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SPRING MOUNTED BRAKE

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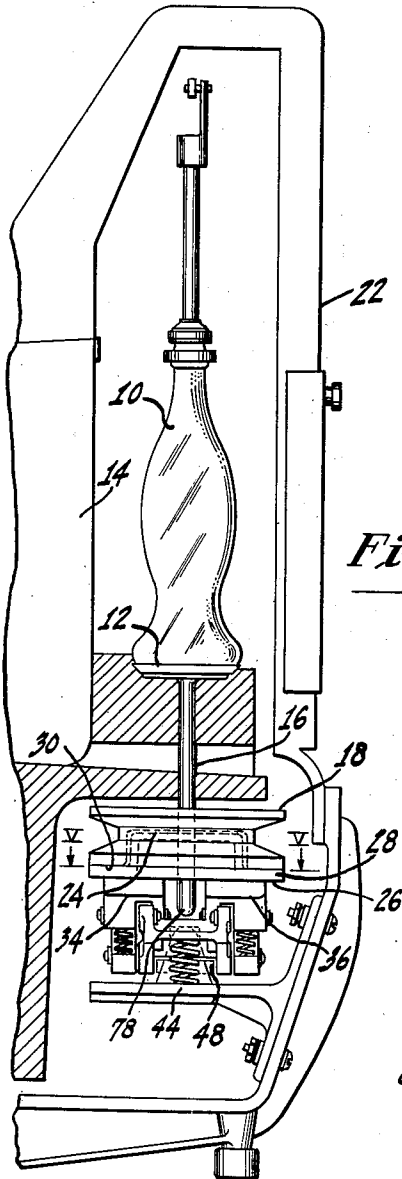


Fig. 1.

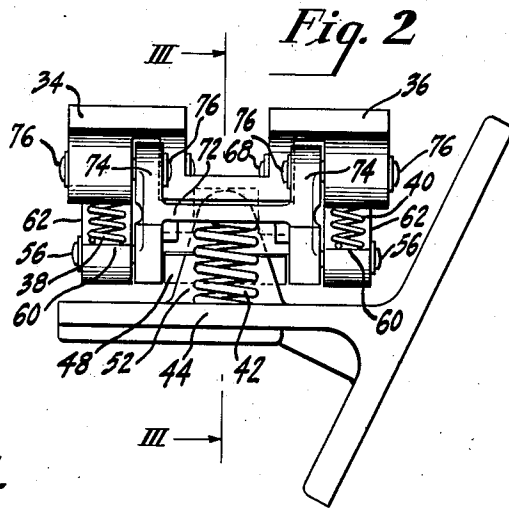


Fig. 2.

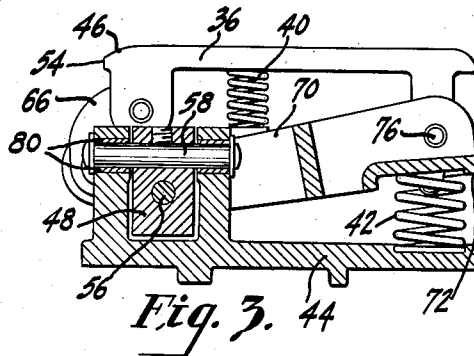


Fig. 3.

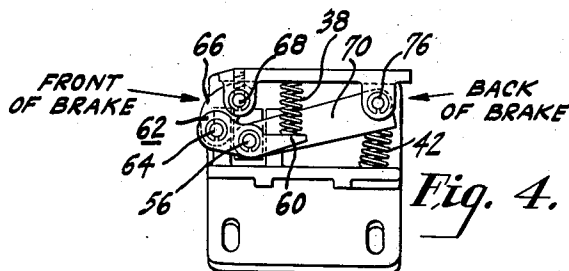


Fig. 4.

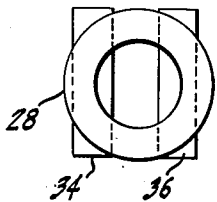


Fig. 5.

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SPRING MOUNTED BRAKE

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This invention relates to a brake and has for one of its objects the provision of means for successively braking a plurality of moving objects.

Another object is the provision of improved means in a braking arrangement of the character described for compensating for variations in placement of the different braking surfaces.

A further object is the provision of a brake capable of giving continuous accurate and trouble-free service with a minimum of vibration under adverse conditions.

An additional object is to provide improved means for effecting a speedy braking of the motion of an object, and after braking for holding the object motionless with respect to the brake, so as to provide a stable braking system with a minimum of chatter.

The invention will be described with reference to its use in a beverage inspection machine which may, for example, be of the type described in Weathers Patents No. 2,268,098 and No. 2,323,636. The description in this connection is, however, merely illustrative and it is not intended to limit the use of a brake according to the invention to any particular application.

In the accompanying drawing,

Figure 1 is a view in elevation of a portion of a beverage inspection machine including a brake according to the invention,

Figure 2 is an enlarged view of the brake of Fig. 1,

Figure 3 is a sectional view taken along the lines III-III of Fig. 2 and looking in the direction of the arrows in that figure,

Figure 4 is a side view of the brake of Fig. 2, and

Figure 5 is a plan view of the brake lining and brake shoes taken on the line V-V of Fig. 1.

The machine illustrated in Fig. 1 is of a type designed to inspect bottled carbonated beverages and other fluids for any solid particles which may be contained therein, and to separate bottles containing such particles from those found to be normal.

The bottles 10 to be inspected are transferred from a moving conveyor to bottle supporting cups 12 arranged on the perimeter of a rotating turret, indicated generally at 14. In a practical inspection machine there may be twenty such bottle cups arranged around the turret. Each bottle cup 12 is connected by a spindle 13 to a pulley 18 in contact with a driven spinner belt. By this means the contents of each bottle are set in spinning motion before inspection. The belt is then disengaged from the pulley and the spinning mo-

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tion of the bottle to be inspected is stopped abruptly. At this moment a beam of light or other radiant energy is directed through the bottle to an appropriate responsive device; for example, a bank of photocells mounted on a cam-controlled oscillating swing arm 22, which may be pivoted at the axis of the turret. Although the spinning of the bottle has ceased, its fluid contents continue to rotate within the bottle and any particle which may be in the fluid cuts the beam of light, causes an abrupt variation in the amount of light passing to the photocells, and actuates appropriate rejection means through the differential response of the photocells.

A practical machine of the character described may be installed in a bottling plant as part of a continuously moving conveyor system which brings bottles to the machine from washing, filling and capping machines, and passes the bottles after inspection to a packing station. Effective and continuous braking is very difficult to achieve because of the high humidity. Moreover, the inspection machine is ordinarily required to inspect upwards of 120 bottles per minute and to detect particles having a diameter of as little as two millimeters without causing false rejections in excess of one-half of one per cent of the bottles inspected.

In order to achieve the required speed of inspection while maintaining desired sensitivity, the rotational movement of the bottles about the perimeter of the turret—as distinct from their spinning motion about their own axes—is not stopped during inspection. In addition to the photocells, the swing arm 22 bears a light source and lenses for producing the inspection beam and moves in perfect step with the bottle during inspection. It then swings back rapidly to inspect the succeeding bottle. To avoid an excessive number of false rejections, it is essential that the bottle shall be perfectly motionless with respect to the inspecting light beam. During a period of one-half second the arm 22 must swing back, reduce the spinning motion of the bottle from about 1700 revolutions per minute to zero, and travel with the bottle holding it perfectly motionless with respect to the light beam during inspection, before swinging back again to pick up the next bottle. The portion of the aforementioned period of one-half second allotted to braking must be as short as possible, so that the larger particles should not have time to settle at the bottom of the bottle, and so as to allow adequate time for inspection.

It has hitherto been the practice to brake the

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spinning motion of the bottle to be inspected by means of a braking device which was forced into the sheave or groove 24 of the pulley 18 under each bottle cup 12. Under the conditions mentioned above, the brake wore out very rapidly and it was difficult to achieve the necessary speed and accuracy of braking with a minimum of vibration and rolling.

According to the invention each pulley 18 is provided with a separate braking surface 26. This may be constituted by a member 28 of brake lining or other suitable friction material secured to the lower face 30 of each pulley, as for example by rivets, glue or the like. The member 28 may take the form of a disk having a central aperture to receive the lower end 78 of the spindle 16.

The brake itself—as distinct from the separate braking surfaces on the lower face of each spinning pulley—includes a pair of brake shoes 34 and 36 mounted by means of springs on a bracket 44 extending from the swing arm 22. The brake shoes may be of any appropriate material, say, cast iron or steel. The twenty spinning pulleys are slightly spaced from each other in a horizontal plane, and the upper surface of the brake shoes is on a slightly higher level than the braking surface 26. However, the forward edges 54 of each shoe are inclined, as shown at 46, so that on each return stroke of the swing arm the shoes slip under the member 28 and into confronting relation with the braking surface 26.

A block 48 is mounted on bearings 50 which are held in supports 52 located towards the front of the brake and extending upwardly from the bracket 44. The block is provided with shafts or pins 56 and 58 which are disposed at right angles to each other; the block thus constitutes a universal joint. A vertical spring 38 supports the brake shoe 34 and a vertical spring 40 similarly supports the brake shoe 36. Each of these springs is located towards the forward end of the shoe which it supports. The lower ends of the two springs rest on arms 60 of bell cranks 62 pivoted on the shaft 56 at either side thereof. At their forward ends the bell cranks 62 are pivotally connected by pins 64 to links 66, which are in turn pivotally connected by pins 68 to the forward ends of the brake shoes 34 and 36, respectively.

An arm 70 is pivoted at its lower forward end on the shaft 56 of the universal joint. At its upper or rear end, it forms a yoke having a web 72 and uprights 74 pivotally connected by pins 76 to the rear of both brake shoes. A third vertical spring 42 rests on the bracket 44 and supports the web 72. It will thus be seen that each of the forward springs 38 and 40 is independently associated with the brake shoes 34 and 36, respectively, at their forward ends, while the rear spring 42 is connected to both of the brake shoes at the back. The combination of brake shoes and springs is interconnected by means of the arm 70 of the bell cranks 62 and links 66 at the universal joint 48, and permits freedom of movement about both shafts 56 and 58.

It would be quite impractical to construct the inspection machine to such precise tolerances that the braking surfaces 26 under each bottle cup would all be in precisely the same plane. Moreover, differential wearing of the braking surfaces and brake shoes, and of different parts of the same surface, enhance differences in the level

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of the various surfaces. The construction outlined, however, compensates for these differences. On each backward stroke of the swing arm, the brake shoes come into confronting relation with one of the braking surfaces. The two front springs apply different and independent forces to the front portion of the shoes with which they are respectively associated, while the rear spring 42 applies a common force at the back of the brake. No matter what the level of the braking surface, the brake shoes immediately adjust themselves to the proper height because of the freedom of movement permitted by the interconnecting universal joint and springs.

While the main braking force to stop the spinning motion is applied by the two front springs and the main function of the rear spring is to maintain the surface 26 in braking engagement with the shoes, it is the combination of these elements which produces beneficial results. The brake of the invention lasts much longer than those of the type used previously and effects a substantial reduction in vibration and, therefore, in false rejections.

Variations from the embodiment described within the scope of the invention will suggest themselves to those skilled in the art. For example, it is permissible to use more than two brake shoes, each with its own spring, and a common spring for all the shoes. More than one spring may be used at the back of the brake, if desired. The brake linings may be attached to the brake shoes instead of to the pulleys, or dispensed with entirely if sufficient braking friction can otherwise be secured. While the invention has been described in an application in which it is used to stop the spinning motion of the pulleys and of the bottles which they support, while permitting the continued movement of the bottles around the turret, it will be apparent that the invention is equally applicable to stop translatory as well as spinning motion.

There has thus been described a common brake for a plurality of movable objects, each provided with a braking surface. The brake consists of a plurality of brake shoes, each having separate spring means urging it into independent braking engagement with a braking surface, and spring means common to all the shoes for imparting to them all a common braking force. The various parts of the brake are interconnected by a universal joint permitting freedom of movement about at least two axes and thereby compensating for variations in placement of the different braking surfaces.

I claim as my invention:

1. A brake for a plurality of movable objects, each provided with a braking surface which may be misaligned with corresponding surfaces of others of said objects, said brake comprising a pair of brake shoes, a support for said shoes, means for moving said support relatively to said objects to bring said shoes into confronting relationship with each of said surfaces successively, springs independently associated with each of said shoes and arranged to urge each of said shoes into braking engagement with the surface confronting it independently of the other of said shoes, further springs common to and associated with both of said shoes and arranged to urge both of said shoes into common braking engagement with said surface, and means including a universal joint interconnecting said springs whereby to compensate for variations in placement of said surfaces.

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2. A brake according to claim 1 wherein the forward edge of said shoes is inclined.

3. A braking arrangement for a plurality of movable objects comprising members having braking surfaces secured to each of said objects, a plurality of brake shoes, means for bringing said shoes into confronting relation with one of said surfaces, spring means for urging each of said shoes into braking engagement with said surface independently of the other of said shoes, further spring means associated with all of said shoes for urging all of said shoes into common braking engagement with said surface, means connecting said shoes and adapted to permit freedom of movement thereof about at least two axes, and means for repeating said braking action with respect to each of the others of said surfaces successively.

4. A brake for a movable object comprising a member secured to said object and having a braking surface, a plurality of brake shoes, a support for said shoes, means for moving said support to bring said shoes into confronting relation with said surface, spring means for bringing each of said shoes into braking engagement with said surface independently of the other shoes, further spring means for bringing all of said shoes into braking engagement with said surface, and means connecting said shoes, said connecting means being mounted to permit freedom of movement thereof about at least one axis.

5. A beverage inspection machine including a plurality of bottle supporting cups, pulleys connected to each of said cups to spin the same, brake linings secured to the face of each pulley, a pair of brake shoes, a swing arm constituting a support for said shoes and arranged to bring said shoes into confronting relation with each of said brake linings successively, springs independently associated with each of said shoes, and arranged to urge each of said shoes into braking engagement with the surface confronting it independently of the other of said shoes, a further spring common to and associated with both of said shoes and arranged to urge both of said shoes into common braking engagement with said surface, and means including a universal joint interconnecting said springs whereby to compensate for variations in placement of said surfaces.

6. A brake for a movable object having a brak-

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ing surface, said brake comprising a plurality of brake shoes arranged to confront said surface, means for urging said shoes in substantially the same direction into braking engagement with said surface, said means comprising spring means arranged to urge each of said shoes independently and further spring means arranged to urge all of said shoes into braking engagement with said surface, said shoes being mounted to permit freedom of movement thereof about at least one axis located in a plane substantially parallel to said surface.

7. A brake for a movable object provided with a braking surface, said brake comprising a plurality of brake shoes, a support for said shoes, means for moving said support relatively to said object to bring said shoes into confronting relationship with said surface, means for urging said shoes in substantially the same direction into braking engagement with said surface, said means comprising spring means arranged to urge each of said shoes independently and further spring means arranged to urge all of said shoes into braking engagement with said surface, said shoes being mounted to permit freedom of movement thereof about at least one axis.

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