March 14, 1961 F. J. STACEY ET AL 2,974,775

CAN RUNWAY

Filed Oct. 30, 1957 2 Sheets-Sheet 1

Fig. 4

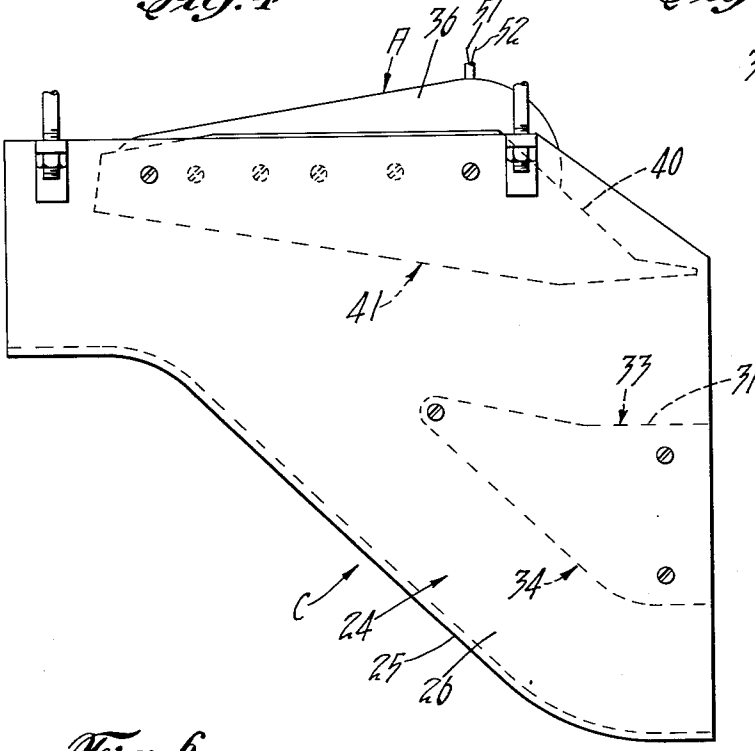


Fig. 5

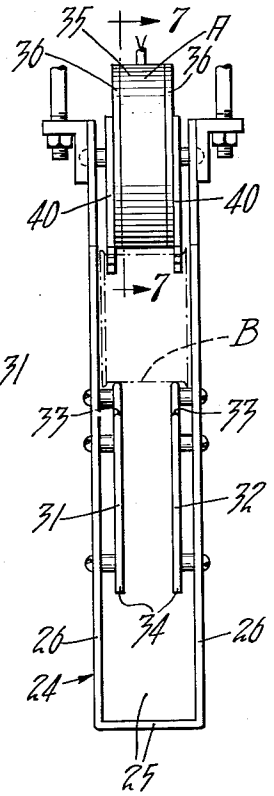


Fig. 6

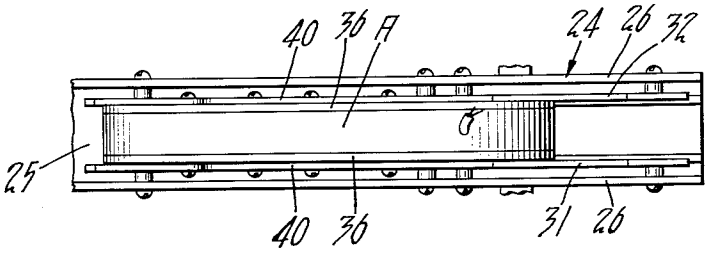
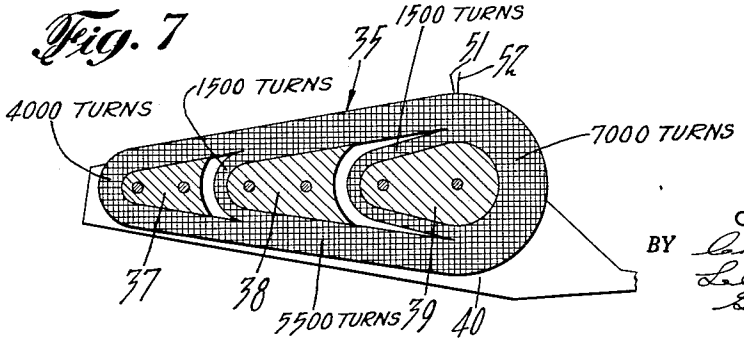


Fig. 7



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March 14, 1961 F. J. STACEY ET AL 2,974,775

CAN RUNWAY

Filed Oct. 30, 1957 2 Sheets-Sheet 2

Fig. 1

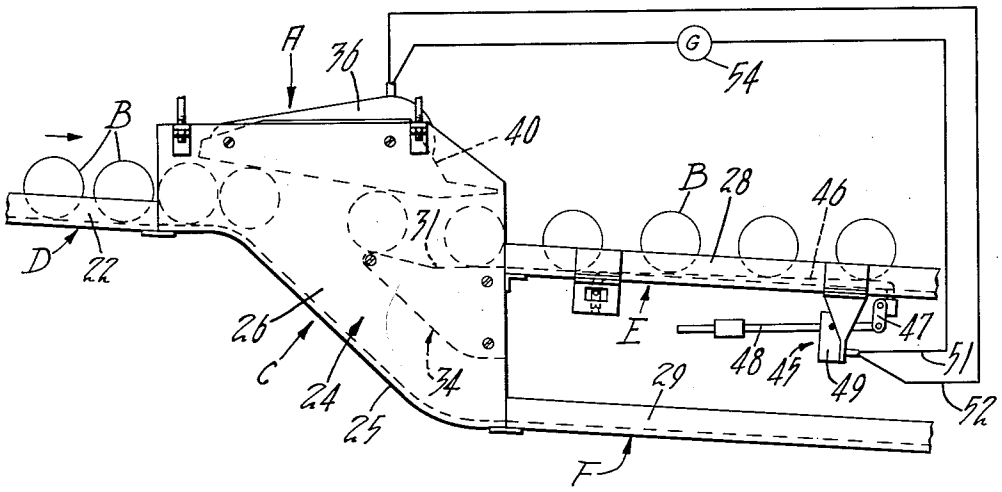


Fig. 2

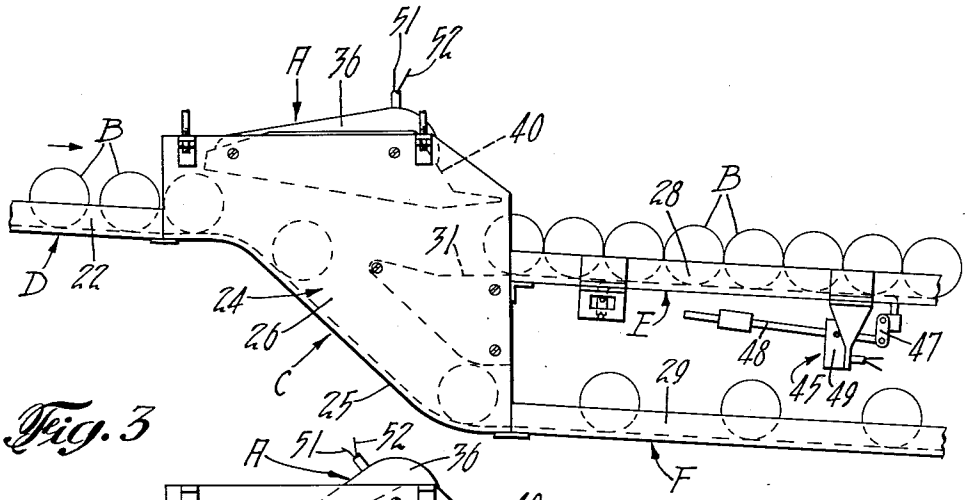
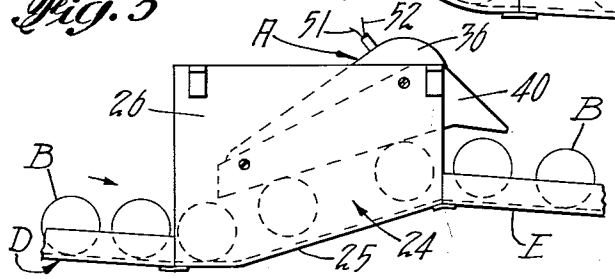


Fig. 3



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CAN RUNWAY

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6 Claims. (Cl. 198—41)

The present invention relates to can runways and the like and has particular reference to magnetic transfer devices for controlling the flow of the cans along the runways.

An object of the invention is to produce in a can runway, a magnetic pulling force on cans rolling along the runway, so as to propel the cans along substantially horizontal runway sections, or along overhead sections spanning a gap such as in can dividers, or along inclined sections designed to gradually elevate the cans from one level to a higher level.

Another object is to produce through magnetic forces, an acceleration of the cans in the runway so as to speed up the travel of the cans through certain runway sections to augment their momentum or to produce sufficient momentum when starting from rest to carry them over certain runway sections.

Another object is to provide for stripping the cans away from the magnetic pulling force at the termination of the magnetic section of the runway so as to overcome any tendency of the cans to stop moving in this section and thereby build up to cause a jam.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of a runway embodying the instant invention, the view including a wiring diagram of the electrical devices used in the runway;

Fig. 2 is a view similar to Fig. 1, with certain of the parts in a different position;

Fig. 3 is a view similar to Fig. 1 showing a modified form of the invention;

Fig. 4 is an enlarged side elevation of a portion of the runway;

Fig. 5 is an end elevation of the runway portion shown in Fig. 4, as viewed from the right in Fig. 4;

Fig. 6 is a top plan view of the runway portion shown in Fig. 4; and

Fig. 7 is a sectional view taken substantially along the line 7—7 in Fig. 5.

Briefly the invention provides a magnetic transfer device A (Figs. 1, 2 and 6) for controlling the flow of sheet metal, magnetizable, cylindrical cans or containers B rolling on their sides in processional order along a runway or through a system of runways. This transfer device A is designed to create along a portion of a runway a magnetic field which increases in intensity from one end of the runway portion to its opposite end so as to produce an increasing magnetic pull or attracting force on cans rolling along the runway and to thereby result in an accelerating or forced propelling action on the cans. The device may also be used to retard the speed of travel of the cans as desired.

The transfer device A is readily applicable to propelling cans B uphill along slightly inclined runways as shown in Fig. 3 or to transferring cans across gaps or open spaces in runways or in can dividers commonly used in runway systems as shown in Figs. 1 and 2 or in starting the rolling action of cans at rest or upon occasions when a reversal of the rolling direction becomes necessary and may be even used to reduce the speed of fast rolling cans to a desirable speed if required.

As a preferred and exemplary embodiment of the instant invention the drawings illustrate a portion of a runway system which includes the magnetic transfer device A in a can divider C. In such a runway system the cans B roll on their sides at high speed in a single line procession along an inlet runway D connected to the divider. Upon entering the divider, the magnetic transfer device A, disposed in a position above the path of travel of the cans, takes over the support of the cans by magnetic attraction and propels them along the transfer device over a gap in the divider in a continuing straight line procession. Upon passing the gap in the divider, the cans are stripped off the transfer device and are released to a continuing outlet runway E.

Since the cans B upon leaving the inlet runway D are rotating in a different direction than that relative to the magnetic transfer device A, they temporarily cease rotating when attracted to the transfer device and then begin rotation in the opposite direction. It is here that the transfer device accelerates and thus tends to maintain the high speed travel of the cans through the runway system.

The outlet runway E preferably leads to a subsequent operation machine. When a jam occurs in such a machine the cans build up in the outlet runway E. Under such conditions provision is made to cause the magnetic transfer device to release the cans into the gap in the divider where they fall into an auxiliary outlet runway F which guides them to any suitable place of deposit or to a second subsequent operation machine.

The entire runway system preferably is disposed in a slightly declining position so as to facilitate rolling of the cans therethrough by gravitational forces. The cans are fed into the system from a can elevator or other machine.

The inlet runway D preferably comprises a pair of spaced and parallel angle irons **22** (Figs. 1 and 2) which constitute tracks which lead from an elevator or other machine and which support and guide the cans along a predetermined path of travel to the divider unit C. The divider unit C is connected to the discharge end of the inlet runway D.

The divider unit C preferably comprises a U-shaped housing **24** having a steeply sloping bottom wall **25** and a pair of spaced and parallel upright side walls **26** of substantially triangular shape. The top of the housing **24** is open. This housing **24** preferably is made of non-magnetic materials. At the entrance or inlet end of the housing **24** (the left as viewed in Figs. 1 and 2) the side walls **26** are of a height slightly greater than the angle irons **22** of the inlet runway D and are connected to the ends of the angle irons so that the side walls **26** and the bottom wall **25** form a smooth but steeply sloping continuation of the inlet runway D.

At the exit end of the housing **24** (at the right as viewed in Figs. 1 and 2) the side walls **26** are considerably higher than the entrance end and are connected to the two outlet runways E, F. These two outlet runways are vertically spaced one above the other with the main outlet runway E disposed near the top of the divider C as a continuation of the inlet runway D and the auxiliary outlet runway F disposed near the bottom of the divider C adjacent its bottom wall **25**. These outlet runways E, F are similar to the inlet runway D and preferably comprise respective pairs of spaced and parallel angle irons **28, 29** to receive, support and guide the divided cans B along their two separate single line paths

of travel. A pair of spaced and parallel, generally triangular and vertically disposed guide plates **31**, **32** attached to the inner faces of the divider housing side walls **26** in spaced relation thereto (see also Figs. 3, 4 and 5) and having upper and lower guiding edges **33**, **34** are provided to guide the cans B into the upper or main outlet runway E and the lower or auxiliary outlet runway F.

The magnetic transfer device A is disposed in the open top of the divider housing **24** between the housing side walls **26**. This device preferably comprises an electromagnet **35** having a pair of spaced and parallel, pear or oblong shaped side or pole plates **36** secured to a series of intervening, longitudinally aligned and adjacently disposed cores around which a continuous strand of wire is wound to provide a series of magnets having windings of a progressively increasing number of turns. By way of example, Fig. 7 of the drawings shows a magnet having three cores **37**, **38**, **39**. In winding these cores, preferably 1500 turns of wire is wound on core **39**, then the wire is taken over core **38** and around cores **38** and **39** for another 1500 turns, and finally taken over core **37** and around all the cores for another 4000 turns. This results in a magnet in which core **37** has a winding of 4000 turns, and core **38** a winding of 5500 turns, and core **39** a winding of 7000 turns. Hence when an electric current is applied to the magnet, a series of magnetic fields of progressively increasing intensity are set up along the magnet pole plates **36**.

In order to project these magnetic fields of increasing intensity into and along the upper portion of the divider C between the inlet runway D and the main or upper outlet runway E, the magnet **35** is disposed in a position such that its lower edge is substantially parallel with the desired path of travel of the cans with the side plates **36** of the magnet secured to the adjacent side walls **26** of the divider housing **24**, preferably in spaced relation thereto. Guide and stripper plates **40** of nonmagnetic material are attached to the magnet side plates **36** to guide the cans as they advance along the transfer device and to strip them off the magnet **35** as they approach the outlet runway E. For these purposes the plates **40** preferably are formed with a lower tapered edge **41** which gradually declines from the magnet core **37** to and beyond the magnet core **39** and which is spaced below the windings of the cores to progressively draw the cans away from the magnet until they are beyond the practical holding capacity of the last core **39**.

The magnetic transfer device A preferably is maintained in an energized condition so as to support the cans B. Hence as the cans B roll down the inlet runway D into the divider C they enter the magnetic field set up by the energized magnet **35** and are thus attracted to the magnet and are simultaneously propelled therealong over the gap in the divider at an accelerated or progressively increasing rate of travel until stripped off by the tapered edge **41** of the stripper plates **40** and thereby delivered into the upper or main outlet runway E.

When the outlet runway D becomes jammed for any reason, and the cans back up in the runway as shown in Fig. 2, provision is made to deenergize the magnetic transfer device A and thereby allow the cans B from the inlet runway D to roll through the gap in the divider, along the steeply sloping bottom wall **25** and into the lower or auxiliary outlet runway F. For this purpose the upper or main outlet runway E is provided with a conventional runway control switch **45** of the character disclosed in United States Patent 1,806,879, issued May 26, 1931, to H. W. Lindgren on Runway Switch and Control Therefor.

Briefly this switch **45** comprises a rod **46** which extends longitudinally in the outlet runway E, between the angle irons **28**, **29** one end of the rod being anchored and disposed below the path of travel of the cans B through the runway. The opposite end of the rod **46** extends up into the path of travel of the cans and is connected by a link **47** to one end of a pivotally mounted and weighted balance beam **48**. The balance beam is connected to and actuates a normally closed electric switch **49**, such as a mercury switch. This switch is connected by a pair of wires **51**, **52** which connect with the magnet **35**, one of the wires being also connected to a source of electric current such as a generator **54**.

In operation, cans B delivered into and rolling along the outlet runway E merely roll over the switch rod **46** without affecting it. However when the cans back up onto the rod **46** as shown in Fig. 2, they depress the rod and thus rock the balance beam **48** to open the electric switch **49**. This breaks the electric circuit through the wires **51**, **52** and deenergizes the magnet **35** with the result that the incoming cans B are no longer attracted to the transfer device A but are diverted into the lower auxiliary outlet runway F as explained above.

Where the magnetic transfer device A is used in a runway without a divider C as shown in Fig. 3, as in the delivery of cans B from one level to another along an inclined or declining path of travel, the device may be arranged in such an inclined or declining position adjacent the desired path of travel of the cans to effect the desired result. Usually in such runways, the travel of the cans is continued in the same direction and in a single line procession. In such cases it is often desired to omit the feature of deenergizing the magnet and hence a permanent magnet or magnets may be used instead of electromagnets.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. In a can runway system, an inlet runway, a pair of outlet runways comprising a main outlet runway aligned with said inlet runway and an auxiliary outlet runway offset from said inlet runway, a divider unit connected with said runways, said unit having a gap between said inlet runway and said main outlet runway and having a steep sloping bottom wall connecting said inlet runway with said auxiliary outlet runway, a magnetic transfer device disposed above the gap in said divider unit, said transfer device comprising electromagnet means having a series of adjacently disposed magnetic fields of progressively increasing intensity for attracting and accelerating said cans along said transfer device across said gap from said inlet runway into said main outlet runway, and a control device located in said main outlet runway and connected with said electromagnet means and operable by cans backed up in said main outlet runway for deenergizing said magnet means to release cans therefrom into said auxiliary outlet runway.

2. A magnetic transfer device for propelling rolling magnetizable cans along a path of travel through a runway and the like, comprising a plurality of adjacently disposed magnet cores having a continuous strand of wire wound around said cores individually and collectively in windings gradually increasing in turns from one core to its adjacent core to provide magnetic fields of progressively increasing intensity adjacent the path of travel of said cans for attracting the cans toward said cores successively and for advancing them along said path.

3. A magnetic transfer device for propelling rolling magnetizable cans along a path of travel through a runway and the like, comprising a plurality of adjacently disposed electromagnets of different strengths, said electromagnets being arranged in the increasing order of

their strengths adjacent the path of said cans to set up a series of magnetic fields of progressively increasing intensity for attracting said cans toward said electromagnets and for advancing them along said path, and control means operable by cans in said path for energizing and deenergizing said electromagnets dependent upon the number of said cans operating thereon.

4. A magnetic transfer device for propelling rolling magnetizable cans along a path of travel through a runway and the like, comprising a plurality of adjacently disposed magnets of different strengths, said magnets being arranged in the increasing order of their strengths adjacent the path of said cans to set up a series of magnetic fields of progressively increasing intensity for attracting said cans toward said magnets and for advancing them along said path, and nonmagnetic guide and stripper means disposed adjacent said magnets and spaced therefrom at progressively increasing distances substantially proportioned to the strengths of the magnets for guiding the cans along said device and for stripping said cans from attraction of the magnets at the termination of their advancement along said device.

5. In a can runway system, an inlet runway, an outlet runway, and a magnetic transfer device disposed between said runways and connected thereto for transferring rolling magnetizable cans from said inlet runway to said outlet runway, said magnetic transfer device comprising a plurality of adjacently disposed magnets of different strengths, said magnets being arranged in the increasing order of their strengths adjacent the path of the cans to set up a series of magnetic fields of progressively increasing intensity for attracting said cans and for accelerating them along said transfer device for delivery into said outlet runway, and a guide and stripper plate having a tapered edge disposed adjacent and declining from said magnets for guiding the cans along said transfer device and for stripping the cans from said device at the termination of their advancement therealong.

6. A magnetic transfer device for propelling rolling magnetizable cans along a path of travel over a runway or the like, comprising a plurality of magnets of different strengths disposed above said path of the cans, and nonmagnetic guide and stripper means below and spaced from said magnets and disposed above said path of the cans, said magnets being arranged in the increasing order of their strengths in the direction of travel of the cans to set up a series of magnetic fields of progressively increasing intensity for attracting said cans upwardly and away from said runway toward and against said guide and stripper means and for advancing said cans therealong, whereby said cans are caused to roll along said guide and stripper means and to be stripped from attraction of the magnets at the termination of their advancement along said guide and stripper means.

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