Aug. 18, 1959 A. F. ISRAELSON ET AL 2,900,076

MAGNETIC SEPARATOR FOR PILLS

Original Filed Oct. 17, 1956

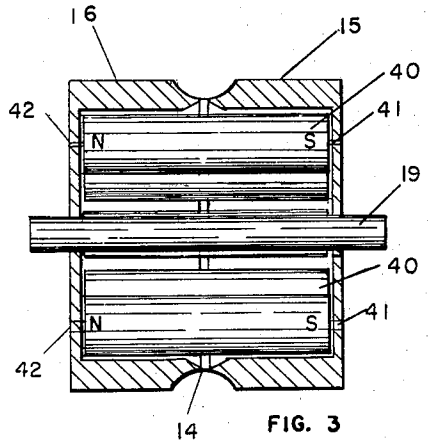


FIG. 3

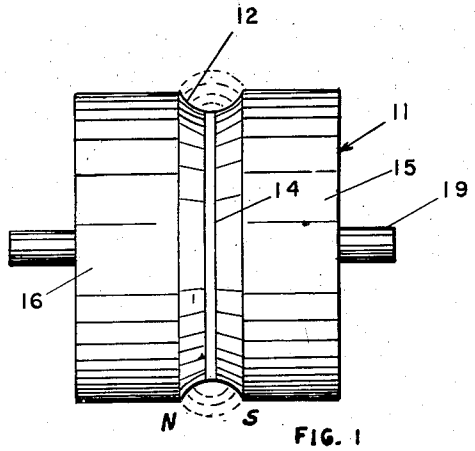


FIG. 1

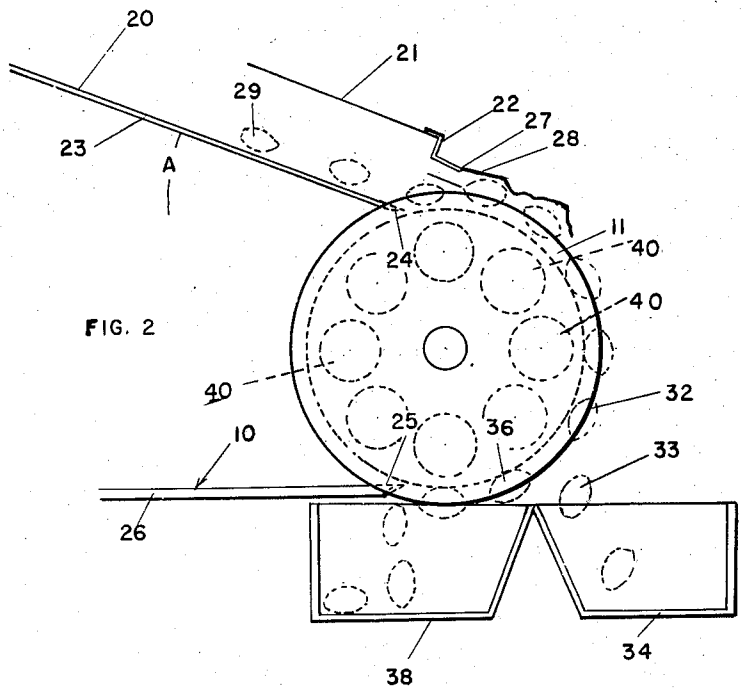


FIG. 2

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United States Patent Office 2,900,076
Patented Aug. 18, 1959

2,900,076

MAGNETIC SEPARATOR FOR PILLS

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Substituted for abandoned application Serial No. 616,570, October 17, 1956. This application December 19, 1957, Serial No. 703,979

6 Claims. (Cl. 209—215)

This invention relates to magnetic separators and, more particularly, to magnetic separators for sorting small objects such as pills.

This application constitutes a substitute application of patent application, Serial No. 616,570, filed October 17, 1956, which has been abandoned.

In the manufacture of certain medicinal pills, the cores of the pills contain a particular substance which is inserted in the pill and then coated with another substance. Because of the high production rate at which the pills are coated in automatic machines, the machines may occasionally fail to put a core in a pill and, therefore, an indispensable ingredient is omitted from that pill. In some instances, it is difficult to sort the defective pills from the non-defective pills.

It has been determined that if iron could be added to the cores, the pills could be passed over a magnetic device and the pills which were provided with proper cores could be sorted from the pills not having proper cores. It has been discovered that by using a magnetic roll of a specific design, the pills which are properly constituted and not defective can be separated from the pills which are defective.

The present invention discloses a machine having a magnetic roll with a specific shaped face which will accommodate the pills and which will concentrate the magnetic flux through a path over which the pills must each pass.

It is, accordingly, an object of this invention to provide a magnetic separator which is simple in construction, economical to manufacture, and simple and efficient in operation.

Another object of this invention is to provide a machine for magnetically sorting pills.

A further object of this invention is to provide a specific design of magnetic roll for sorting small articles of manufacture, some of which contain ferrous material and others of which do not contain ferrous material.

A still further object of the invention is to provide a roll having a peripheral groove therein with means to provide a magnetic field across the groove.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:

Fig. 1 is a view of a magnetic roll having a peripheral groove therein according to the invention;

Fig. 2 is a view of the roll shown in Fig. 1 connected in a machine for sorting pills; and

Fig. 3 is a longitudinal cross sectional view of the roll according to the invention.

Now with more specific reference to the drawing, a roll **11** is shown supported in a machine **10**. The roll

11 has a peripheral groove **12** therein which is deeper at its center and it becomes shallower at its edges. Thus, the peripheral groove **12** is contoured to approximately the shape of the pills to be sorted. A gap **14** is formed in the periphery of the roll **11** and two halves **15** and **16** of the roll **11** are separated at the gap **14**.

The roll **11** is supported on a non-magnetic shaft **19** which will be mounted between suitable bearings. The roll **11** will have suitable magnets supported therein and it may be mounted below a chute **20** which may have a suitable cover **21** thereon and a suitable end shield **22**. The lower portion of bottom **23** of the chute **20** will be made of non-magnetic material and will terminate in a contour portion **24** which will be shaped to fit into the groove **12**.

The two halves **15** and **16** of the roll **11** are cup shaped and are supported on the non-magnetic shaft **19** as shown with the gap **14** therebetween. Eight bar magnets **40** are supported between the cylindrical cup shaped members **15** and **16** and are atached to the bottom of the cup shaped members **15** and **16** at **41** and **42**. The bar magnets **40** all have like poles in one direction. This makes the magnetic circuit radially outwardly and across the gap **14**. The shaft **19** must be non-magnetic or it would short the magnetic circuit.

A non-magnetic stainless steel scraper **26** supported adjacent the bottom of the roll **11** will be contoured to fit into the groove **12** in the face of the roll **11** at **25** and a strip of very light, very flexible cloth felt or other flexible sheet material **28** will be attached at **27** to the end shield **22**. The sheet **28** prevents the pills from feeding more than one at a time to the magnetic roll **11**. It also gives better control of non-magnetic pills by preventing them from ricocheting off the desired path. Pills **29** will be fed down the chute **20** and will be discharged over the end portion **24** onto the groove **12**. The pills containing the magnetic core will be attracted to the roll **11** and held tightly thereto as they move with the roll **11** as it rotates. Then as the roll **11** contines to rotate, the pills come down with it past a location **32**. Defective pills **33** from which the magnetic core has been omitted, not being attracted by the magnetic roll **11**, will be rejected and dropped from the roll **11** into a container **34**. The pills which are properly constituted will be attracted to the roll **11** as at **36** and will be scraped off by means of the end **25** of the scraper **26** and will fall into a container **38**.

With the machine disclosed herein, it has been discovered that with the chute **20** disposed at an angle of between seventeen and twenty degrees to a horizontal, the pills can be fed through the machine **10** at the rate of from between five hundred to six hundred pills per minute and the quantity of iron in the core of the pill need not be more than five to ten milligrams.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is capable of modification within a range of equivalents without departing from the invention which is as broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A machine for sorting pills containing ferrous material from pills not containing ferrous material comprising a magnetic roll having a peripheral groove therein, means to provide a magnetic field across said groove, said groove being contoured to fit the general contour of one side of said pills, a chute disposed at an angle of between seventeen and twenty degrees to said roll and having an extension on the bottom thereof contoured to fit said groove and disposed therein, a cover overlying said chute and said groove and having a flexible fabric

member extending over a portion of said groove whereby said pills are held in contact with said groove, a first container disposed below one side of said roll and adapted to receive pills not containing ferrous material which fall from said roll, a scraper disposed along the bottom of said roll having an extension thereof extending into said groove and adapted to scrape pills containing ferrous material from said roll, and a second container disposed below said roll to receive said ferrous pills.

2. The machine recited in claim 1 wherein said scraper and said chute bottoms are made of non-magnetic material.

3. The machine recited in claim 2 wherein said roll has a peripheral surface made of two spaced cylindrical members separated therefrom and said space between said cylindrical members constitutes the bottom of said groove.

4. A magnetic separator comprising a magnetic roll made of two halves having a peripheral gap between said two halves, means to provide a magnetic field across said gap, the outer edges of said halves defining said gap extending outwardly and axially to form a groove terminating at its bottom in said gap, chute means to direct magnetic articles of manufacture and non-magnetic articles of manufacture onto said groove in said roll, scraper means to scrape said magnetic articles from said roll at a proper point, said non-magnetic articles dropping from said roll before reaching said scraper means, support means attached to a fixed member above said chute means, and a cloth member attached to the end of said support means, said cloth member being spaced from said roll and adapted to overlie said articles to direct said articles on said roll.

5. A magnetic roll for a magnetic separating device comprising a non-magnetic shaft, two cup shaped members made of magnetic material and supported on said shaft with the open ends of said cup shaped members facing each other and a nonmagnetic gap therebetween, and bar magnets disposed around said shaft with one end of each said bar magnet engaging the inside of the bottom of each said cup shaped member, the edge of each said cup shaped member being reduced in thickness around the periphery thereof adjacent the other whereby a peripheral groove is provided.

6. A magnetic roll for a magnetic separating device comprising a non-magnetic shaft, two cup shaped members made of magnetic material and supported on said shaft with the open ends of said cup shaped members facing each other and a non-magnetic gap therebetween, and magnets disposed around said shaft with one end of each said magnet engaging the inside of the bottom of each said cup shaped member, the edge of each said cup shaped member being reduced in thickness around the periphery thereof adjacent the other whereby a peripheral groove is provided.

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