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GRADING AND REJECTING DEVICE

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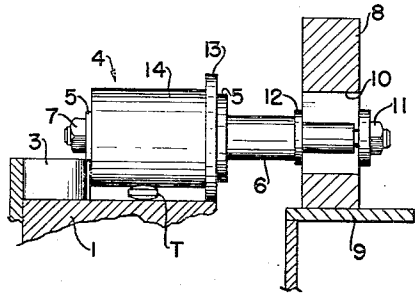


FIG. 1

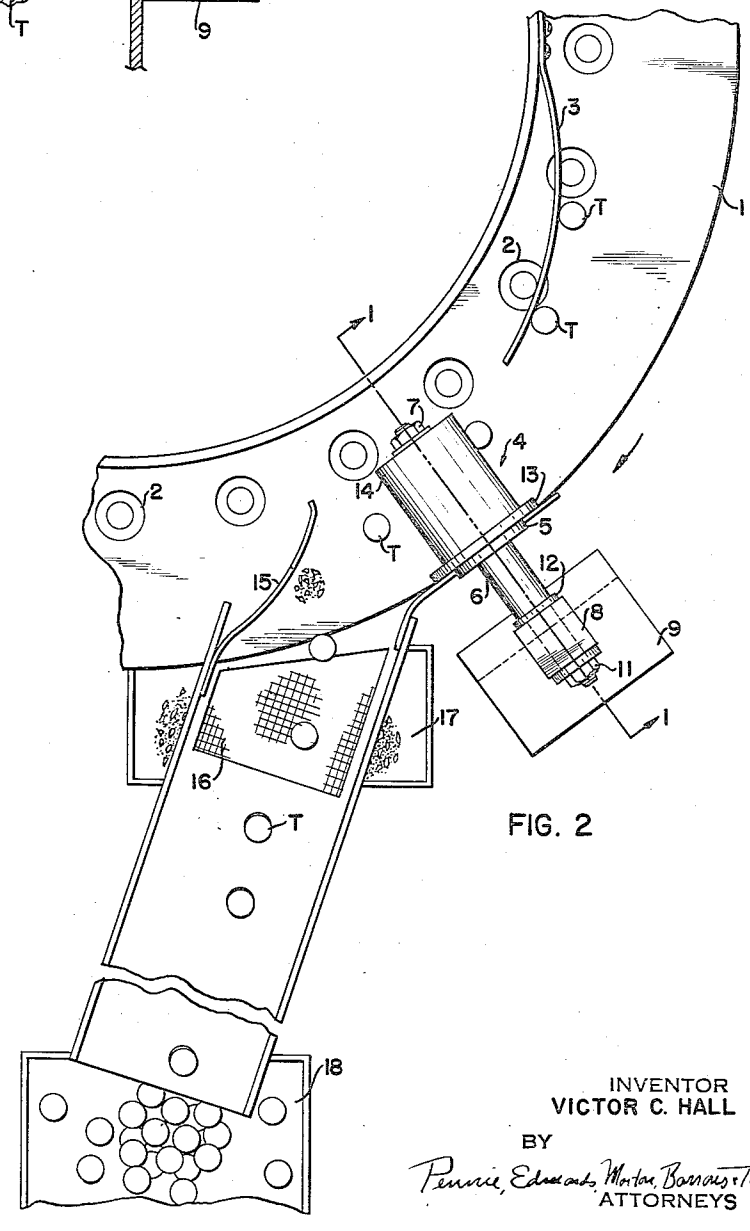


FIG. 2

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GRADING AND REJECTING DEVICE

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4 Claims. (Cl. 241—79)

This invention relates to the grading of small solid objects such as medicinal tablets to determine those that are below acceptable standards and to separate and remove them from the acceptable tablets. For convenience, the invention will be described in connection with medicinal tablets of the type formed of compressed granular material. The invention provides a yieldable, preferably resilient, roller under which the tablets pass while supported on a hard base, and means for adjusting the pressure which the roller exerts on the tablets so that acceptable tablets pass uninjured while unacceptable tablets, such as those formed of an insufficient amount of material, or which are physically misshaped or otherwise defective, are crushed and in that form are separable from the other tablets.

The device of the invention is advantageously suitable for use in combination with automatic tablet forming machines of the type which form the tablets by compression in dies and which also compress coatings of granular material over previously formed core tablets. The invention solves an especially difficult problem in the grading of medicinal tablets having core tablets covered with coatings. Such coatings are usually formed by depositing the core tablet in a die over granular material, then applying granular material over the core tablet, and compressing the coating in the die between punches. The operation may occasionally fail to deposit a core tablet in one of the dies with the result that a tablet will be formed only of coating material, or the tablet may result from the coating of an imperfect core tablet. Such imperfect tablets have a different structure, hardness, and strength than perfect tablets, and the roller is adjusted to crush them while permitting the perfect tablets to pass uninjured.

In a preferred embodiment and combination, the roller is formed of relatively resilient rubber and is mounted over a firm base on which the tablets travel and against which they are pressed by the roller. In one common tablet forming and coating apparatus, the tablets are removed from the dies and travel on a rotating bed over which the roller is mounted. The roller is adjustably mounted to vary the pressure on the tablets and is also preferably provided with means to rotate it, preferably at about the peripheral speed of the tablets traveling on the rotating bed.

These and other objects of the invention will be better understood after considering the following discussion taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevation of a tablet grading device of the invention illustrated in combination with parts of a rotary tablet forming and coating machine, and

Fig. 2 is a plan view of the apparatus illustrated in Fig. 1.

The drawings illustrate only fragmentary portions of the well known and widely used Stokes type tablet forming machine, modified to compress granular coatings on core tablets, having a rotary die bed 1 comprising a plu-

rality of tablet forming dies 2 in which the tablets are coated and when finished are pushed out of the die to the level of the die bed on which they continue to rotate. The baffle 3 is provided to deflect the coated tablets T away from the dies and to carry them under the roller 4 of the invention.

This roller 4 is formed of yieldable but relatively firm rubber and is mounted on a bearing sleeve 5, which is freely rotatable on the shaft 6 and held in position by the nut 7. As illustrated in the drawings, the shaft is adjustably but securely mounted on the upright bracket 8 which is rigidly attached to the stationary frame 9 of the tablet forming machine. The bracket 8 has an upright slot 10 in which the shaft 6 is adjustable in an upward and downward direction to vary the space between the roller 4 and the die bed. The shaft can be secured in the desired position by tightening the nut 11 against the collar 12 which is fixed to the shaft 6.

The roller 4 comprises a relatively large diameter drive wheel portion 13 which makes bearing contact with the rotary bed 1 to drive the roller, and an integral smaller diameter portion 14 which is the part under which the tablets must pass after being removed from the dies. By suitably adjusting the position of the shaft 6, varying degrees of pressure may be applied by the roller portion 14 to the tablets.

With particular reference to Fig. 2, the finished coated tablets which are pushed out of the dies contact the stationary baffle 3 and are deflected towards the central portion of the rotary die bed 1 and directed to pass under the roller 4. If the tablets are properly formed as previously described, they pass under the roller without injury. If they are not suitably formed, they are crushed or shattered by the roller. After the tablets pass under the roller, they engage the stationary baffle plate 15 and are deflected from the rotary die bed from which they fall onto the angularly disposed screen 16. The broken or crushed tablets fall through the screen into the receptacle 17. The uninjured and acceptable tablets continue and fall into the receptacle 18.

While the invention has been described in connection with a rotating die bed on which the tablets travel, it is to be understood that the tablets may be fed under the roller by any suitable means. The roller may be mechanically driven to rotate over a stationary base, or one moved in a different manner, such as a conveyor belt.

While the grading device of the invention can be used advantageously in grading a variety of solid objects, preferably formed of granular materials that are susceptible to crushing with the yieldable rubber roller, it is especially effective for use in connection with the grading of medicinal tablets which have an inner core tablet coated with a granular material formed by compression in the type of apparatus illustrated. Such tablets are difficult to grade, and the device of the invention provides an effective means of detecting and removing tablets which are defective for various reasons.

I claim:

1. An improved device for grading small hard objects to separate imperfect objects which are structurally weak, have low density or are oversized, which device comprises a roller of resilient material, means for mounting said roller in spaced position above a hard base on which the objects travel in passing under the roller, said roller being adjustable to provide the required pressure on the objects and said resilient material being such that said imperfect objects are crushed while the remaining objects are not injured, and means for separating the remaining objects from the crushed objects.

2. An improved grading device according to claim 1 which comprises means for driving the roller at substantially the speed of travel of the objects.

3. An improved grading device according to claim 1 in which said roller is formed of yieldable rubber, and which said separating means comprises a screen on which said crushed and said remaining whole objects are deposited to separate the whole objects from the crushed objects.

4. An improved device for grading small hard objects to separate imperfect objects which are structurally weak, have low density or are oversized, which device comprises a roller having one part of relatively large diameter and having another part of smaller diameter constructed of resilient material, a hard base, said roller being adjustable and positioned above said base with said one part of said roller engaging said base and with said other part of said roller passing above said base, means for moving said base relative to said roller whereby the engagement of said one part of said roller with said base causes said roller to turn and whereby said objects positioned on said base are passed beneath said other part of said roller and in contact with said roller, said imperfect objects thereby being crushed while said remaining objects are not injured, and means for separating said crushed objects from said remaining whole objects.

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