continuously or selectively driven to thereby cause the articles to be positively discharged laterally into an adjacent station. In accordance with a preferred and novel structure, a roller extends longitudinally of the movement of the articles immediately forwardly of the discharge end of the diverting means. The roller is supported on a generally horizontal platform spanning the area between the two devices. Certain articles may discharge onto the platform, but will move laterally therefrom into the adjacent loading stations by rotation of the roller diverting means. For optimum operation, applicant has found that the roller is preferably inclined upwardly from the end of the diverter.

The present invention thus provides a positive means for preventing jamming of articles between a plurality of stations fed from a single chute.

The drawings furnished herewith illustrate the best mode presently contemplated for carrying out the invention.

In the drawings:

FIG. 1 is a diagrammatic illustration of a transfer system incorporating the present invention;

FIG. 2 is a fragmentary top elevational view of the infeed portion of the system diagrammatically shown in FIG. 1;

FIG. 3 is an enlarged side elevational view taken generally on line 3—3 of FIG. 2; and

FIG. 4 is a schematic illustration of a motor control circuit for operating a roller unit shown in FIGS. 1–3.

Referring to the drawings and particularly to FIG. 1, the present invention is illustrated in a mail bag delivery and sorting system for purposes of describing one specific embodiment of the present invention. The illustrated system includes an incoming feed belt **1** carrying a plurality of mail bags **2** in a random and unsorted grouping. Each of the bags **2** includes an identification tag **3** secured to the end of a bag closing rope **4** and carrying destination information thereon. The incoming feed belt **1** carries the bags in a random manner to a continuous transfer chute **5** which extends parallel to the belt **1** and which is inclined downwardly from the feed belt **1**. A suitable diverter **6** moves across the belt **1** to distribute the mail bags **2** onto the chute **5**. Chute **5** directs the mail bags **2** to a pair of loading stations or devices **7** and **7'**, shown in FIG. 2, which are arranged in side-by-side parallel relation between the chute **5** and an automatic sorting conveyor **8**. A pair of similar loading devices are shown for illustrative purposes although more may be employed. Devices **7** and **7'** are of the same construction and as hereinafter described corresponding elements are similarly numbered with superscript primes added to the elements of device **7'**.

Each loading device **7** operates similarly to deliver the mail bags **2** to the sorting conveyor **8** under the control of an operator, not shown, as hereinafter described. The conveyor **8** is preset through an automatic control system to deliver the bags **2** to a plurality of unloading stations, not shown, each of which is related to the various classifications carried by the identification tag **3**. Each loading device **7** includes an orienting table assembly **9** at the discharge end thereof at which the operator, not shown, reads the identification tag **3** and through operation of a keyboard **10** determines at which of the plurality of unloading stations the particular mail bag **2** is to be discharged.

The illustrated sorting conveyor **8**, of which only a portion is shown, is a tilting tray unit and preferably corresponds to that shown in U.S. Patent 3,023,665 to Richard L. Speaker. The illustrated conveyor **8** includes a train of trays **11** which are individually pivotally releasably secured in a horizontal transporting position by a suitable supporting truck **12** which moves in a track **13**. A chain drive **14** or other suitable means is connected to the trucks **12** and move the trays **11** in an endless path past a plurality of unloading stations, not shown. Means at the unloading stations are provided for tilting of an aligned tray to a laterally inclined discharge position and discharging of a bag **2** from the corresponding tray **11**.

In the illustrated embodiment of the invention, the trays **11** are paired with the two loading devices **7** and **7'** such that alternate trays are automatically loaded from each of the loading devices **7** and **7'** as hereinafter described.

Loading device **7** includes an upwardly inclined power driven transfer means shown as an induction belt **15** which has the lower end spaced downwardly of the lower end of an aligned portion of chute **5** and terminates at above the upper end of table assembly **9**. The bags **2**

are transferred successively from chute 5 to belt 15 and carried to assembly 9. The inclination of the induction belt 15 is determined by the allowable floor space and the dimensions of the building within which the system is mounted.

The chute 5 is inclined downwardly from the incoming feed belt 1 for directing the mail bags 2 downwardly toward the corresponding induction belt 15.

In accordance with the present invention, a raised separator or diverter 16 is aligned with the space between the adjacent loading devices 7 and defines inclined walls for separating the mail bags 2 as they move downwardly to the devices 7 and 7'. Immediately adjacent the discharge end of the diverter 16 a positively driven diverting roller assembly 17 is mounted between the loading devices 7 and 7' to positively prevent jamming of the mail bags 2 as hereinafter described.

The power driven induction belt 15 is an endless flat belt supported by lower and upper belt rolls 18 and 19 which are rotatably secured to a pair of side wall structures 20 and 21 of a suitable supporting framework. An idler roll 22 is provided bearing on the undersurface of the belt 15 to maintain the desired tension in the belt. A drive motor 23 is mounted between the side wall structures 20 and 21 and coupled to the upper drive belt roll 19 for moving thereof in an endless loop and transferring of the mail bags in succession upwardly to the table assembly 9. The side wall structures 20 and 21 project above the level of belt 15 to prevent the bags 2 from moving laterally off the belt. As the bags 2 move over the upper end of the belt 15, they drop onto the upper end of the orienting table assembly 9 which is arranged immediately adjacent the discharge end of the belt.

As most clearly shown in FIGS. 2 and 3, the lower edge of the inclined chute 5 is spaced vertically upwardly of the belt 15. A vertical connecting wall 24 is secured to the lower edge of the chute 5 and drops sharply therefrom at a slight angle terminating immediately adjacent the upper surface of the belt in alignment with the lower belt roller 19.

Under normal operations, the incoming mail bags 2 slide down the inclined chute 5 and onto either one of the induction belts 15. The diverter 16 will generally separate the bags between the two stations. However, where a substantial number of bags is discharged into the chute 5 adjacent both of the loading devices 7 and 7'. the bags may tend to build up over the diverter 16. In accordance with the present invention, a horizontal plate or platform 25 is provided immediately adjacent the discharge end of the diverter 16 and spans the area or gap between the loading devices in the area of the lower portion of the belts 15. A vertical stop wall 26 projects upwardly from the platform 25 in spaced relation to the discharge end of the diverter 16. Wall 26 is a laterally curved member to assist movement of the bags 2 to the opposite sides of roller 28. The side walls 21 and 21' are recessed or removed to the level of platform 25 to allow lateral movement from platform 25 onto the adjacent belts 15 and 15'. The width of platform 25 adjacent diverter 16 is somewhat less than the span between devices 7 and 7' and increases to substantially a complete span at wall 26. Tapered side walls 27 and 27' are joined to the edges of platform 25 and depend downwardly to belts 15 and 15'. The roller assembly 17 is secured onto the platform 25 between the diverter 16 and the stop wall 26 and serves to positively transfer or discharge any of the accumulated bags onto one of the adjacent belts 15 and 15' as more fully described hereinafter.

The illustrated roller assembly 17 includes a rubber coated roller 28 having the axis of rotation extending generally parallel to the rotation or movement of the belts 15. The one end of the roller 28 is rotatably supported in a bearing unit 29 immediately beneath the discharge end of the diverter 16. The opposite end of the roller 28 is supported by a bearing unit 30 secured to the platform 25. The bearing unit 30 supports the corresponding end of the roller 28 raised upwardly with respect to the opposite end such that the axis of rotation is inclined at a small angle. The illustrated roller 28 includes a rubber cover 31 preferably having the crisscrossed corrugated surface, not shown. A chain and sprocket 32 interconnects the end of the roller 27 supported by bearing unit 29 to a drive motor 33 which is shown mounted beneath the lower end of the diverter 16.

The illustrated diverter 16 has a generally inverted V-shaped cross-section with the oppositely slanting walls 34 and 35 directing the mail bags into the spaced loading devices 7 and 7'. Diverter 16 begins spaced slightly from the upper portion of the inclined chute 5 and projects upwardly from the surface of the chute 5. The cross-section of the diverter 16 increases laterally and vertically with the lower end projected outwardly or forwardly of the lower edge of the chute 5, as most clearly shown in FIG. 3. Sidewall panels 36 generally close the gap between the projected end of the diverter 16, the side connecting walls 27 and 27' and the connecting walls 24 and 24'. The diverter 16 thus provides a continuous surface for diverting of the bags 2 between the adjacent belts 15 and 15' and onto the platform 25.

In the illustrated embodiment of the invention, the motor 33 is shown connected for operation through a manual control system for simplicity of illustration. In actual practice, automatic control means may be provided for selectively or simultaneously driving the belts 15 and 15' and roller 28 can be employed.

Referring particularly to FIGS. 1 and 4, a pair of push button switches 37 and 37' are shown one for each of the operating stations at the respective loading devices 7 and 7'. Each of the switches 37 and 37' is a double-pole, single-throw switch adapted to selectively connect drive motor 33 to an incoming power source. Switch 37 connects the motor 33 to drive the roller 28 in one direction and the switch 37' connects the motor 33 to drive the roller in the opposite direction. The switches 37 and 37' therefore actuate the roller 28 to discharge the mail bags onto the associated belts 15 and 15'. If the operator at station 7 operates switch 37, the roller 28 is driven in a direction to discharge bags 2 onto the belt 15. Similarly, if switch 37' is operated, the roller 28 is driven to discharge mail bags 2 onto the belt 15'.

If desired, suitable interlock means can be provided such that if either switch 37 or 37' is actuated, the opposite switch will be disenabled until such time as the actuated switch is returned to the open position. This would prevent simultaneous interconnection of the switches 37 and 37' and establishing of a direct short across the power source.

Generally, the operation of the illustrated embodiment of the invention is summarized as follows. The mail bags 2 are fed to the chute 5 from the incoming feed belt 1. The bags 2 drop under gravity down the chute 5 into the respective loading devices 7 and 7' and then are sequentially carried upwardly and discharged onto the orienting table assembly 9 from which they are fed to the conveyor 8.

The diverter 16 is normally effective to maintain separation of the bags 2 between devices 7 and 7'. If however bags 2 do accumulate adjacent the infeed end of the belts 15 and 15' and overlie the space therebetween tending to jam the infeeding portion, the bags 2 move onto the platform 25 and roller assembly 17. The operator at either station can operate the corresponding switch 37 or 37' to correspondingly drive the roller 28 which positively engages an adjacent bag and forces it to move off the platform 25 into the adjacent belt 15.

Applicant has found that a particularly satisfactory transfer arrangement for high speed transferring of mail bags from the chute onto the belts 15 and 15' includes a discharge chute 5 located at substantially 22° to the horizontal, a diverter 16 at substantially 5° to the hori-

zontal and a roller inclined in the opposite direction at substantially 10° to the horizontal.

The present invention thus provides a positive means of preventing jamming of articles from an infeeding chute onto a plurality of laterally spaced operating stations and thus provides a means for maintaining continuity of high speed sorting or other work transferring systems.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. Apparatus for feeding articles from a source to a plurality of laterally spaced side-by-side devices, comprising,

(a) a downwardly inclined chute spanning the infeed side of the devices and extending upwardly therefrom for receiving articles at the top of the chute and delivering them to the devices and having raised article diverter means forming a part of the chute between adjacent devices for separating the articles and laterally diverting articles to the adjacent devices, and

(b) a driven diverting roller means mounted adjacent the lower end of the diverter means to positively exert a laterally moving force and to prevent jamming of articles between the devices.

2. Apparatus for feeding articles to a plurality of laterally spaced side-by-side operating devices from a source, comprising,

(a) a downwardly inclined planar chute spanning the infeed side of the operating devices and terminating in vertically spaced relation thereto,

(b) a diverter means forming a part of the lower end of the chute between adjacent devices, said diverter means being generally an elongate convex member extending longitudinally of the chute between the devices, and

(c) a driven diverting roller means mounted immediately below the lower end of the diverter means for laterally moving articles discharged thereon and thereby preventing jamming of articles between the devices.

3. The apparatus of claim 2, wherein said roller means includes,

(a) a roller having an axis of rotation extending parallel to the diverter means, and

(b) bearing means supporting opposite ends of the roller with the roller end adjacent the diverter means below the opposite roller end.

4. The apparatus of claim 2 wherein said diverter means is an inverted V-shaped member beginning at the top generally in the surface of the chute and extending progressively upwardly from the surface and having its lower end adjacent to the bottom of the chute.

5. Apparatus for feeding articles to a plurality of laterally spaced side-by-side devices from a source, comprising,

(a) transfer means forming a part of each device and extending in parallel relation and having aligned infeed ends,

(b) an inclined chute spanning the infeed ends of the transfer means with the lower end of the chute in vertically spaced relation to the transfer means,

(c) a convex diverter forming a part of the chute between adjacent transfer means and extending from the upper portion of the chute to at least the terminal end of the chute, the cross-section of said diverter increasing from the upper end to the lower end,

(d) a generally horizontal platform spanning the gap between the infeed ends of the transfer means, and

(e) a driven diverting roller mounted on the platform adjacent the end of the diverter and parallel to the transfer means for laterally moving articles discharged thereon and thereby positively preventing jamming of articles between the transfer means.

6. Apparatus for feeding articles to a plurality of laterally spaced side-by-side devices from a source, comprising,

(a) inclined transfer means forming a part of each device and extending in parallel relation and having aligned infeed ends,

(b) an inclined chute spanning the infeed ends of the transfer means with the lower end in vertically spaced relation to the transfer means,

(c) a convex diverter forming a part of the chute between adjacent transfer means and extending from the upper portion of the chute to at least the terminal end of the chute, the cross-section of said diverter increasing from the upper end to the lower end,

(d) a generally horizontal platform spanning the gap between the infeed ends of the transfer means, and

(e) a driven diverting roller mounted on the platform adjacent the end of the diverter and parallel to the transfer means, said roller being inclined in the direction of said transfer means for laterally moving articles discharged thereon and thereby positively preventing jamming of articles between the transfer means.

7. Apparatus for feeding articles to a plurality of laterally spaced side-by-side members from a source, comprising

(a) a downwardly inclined chute for spanning the infeed side of the members with the lower end of the chute spaced above the spaced members,

(b) an article diverter forming a part of the chute in alignment with the spacing of the station and projecting from the upper portion of the chute downwardly to the lower operation of the chute, said diverter having a convex cross-section increasing from the upper to lower end to define a generally pointed diverting surface,

(c) a lateral platform spanning the space between the members below the level of the chute and above the members, and

(d) a diverting roller rotatably mounted on the platform and extending parallel between the members with the end of the roller adjacent the diverter being lower than the opposite end.

8. Apparatus for feeding articles to a plurality of laterally spaced side-by-side operating stations from a source, comprising

(a) an individual upwardly inclined endless transfer belt at each station,

(b) a downwardly inclined planar chute spanning the infeed side of each station with the lower end of the chute spaced from the lower ends of the belts,

(c) a wall means disposed between the lower edge of the chute and each of the belts,

(d) an article diverter extending from the upper portion of the chute beyond the lower edge of the chute in alignment with the spacing between stations, said diverter having a convex cross-section increasing from the surface of the chute at the upper end to a maximum cross-section at the bottom to define a raised pointed diverting surface,

(e) a generally horizontal platform spanning the space between the infeed end of the transfer belts and located below the lower ends of the chutes and above the adjacent portion of the belts,

(f) a vertical stop wall projecting upwardly from the platform in spaced relation to the lower end of the diverter, and

(g) a diverting roller rotatably mounted on the platform and extending parallel to the belts with the one end beneath the terminal end of the diverter and extending upwardly therefrom.

9. Apparatus for feeding articles to a plurality of laterally spaced side-by-side operating stations from a source, comprising

(a) an individual upwardly inclined endless transfer belt at each station,

(b) a downwardly inclined storage chute spanning the infeed side of the station with the lower end of the chute spaced upwardly from the lower ends of the belts,

(c) connecting walls secured one each to the lower edge of the chute and extending downwardly and outwardly to the corresponding belt,

(d) an article diverter forming a part of the chute in alignment with the spacing of the stations and projecting from the upper portion of the chute downwardly to substantially the vertical plane of the lower edge of said wall, said diverter having an inverted V-shaped cross-section increasing from an apex at the top to a maximum cross-section at the bottom,

(e) a horizontal platform spanning the space between the infeed end of adjacent stations and located generally centrally of the connecting walls of adjacent stations,

(f) a vertical stop wall projecting upwardly from the platform in spaced relation to the lower end of the diverter, said stop extending outwardly and rearwardly from the roller,

(g) a diverting roller mounted on the platform and extending parallel to the belts,

(h) bearing means supporting the one end of the roller beneath the terminal end of the diverter, and

(i) bearing means supporting the opposite end of the roller adjacent the stop wall and above the support of the opposite end of the roller to incline the roller in the direction of the belts.

10. The apparatus of claim 9 having

(a) said chute mounted at a predetermined angle with respect to the horizontal,

(b) said diverter mounted at substantially a smaller angle to the horizontal, and

(c) said roller mounted at an angle intermediate the angles of the chute and diverter.

11. The apparatus of claim 9 having

(a) said chute mounted at substantially 22° to the horizontal,

(b) said diverter mounted at substantially 5° to the horizontal, and

(c) said roller mounted at substantially 10° to the horizontal.

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SAMUEL F. COLEMAN, *Primary Examiner.*

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,193,080 July 6, 1965

Richard L. Speaker

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 36, for "operation" read -- portion --.

Signed and sealed this 28th day of December 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents