March 3, 1959 J. A. ROSKELLEY 2,875,565

NAIL PACKAGING APPARATUS

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FIG. 1.

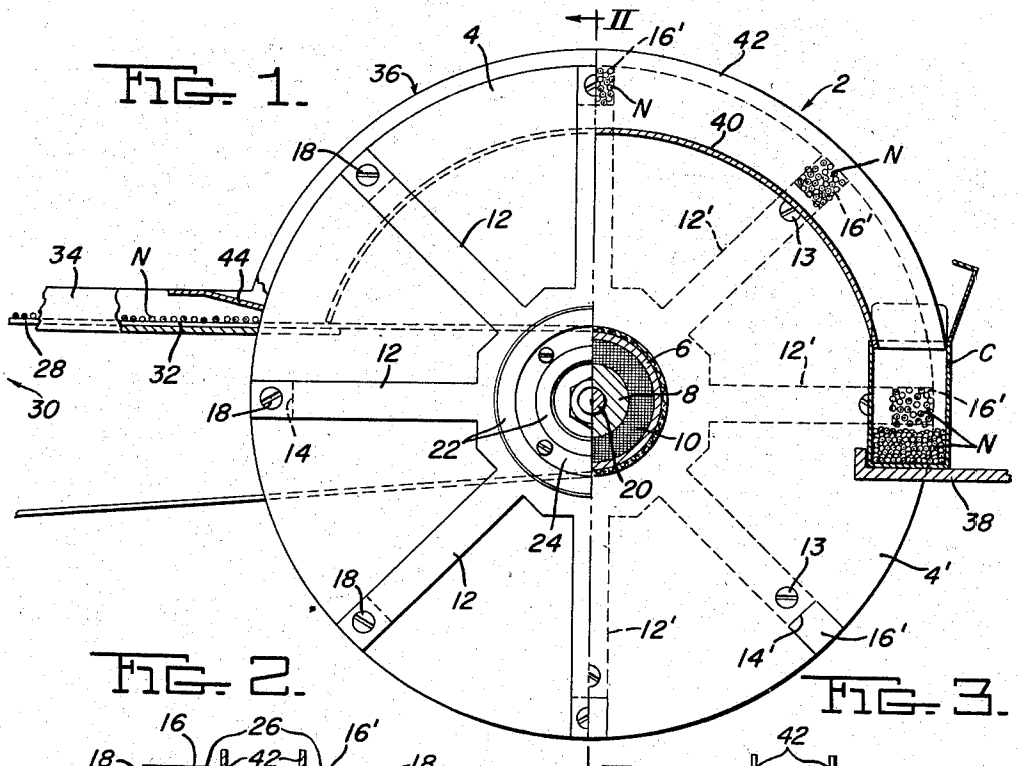


FIG. 2.

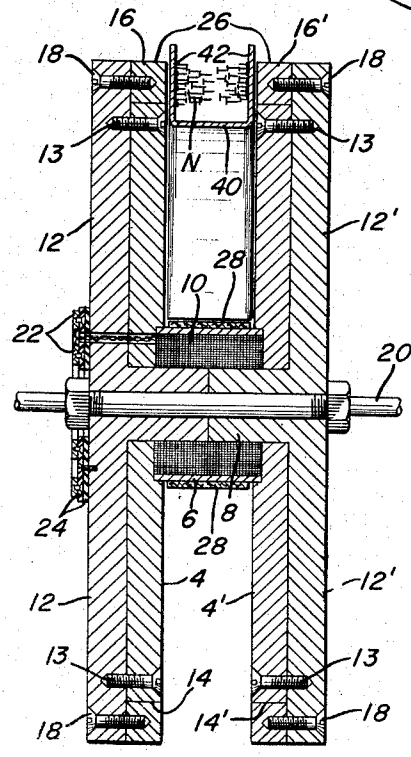
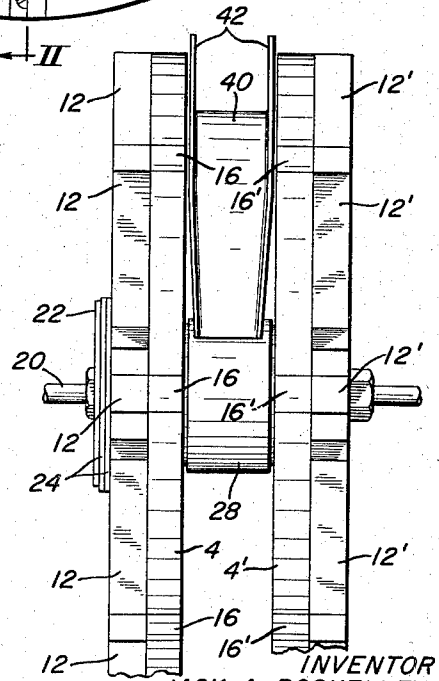


FIG. 3.



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NAIL PACKAGING APPARATUS

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5 Claims. (Cl. 53—235)

The present invention relates generally to packaging equipment and more particularly to apparatus for packing slender elongated magnetic articles such as nails, screws, bolts, etc. in containers or packages in a uniform compact mass so as to achieve efficient utilization of the space in each container or package.

It is, accordingly, an object of the invention to provide apparatus in the form of a magnetic packaging wheel for packing magnetic articles in a container or package.

It is an object of the invention to provide apparatus in the form of a magnetic packaging wheel including a pair of spaced discs which rotate astride a conveyor system carrying the magnetic articles to the packaging wheel.

It is a further object of the invention to provide magnet means for setting up spaced magnetic fields between the discs described above for the purpose of lifting the magnetic articles from the conveyor and carrying them to and depositing them in a container or package by means of magnetic fields of force.

It is a further object of the invention to provide a magnetic packaging wheel as described above adapted to function as a pulley for a conveyor system and to be rotated thereby to perform its packaging function.

These and other objects will become more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a side elevational view partly in section;

Figure 2 is a cross sectional view taken on the line II—II of Figure 1; and

Figure 3 is an end view with parts removed looking to the left of Figure 1.

Referring more particularly to the drawings reference numeral **2** designates generally to the magnetic packaging wheel of the apparatus of the invention. Wheel **2** includes a pair of spaced discs **4** and **4'** of non-magnetic material such as aluminum, Micarta, non-magnetic stainless steel or similar material, rigidly mounted on a non-magnetic hub **6** which may also be made of aluminum, Micarta, non-magnetic stainless steel, etc. I have found it preferable to use aluminum for the discs **4, 4'**.

The hub **6** which extends between the discs **4** and **4'** has a core **8** of mild steel surrounded by electromagnetic windings **10**. Although I have found it preferable to use mild steel for core **8** it will be noted that other material which readily conducts magnetic lines of force and which may be solid or laminated could be used for this purpose. The core **8** extends beyond the ends of the hub **6** and forms a common base for radially extending spaced opposed magnet arms **12** and **12'** which may be solid or laminated and are made of mild steel or other material which readily conducts magnetic lines of force. Discs **4, 4'** are fastened to the respective magnet arms by means of non-magnetic screws **13**.

The outer edges of discs **4** and **4'** are provided with spaced, generally rectangular cut-out slots **14** and **14'**, respectively, for receiving solid or laminated magnet pole faces **16** and **16'** of mild steel or other magnetically

permeable material, which are attached, by means of screws **18** to the inner surfaces of the distal ends of arms **12** and **12'**, respectively. The core **8** is mounted for rotation on a non-magnetic shaft **20** which may be made of non-magnetic stainless steel or other suitable non-magnetic material and which carries copper slip rings **22** and Micarta insulators **24**.

The arrangement just described provides a plurality of radially spaced, inward hooked U-shaped magnets **26** around wheel **2**. Each of the magnets including a pair of opposed arms **12** and **12'**, attached to discs **4** and **4'**, respectively, radiating from a common base or center **8** and carrying opposed pole faces **16** and **16'**. The pole faces **16** and **16'** are of opposite polarity so that areas of magnetic force are set up between pairs of opposed pole faces when windings **10** are energized through the copper slip rings **22** which are connected to a suitable power source (not shown).

Although I have shown the use of electromagnets for creating the magnetic fields, it will be noted that permanent type magnets may be used if preferred.

The hub **6** may function as a pulley surface for a continuous conveyor **28**, as shown in Figure 1. In this arrangement the conveyor **28**, which is driven by suitable means (not shown) at its loading end **30**, also provides the motive power for turning the wheel **2**. However, if desired, separate means can be provided for rotating wheel **2**.

The conveyor **28** carries magnetic articles such as nails N from a source of supply which may be a nail aligning drum (not shown) which deposits the magnetic articles on the upper flight **32** of the conveyor in generally parallel relation in a single layer. The conveyor **28** must be non-magnetic and may be made of a non-magnetic material such as fabric, synthetic material, non-magnetic metal belting or a combination of any such materials. A non-magnetic trough **34** which may be made of non-magnetic stainless steel supports the upper flight **32** of conveyor **28** adjacent the wheel **2**. The conveyor **28** may be flighted to bring the magnetic articles to the wheel **2** in positions substantially perpendicular to the pole faces **16** and **16'** of the magnets **26**. If desired, other means of conveying or feeding the magnetic articles into the wheel **2** may be used and separate motive power applied to the wheel.

An arcuate guide **36** made of non-magnetic material such as stainless steel is disposed between the perimeters of the discs **4, 4'** and extends from a connection on the trough **34** to a container C supported on a bracket **38** between the discs **4, 4'** on the circumference of wheel **2** opposite the conveyor **32**. The guide **36** is provided with a bottom **40** and spaced side walls **42**. The guide **36** functions to prevent the nails being packaged from coming into direct contact with the pole faces **16** and **16'** of the magnets **26**. The guide also serves to funnel the magnetic articles into the container. The bottom **40** of guide **36** prevents the articles being packaged from passing beyond the pole faces to the hub **6**. A stripper bar **44** of non-magnetic material, which may be non-magnetic stainless steel, projects from the end of the guide **36** adjacent the conveyor **28** and extends over the upper flight of the conveyor so as to prevent the magnetic fringe areas surrounding each pair of pole faces **16, 16'** from disturbing the arrangement of the nails N on the conveyor as the wheel is rotated.

In operation, as each pair of opposed pole faces **16, 16'** passes upwardly astride the continuously driven conveyor **28** as wheel **2** is rotated clockwise as shown in Figure 1, the nails are lifted from the conveyor and suspended between the pole faces and thus suspended are carried into the container C. Due to the magnetic lines

of force set up between the opposed pole faces, the nails are held in positions substantially parallel with each other and retain these relative positions as they are stacked in the container.

As the magnetic fields pass the container C from top to bottom, they gently agitate the nails already in the container and thus assure a dense pack. Bounce and misalignment are practically eliminated because the nails are stacked or carried into the container and are not poured or dropped in by gravity as was the general practice prior to my invention.

Thus, the apparatus of the invention packages magnetic articles in an efficient, neat and orderly manner. Its simplicity of design lends itself to economic initial installation and subsequent maintenance.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for packing magnetic articles in a container which comprises a wheel including a pair of spaced discs of non-magnetic material mounted for simultaneous rotation in a vertical plane about a common axis, means for rotating said wheel and for feeding said magnetic articles along a horizontal plane into the circumference of said wheel between said discs, magnet means carried by each of said discs adjacent the perimeter thereof in radially spaced relation whereby radially spaced magnetic fields are set up between said discs, means supporting said container between said discs on the circumference of said wheel opposite said feeding means, and a non-magnetic arcuate guide having a bottom and spaced sides fixedly disposed between said discs and extending from said feeding means to said container.

2. Apparatus for packing magnetic articles as defined by claim 1 characterized by said feeding means including an endless conveyor belt of non-magnetic material, and driving means connected with one end of said endless conveyor belt for driving the same.

3. Apparatus for packing magnetic articles as defined by claim 2 characterized by said discs being fixedly

on a common rotatable hub, and the opposite end of said conveyor belt being disposed around said hub for rotating said wheel.

4. Apparatus for packing magnetic articles as defined by claim 2 including a flange of non-magnetic material on the end of said guide adjacent said conveyor, said flange extending over said conveyor.

5. Apparatus for packing magnetic articles in a container which comprises a non-magnetic endless conveyor having a loading end and a discharge end and being adapted to convey said magnetic articles in a horizontal plane, driving means connected with the loading end of said conveyor, a wheel including a pair of spaced discs of non-magnetic material disposed for simultaneous rotation in a vertical plane astride the discharge end of said conveyor, said discs being fixedly mounted on a common rotatable hub, the discharge end of said conveyor being disposed around said hub for rotating said wheel, the radius of said wheel extending to a point intermediate the ends of said conveyor, a pluralty of magnets circumferentially spaced on the inner faces of said discs, each of the magnets on one disc being disposed opposite a magnet of opposite polarity on the other disc so that a magnetic field is set up between each pair of opposed magnets, means supporting said container between said discs on the side of said wheel opposite said conveyor, a non-magnetic arcuate guide fixedly disposed between said discs and extending from said conveyor to said container, and a flange of non-magnetic material on the end of said guide adjacent said conveyor, said flange projecting over said conveyor, the magnetic fields set up between the magnets of each opposed pair being adapted to pick up said magnetic articles from the conveyor and carry them into said container as said wheel is rotated by said conveyor in the same direction as the conveyor.

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