

July 29, 1958

B. G. COPPING
CAN ALIGNING MEANS

2,845,165

Filed Dec. 6, 1955

2 Sheets-Sheet 1

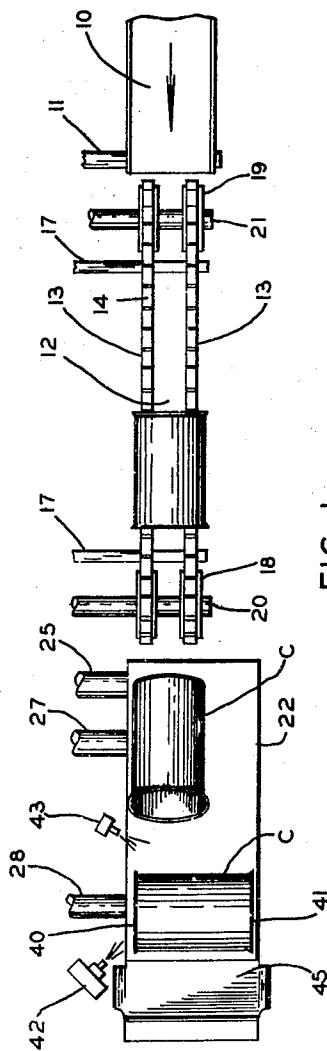


FIG. 1

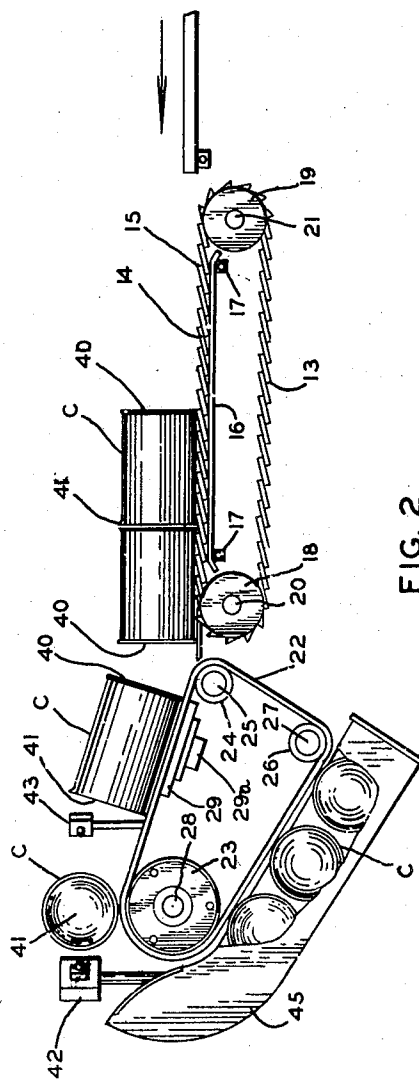


FIG. 2

INVENTOR.
BRUCE G. COPPING

BY

William F. Swezey

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2 Sheets-Sheet 2

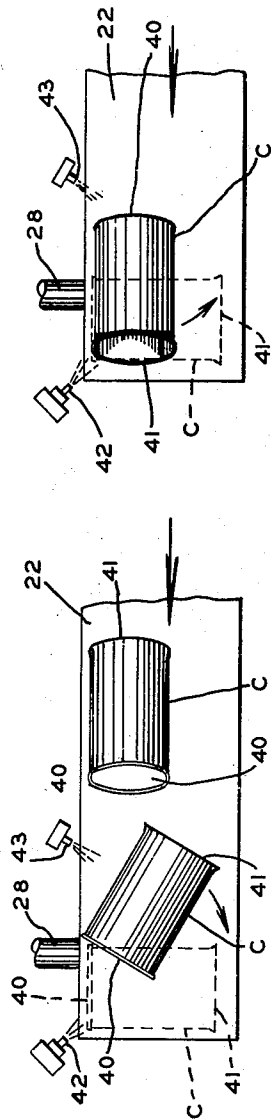


FIG. 3

FIG. 6

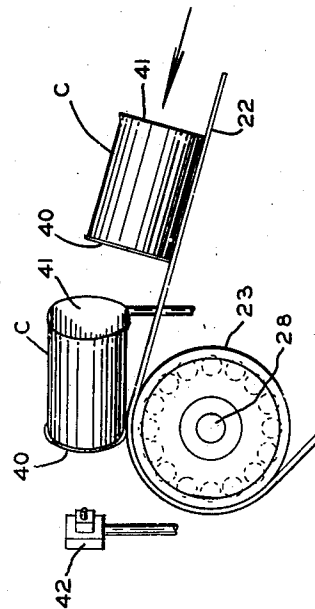


FIG. 4

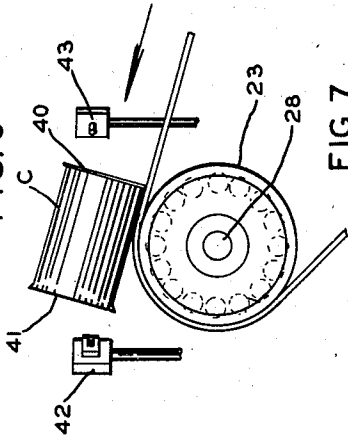


FIG. 7

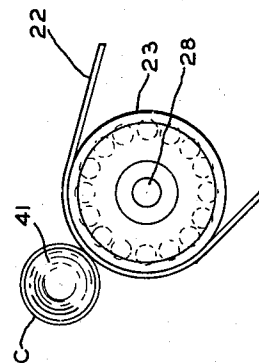


FIG. 5

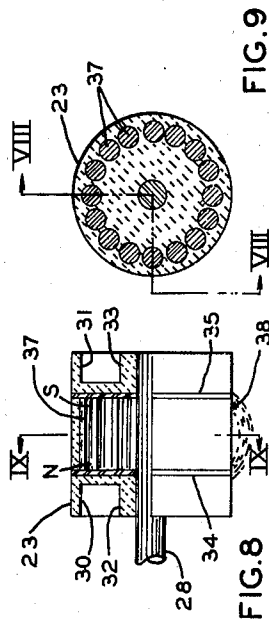


FIG. 9

FIG. 8

INVENTOR.

BRUCE G. COPPING

BY

William F. Swezey

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2,845,165

CAN ALIGNING MEANS

Bruce G. Copping, Akron, Ohio, assignor to Atkron, Inc.,
Cuyahoga Falls, Ohio, a corporation of Ohio

Application December 6, 1955, Serial No. 551,308

13 Claims. (Cl. 198—33)

This invention relates to means for moving unfilled steel cans in a single longitudinal file by suitable conveyor means such as a belt, with the longitudinal axes of the cans parallel to the belt or conveyor in the direction of its movement and with the cans having their closed and open ends indiscriminately positioned so that either the open or closed end of a can is headed forward on the conveying means, and for thereafter positioning the cans so that all their open ends face in the same direction.

An object of the invention is to provide a simple but effective and reliable means for turning each successive can as it reaches the end of the conveyor means so that its longitudinal axis is shifted almost instantly from its direction of travel parallel to the conveyor to a direction in which said axis lies at a right angle to its previous direction of travel and that the turning of the cans is accomplished in such a manner that the open end of each successive can so turned faces in the same direction regardless of whether the open or closed end is leading as it approaches the turning means.

Another object of the invention is to provide magnetic means for causing the successive cans to turn almost instantly as previously described.

Still another object of the invention is to provide a pulley having magnetic poles for causing the cans to so turn.

Another object is to provide means auxiliary to the magnetic means for assisting the cans in so turning so as to increase the capacity of the apparatus.

A further object is to provide a magnetic pulley comprising magnetic and non-magnetic portions with the magnetic portion comprising a plurality of permanent bar magnets extending parallel to and surrounding the axis of the pulley.

Another object is to provide such a pulley in which the all bar magnets extend parallel to and are equally spaced about the axis of the pulley with all the north poles facing in the same direction. It follows that all the south poles face in the opposite direction.

Another object is to provide such a pulley having a pair of circular pole pieces or discs of magnetic material which have approximately the same diameter as the pulley with said pole pieces contacting respectively the north and south poles of the aforesaid bar magnets so that the magnetic flux between the respective poles is effective between limited areas of the curved surface of the pulley.

Another object is to provide means for spacing the cans a short distance apart as they approach the magnetic pulley so that the cans will not transmit the magnetic effect of the pulley to succeeding cans with which they may be in contact and to permit the individual cans to turn almost instantly as they ride over the aforesaid magnetic pulley from the position in which their longitudinal axes are at right angles to the axis of the pulley to a position in which these axes are parallel to that axis and with the open ends of the cans pointing or facing in the same direction.

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Other objects and advantages of the invention will be readily apparent from the following description and accompanying drawings wherein:

Fig. 1 is a plan elevation of an apparatus embodying the invention.

Fig. 2 is a side view of the apparatus shown in Fig. 1 with some of the cans of Fig. 1 omitted.

Fig. 3 is a schematic plan view showing a can in the process of turning in the direction of the arrow, the fully turned position of the can being shown in dotted lines. In this showing the closed end of the can is in the leading position.

Fig. 4 is a side elevation of the showing of Fig. 3.

Fig. 5 is a view similar to Fig. 4 but showing the can fully turned with its open end facing the viewer with its axis parallel to the axis of the pulley.

Fig. 6 is a schematic plan view similar to Fig. 3 but showing a can on the pulley with its open end in the leading position.

Fig. 7 is a side elevation of the showing of Fig. 6.

Fig. 8 is a view partially in section on line VIII—VIII of Fig. 9 showing details of the magnetic pulley construction.

Fig. 9 is a vertical section taken on line IX—IX of Fig. 8.

In general, the invention relates to apparatus for positioning cylindrical containers, which apparatus comprises means for conveying the containers in single file with their longitudinal axes at least approximately parallel to the direction of travel of the conveying means, and an arcuate magnetic means having a pair of axially spaced oppositely charged pole plates on the periphery thereof, the conveyor means operatively engaging the magnetic means and moving the containers thereover for changing the positions of the containers to position them with their longitudinal axes extending transversely of the direction of movement of the conveyor means by magnetic forces from the magnetic means. Other means may be positioned adjacent the magnetic means to assist in the turning of the containers as they are being urged to new positions by the magnetic means.

Referring to Figs. 1 and 2, unfilled cans C are fed in single file and lying on their sides from a suitable source (not shown) by a conveyor 10. The form this conveyor takes may be a V-belt or any conveyor which supports and advances the cans and prevents them from rolling off. The cans are fed onto this belt indiscriminately and at random as far as their open and closed ends are concerned. However all the cans are lying on their sides with their longitudinal axes extending substantially parallel to the conveyor. A shaft 11 drives a pulley (not shown) over which the conveyor belt 10 passes.

From the conveyor 10, the cans pass to a conveyor 12 comprising a pair of spaced endless belts 13, each of which is made of a series of a series of short segments 14 of belting suitably fastened together as by rivets (not shown), so that the segments slope diagonally with their ends 15 staggered as indicated, the whole giving a serrated effect which tends to control the speed of the cans and prevent them from slipping by engaging the edges of the cans. A stationary support 16 is disposed beneath the upper reach of each belt portion 13. Each of these supports is mounted near each end by supporting rods 17 or other suitable means. The belt portions 13 are spaced apart just far enough to support cans in their horizontal position and the serrated ends 15 keep them from slipping. Opposite ends of the belts 13 pass around spaced dual pulleys 18 and 19 supported by shafts 20 and 21 respectively. One of these shafts is driven.

From conveyor 12 the cans are fed onto a belt 22 which passes over the magnetic pulley 23. This pulley has a special construction to be described in detail later on.

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The magnetic pulley 23 is mounted on a shaft 28 and is so disposed that in its relation to a driving pulley 24 operated from a shaft 25 and a take-up pulley 26 mounted on a shaft 27 a triangular arrangement is provided over which the belt 22 passes. This belt is continuous and seamless so that it will have no rough surfaces to disturb or interfere with the operation of sorting the cans by the magnetic pulley as hereafter described. The belt 22 is quite thin so that the maximum effect of the magnetic pulley is utilized. This belt is driven at a speed about twenty percent faster than that of the conveyor 12 feeding cans to it. The result is that each can feeding onto belt 22 is spaced at its trailing end from the succeeding can a distance of about one inch. This prevents the effect of the magnetic pulley from being transmitted to a succeeding can and also separates the cans for independent movement over the magnetic pulley as will be hereafter described.

The magnetic pulley 23 used in practising this invention is shown in detail in Figs. 8 and 9. It comprises both magnetic and non-magnetic parts. The end castings 30 and 31 are non-magnetic and are provided with central bosses 32 and 33 which serve as hubs for mounting the pulley on shaft 28. Circular discs 34 and 35 made of magnetic material bear against the inner surfaces of the end castings 30 and 31 respectively. The ends of bar magnets 37 are supported by discs or pole plates 34 and 35. These magnets 37, here shown as sixteen in number, are spaced equally around the hubs 32 and 33 and are disposed near the cylindrical non-magnetic shell 38 which extends from the magnetic disc 34 to magnetic disc 35. All the north poles N of the bar magnets face in the same direction, that is toward the non-magnetic casting 30 and all the south poles S toward the non-magnetic casting 31. Thus the disc 34 provides a north magnetic pole on the surface of the pulley and the disc 35 likewise provides a south magnetic pole on the surface of the pulley. By this construction the magnetic lines of force run between discs 34 and 35 and above the surface of the pulley approximately parallel to the axis of the pulley.

When an object of magnetic material such as a steel can enters a magnetic field it tends immediately to orient itself to lie with its longitudinal axis parallel to the field. Thus, cans which are carried onto the magnetic pulley just described in a single file tend to arrange themselves with their longitudinal axes parallel to the axis of the pulley and thus at right angles to their previous direction of travel.

In practicing the invention, the conveyor 12 is so disposed that its discharge end feeds the cans substantially directly in line with one of the magnetic poles. In the example here shown the cans C are fed to the pulley 23 by the endless belt 22 in substantial alignment with the south pole disc 35. Practically this could as well be the north pole disc 34. A permanent magnet 29 held by a support 29^a, is disposed beneath belt 22 at its infeed end to prevent the cans from skidding on this belt. If the closed end 40 of a can C is leading (Fig. 3), that end of the can, because of the mass of steel in the closed end, will hug the surface of the pulley tightly at the disc 35 while the trailing open end will tilt upwardly and then almost instantly pivot around so that the can will lie on the pulley with its open end facing the north pole disc 34. This results in the horizontal axis of the can being positioned parallel to the axis of the pulley. The dotted lines in Fig. 3 show the can in this position, the direction of movement being indicated by the arrow.

Conversely, if the open end 41 of a can C approaches the pulley 23 first (Figs. 6 and 7), the open end will tend to override the pulley and the closed end 40 will be gripped at the magnetic pole 35 as in the previous example. Then the open end pivots about the closed end in the direction of the arrow (Fig. 6) and so aligns itself

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parallel to the axis of the pulley as in the preceding example described in connection with Figs. 3 and 4.

In both cases the open end of the can faces the viewer as shown in Fig. 5. The cans will position themselves without extraneous help at the rate of about 200 cans a minute. It has been found that the capacity of the apparatus can be increased to 600 or more cans a minute if a physical means is employed to supplement the magnetic action and thus decrease the time it takes a can to align itself parallel to the axis of the pulley. To this end I provide a pair of air jets 42 and 43, the first being disposed adjacent the discharge end of the belt 22 and the latter, 43, being disposed on the opposite side of the pulley shaft 28 and nearer the infeed end of belt 22. As shown in Figs. 3, 4, 6 and 7, these jets are placed above the belt 22 in a position such that the blast coming from the jets blows against the open end 41 of a can regardless of whether that end is leading or trailing. I have found that air pressure of approximately 40 to 42 pounds is sufficient to cause the fast turning of the cans desired.

As the cans are turned on the pulley and move around the pulley, they enter a chute 45 from which they may be directed in any suitable path.

It will be apparent from the following description that the invention provides an extremely simple uncomplicated means with few moving parts, for changing the direction of travel of unfilled steel cans so that all the open ends of the cans face in the same direction.

While the invention has been shown only in one form it is apparent that its novelty is limited only by the following claims.

I claim:

1. In combination, means for conveying an empty cylindrical steel container having an open end and a closed end with its longitudinal axis approximately parallel to the direction of movement of the conveying means, and magnetic means disposed near the discharge end of the conveying means and engaged therewith for magnetically changing the position of the container so that its longitudinal axis is disposed at a right angle to its former direction of travel on the conveying means, said conveyor means thereafter moving the container through a path normal to the longitudinal axis thereof, said magnetic means comprising a pulley over which the conveying means travels, and the curved surface of the pulley being provided with magnetic north and south poles spaced from each other in a direction parallel to the axis of the pulley.

2. In combination, means for conveying an empty cylindrical steel container having an open end and a closed end with its longitudinal axis approximately parallel to the direction of movement of the conveying means, magnetic means including a pair of axially spaced poles disposed near the discharge end of the conveying means and engaged therewith for magnetically changing the position of the container so that its longitudinal axis is disposed at a right angle to its former direction of travel on the conveying means, and means adjacent said conveyor means and magnetic means to receive the container and move it through a path normal to the longitudinal axis thereof, said conveyor means and gravity combining to discharge the container onto said last-named means.

3. In combination, means for conveying an empty cylindrical steel container having an open end and a closed end, with its longitudinal axis approximately parallel to the direction of movement of the conveying means, magnetic means including a pulley disposed near the discharge end of the conveying means for changing the direction of movement of the container so that its longitudinal axis is disposed at a right angle to its former direction of travel on the conveying means, means for guiding the container from said magnetic means, said pulley being provided with magnetic north and south poles forming

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means spaced from each other in a direction parallel to the axis of the pulley, and a second conveyor means positioned adjacent the first-named conveyor means for carrying the container to the first-named conveyor means, said second conveyor means being so positioned that it discharges the container substantially in alignment with one of the magnetic poles provided, said second conveyor being driven at less speed than is the first conveyor.

4. In combination, means for conveying a plurality of empty cylindrical steel containers, each having an open end and a closed end, in single file with their longitudinal axes approximately parallel to the direction of travel of the conveying means, and magnetic means disposed near the discharge end of the conveyor means for changing the direction of travel of each successive container so that its longitudinal axis is disposed at a right angle to its former direction of travel on the conveyor means, said magnetic means having only a pair of oppositely charged pole means on axially spaced peripheral portions thereof.

5. Structure according to claim 4 in which the magnetic means comprises a pulley over which the conveyor means travels.

6. Structure according to claim 4 in which another conveyor means is provided for carrying the containers to the first-named conveyor means, said other conveyor means being so positioned that it discharges the successive containers onto said first-named conveyor substantially in alignment with one of the magnetic poles on the surface of the pulley, said other conveyor means being driven at less speed than is the first conveyor means whereby the successive containers are spaced from each other a short distance as they pass onto the first-named conveyor means.

7. Structure according to claim 5 in which auxiliary means is provided to assist in turning the containers to a position in which the longitudinal axis of each is parallel to the axis of the pulley.

8. Structure according to claim 7 in which the auxiliary means comprises a pair of air jets, one disposed on either side of the axis of the pulley and spaced from the upper surface of the pulley so that the air discharged from one of said jets impinges on a container near its open end as the container is in the process of turning to a position in which its longitudinal axis is parallel to the axis of the pulley.

9. Apparatus for positioning cylindrical containers and comprising means for conveying the containers in single file with their longitudinal axes at least approximately parallel to the direction of travel of the conveying means, an arcuate magnetic means having a pair of axially spaced poles on the periphery thereof, said conveying means moving said containers to and over said magnetic means for changing the containers to position them with their longitudinal axes extending transversely of the direction of travel of said conveying means by magnetic forces from said magnetic means, and means to assist the turning of the positions of said containers as they are being urged to new positions by said magnetic means.

10. Apparatus for positioning cylindrical containers and comprising means for conveying the containers in single file with their longitudinal axes at least approxi-

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mately parallel to the direction of travel of the conveying means, an arcuate magnetic means having a pair of axially spaced oppositely charged pole plates on the periphery thereof, said conveyor means engaging said magnetic means and moving said containers thereover for changing the positions of the containers to position them with their longitudinal axes extending transversely of the direction of movement of said conveyor means by magnetic forces from said magnetic means, and fluid blast means positioned adjacent said magnetic means to direct a fluid stream against said containers to assist in the turning of said containers as they are being urged to new positions by said magnetic means.

11. Apparatus for positioning cylindrical containers, which apparatus comprises means for conveying the containers in single file with their longitudinal axes at least approximately parallel to the direction of travel of the conveying means, means for depositing said containers on said conveyor means in axially spaced relation in the positions stated, and a magnetic member having a pair of opposite pole plates on the periphery thereof at portions spaced transversely of said conveyor, said conveyor means engaging said magnetic member and moving said containers thereover for changing the containers to position them with their longitudinal axes extending transversely of the direction of movement of said conveyor means by magnetic forces from said magnetic member.

12. Apparatus for positioning cylindrical containers and comprising means for conveying the containers in single file with their longitudinal axes at least approximately parallel to the direction of travel of said conveying means, and a magnetic member having a pair of oppositely charged pole plates on the periphery thereof at portions spaced transversely of said conveyor, said conveyor means operatively engaging said magnetic member and moving said containers thereover with said containers being positioned in the magnetic field created by said pole plates, said magnetic member moving the containers to position them with their longitudinal axes extending transversely of the direction of movement of said conveyor means by magnetic forces from said magnetic member.

13. In combination, means for conveying a plurality of empty cylindrical steel containers, each having an open end and a closed end, in single file with their longitudinal axes approximately parallel to the direction of travel of the conveying means, a pulley engaging said conveying means to provide a discharge end therefor, and magnetic means operatively associated with said pulley for changing the direction of travel of each successive container so that its longitudinal axis is disposed at a right angle to its former direction of travel on the conveyor means, said magnetic means providing a pair of oppositely charged poles at axially spaced peripheral portions of said pulley.

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