March 26, 1963 S. M. MAUDE 3,082,886

CIRCLIP FEEDING MEANS

Filed June 16, 1960 2 Sheets-Sheet 1

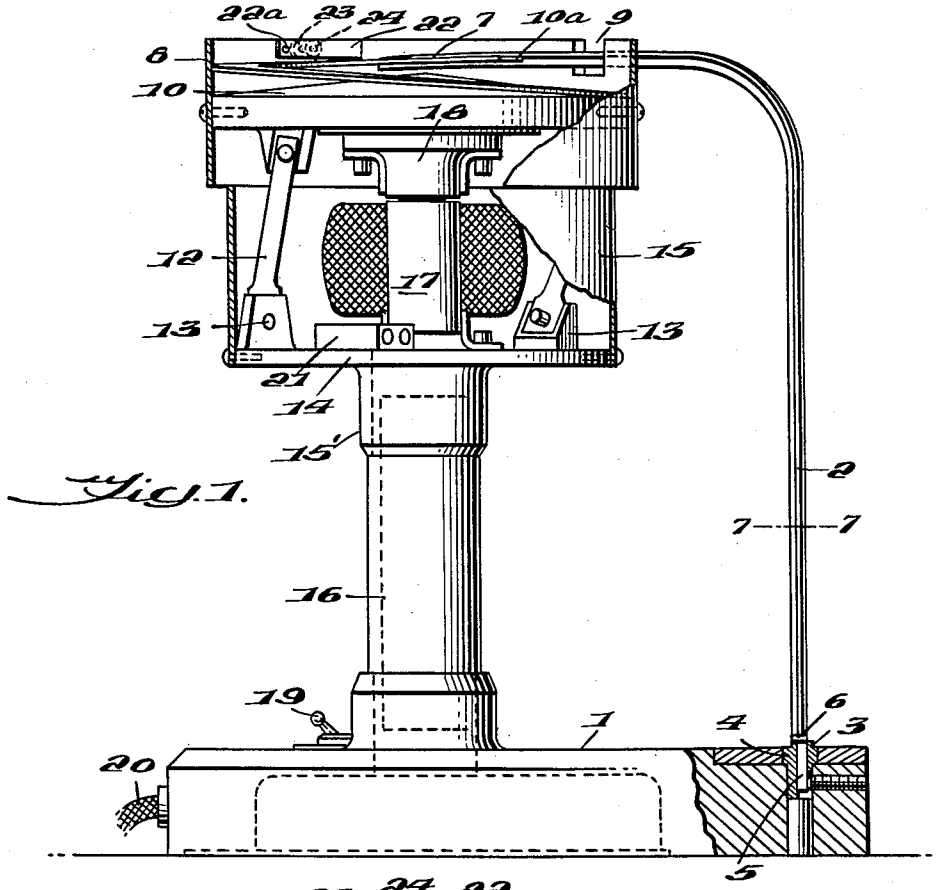


Fig. 1.

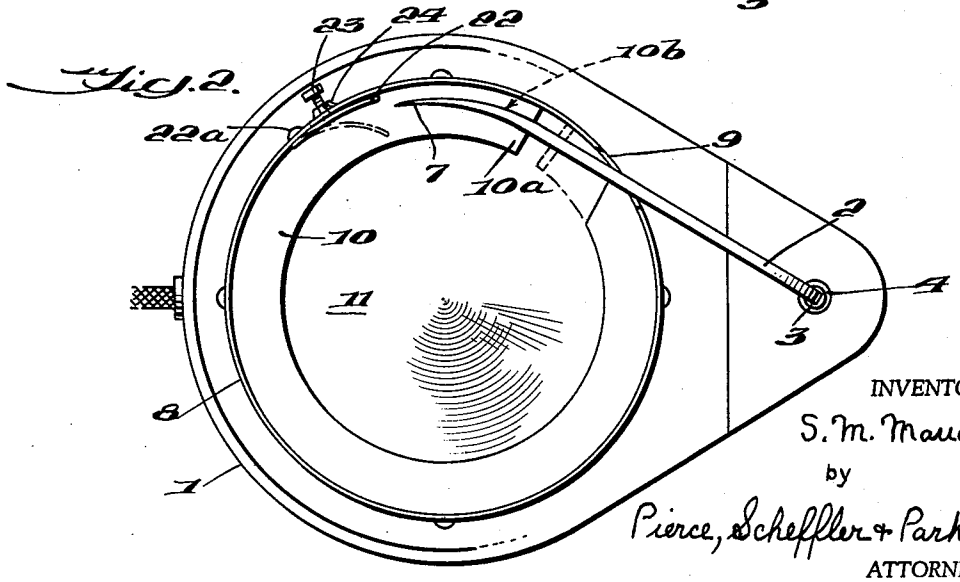


Fig. 2.

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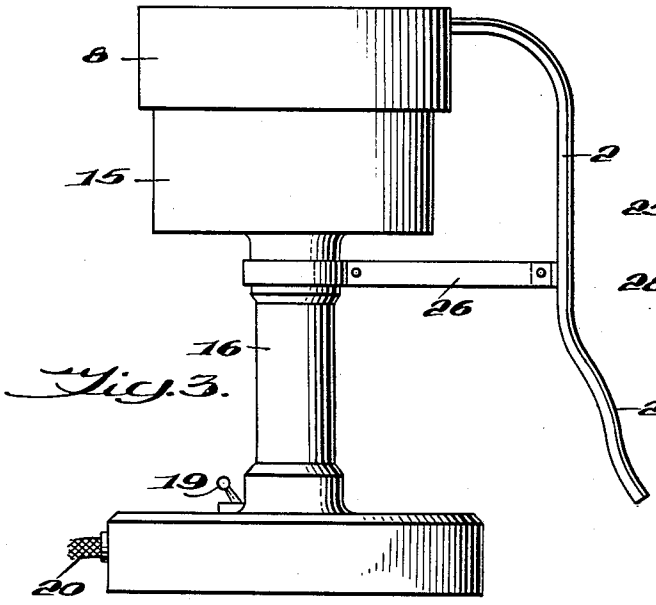


Fig. 3.

Fig. 4.

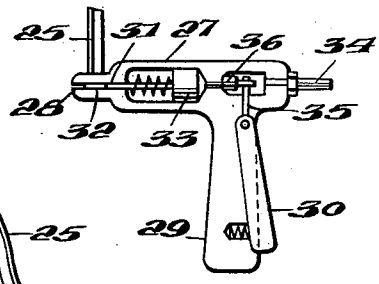


Fig. 5.

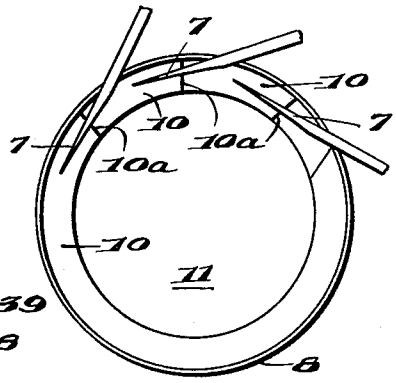


Fig. 6.

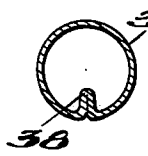


Fig. 7.

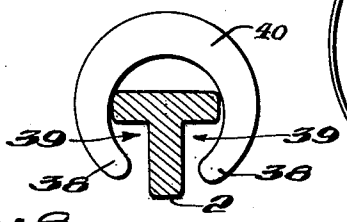


Fig. 8.

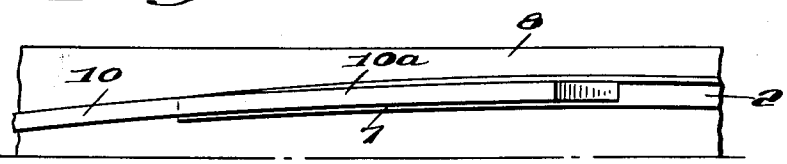
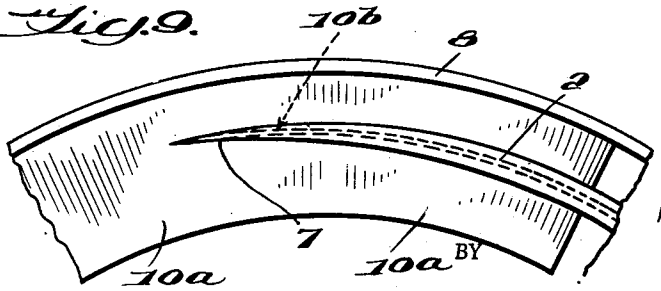


Fig. 9.



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3,082,886

CIRCLIP FEEDING MEANS

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6 Claims. (Cl. 214—8)

This invention relates to means for feeding circlips or other fixing devices (hereafter generally termed "circlips") in such a manner that single circlips can be withdrawn or fed from the feeding means in a rapid and easy manner.

In British Patent No. 821,955 and in my pending British application No. 16142/58 filed May 20, 1958, I have described means for holding circlips so that they can be readily positioned and fall by gravity to a dispensing point from which individual circlips can be withdrawn by means of a hand tool. In both the above cases the circlips are located on guide means which in effect form magazines for the circlips to gravitate to the dispensing point. In both instances it is intended that the circlips should be supplied on bars or like elements having a section complementary to the circlips.

The main object of the present invention is to provide an improved method of, and means for, feeding circlips.

Accordingly there is provided a method of feeding circlips to a dispensing point, consisting in locating a plurality of circlips freely in a container, causing said circlips to leave the container in single file and causing the circlips to follow a guide path in correct register by gravitation to a dispensing point from whence they may be withdrawn or fed successively at will.

The method may include the step of vibrating the container and causing the circlips to move in line to an outlet and then gravitate down a guide path. Alternatively, the method may include containing a plurality of circlips in a rotatable or other container and causing them to emerge singly to follow a guide path.

The invention also includes apparatus for feeding circlips to a dispensing point, comprising a container for loose circlips, means for causing the circlips to leave the container in single file, guide means in association with the container, and means for arresting the circlips at a point where they can be delivered singly from the guide means. The container may have vibrating means associated therewith to cause circlips to emerge in single file from the outlet on guide means. The container for circlips may be constructed to be rotated, oscillated or otherwise operated to cause the circlips to emerge in single file from an outlet and become located on the guide means.

The invention will now be more particularly described with reference to the accompanying drawings, in which:

FIG. 1 is a part sectional elevation of the improved apparatus for feeding circlips to a fixed dispensing point;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is an elevation of a modified form of apparatus with a flexible dispensing element;

FIG. 4 is a substantially diagrammatic view of a form of automatic dispensing tool;

FIG. 5 is a substantially diagrammatic plan view showing a circlip container with several leading-off guide bars;

FIG. 6 is a sectional view of a guide conduit for circlips;

FIG. 7 is a cross-sectional view of the guide bar on the line 7—7 of FIG. 1;

FIG. 8 is an enlarged, fragmentary elevational view of the associated ends of the guide bar and the guide track; and

FIG. 9 is an enlarged fragmentary plan view of the associated ends of the guide bar and the guide track.

In a particular embodiment of this invention shown in FIGS. 1 and 2, the apparatus for feeding loose circlips includes a base member 1 with which is associated a detachably mounted upright guide bar 2 which has a section complementary to the circlips so that they cannot rotate or be withdrawn therefrom laterally or at any angle to the bar length but on which they are sufficiently loose to gravitate downwardly from the upper end until they are arrested in superposed relation by the lowest circlip bearing on to a stop face 3 provided by a support block 4 secured in said base member 1. The end 5 of the bar 2 fits into the block 4. At the point 6 the guide bar is of a section that will allow single circlips to be withdrawn off the bar over the face 3 such as by a hand tool of known type. The bar 2 is curved inwardly at its upper end and then is straight and the section is tapered off to its inlet end 7 to a substantially knife edge as shown more clearly in FIG. 9.

Also supported on the aforesaid base member 1, or by some other structure, is a bowl-like container 8 which has an outlet 9 in its side wall in register with the top of the guide bar 2 and the container 8 is furnished on its inner face with an inwardly projecting spiral or part-helix guide track 10 which together with the guide bar 2 can be followed by circlips in line to the outlet 9 from the shallow cone shaped bottom 11. The upper delivery end 10*a* of the track 10 is in a substantially horizontal plane and is slotted at 10*b* to receive the horizontally disposed end 7 of the bar 2 as shown more clearly in FIG. 9. The bar end 7 projects slightly above the upper face of the track 10 with the bar upper edge providing an easy incline for circlips to move forwardly on to the bar as shown in FIG. 8.

The bowl-like container 8 including its bottom 11 is adapted to be vibrated to cause circlips resting on the bottom to move up the track 10 to the guide bar 2 and outlet 9.

Conveniently such container bottom 11 has a number of leaf springs 12 attached thereto and the opposite ends of the springs are secured to bosses 13 provided on the base plate 14 of the vibrator housing 15. This housing 15 has a mounting boss 15' fitted on to a column 16 which rises from the base 1. Within the housing 15 is mounted a vibrator unit 17 comprising an electrical A.C. coil having its core spaced slightly from a plate 18 secured to the underside of the bottom 11. Thus the unit 17 can be excited at will by manually operated (or automatic) switch means 19 inserted in the supply cable 20 leading to the terminal block 21. The arrangement is such that the container 8 will be vibrated to have a part rotary reciprocating action to create the desired movement of the container for any required period of time. In this manner loose circlips can be introduced into the container and caused to travel up the track 10 and emerge singly therefrom located on the guide bar 2 and gravitate down to the dispensing point 6. Thus circlips can be supplied to a user in bags or other containers and simply poured into the container 8 as required, or into a feed hopper supplying the container 8, and an operator can feed the loose circlips down the guide bar at will, and have a stack of circlips on the vertical part of the bar 2 for successive withdrawal. A leaf spring 22 is secured at one end to the inside of the housing 8, as by rivet 22*a*, and is adjustable by screw 23 having a lock nut 24 to any extended position over the track 10 up to the position shown in broken lines in FIG. 2. The spring 22 forms a peripheral guide for circlips to assist them in registering one at a time with the end 7 of the bar 2. The spring 22 is positioned above the track 10 only sufficiently to permit the passage of a single circlip. If two or more

superposed circlips should approach the end 7 only the bottom one will clear the spring 22 and the others will be deflected off of the track.

The above unit may be modified to suit requirements and, as shown in FIG. 3, in some instances the rigid guide bar 2 may be cut short so that there is only a rigid part for first receiving circlips and then a flexible guide element 25 may be secured, say by a bracket 26, with one end in register with the bar 2. Such flexible element can terminate in a dispensing end located at a fixed withdrawal point as disclosed in FIGS. 1 and 2 or be otherwise arranged for the supply of circlips to a delivery point. An arrangement of this type would enable the flexible element 25 to have its delivery end moved to different positions.

A further arrangement is necessary if it is desired to take circlips to a work position and not use a hand tool for withdrawal purposes. For example, in some cases a desired location for the circlips is inaccessible for withdrawal by a hand instrument and in other instances it is desirable to fix circlips to a part of machinery, an assembly, or other means, where it is desirable to locate circlips by means such as a mechanical, pneumatic or hydraulic tool. In such an instance, again a flexible element 25 can be employed and connected to a gun 27, such as is illustrated in FIG. 4. Circlips can be delivered into the nozzle part 28 of the gun 27 which is furnished with a gripping handle 29 embodying an operating trigger 30. A plunger 31 is positioned in the gun to lie immediately behind a circlip 32 delivered into the gun nozzle and this plunger is operated by piston 33 which can be operated pneumatically or hydraulically by pressurised fluid in supply pipe 34. To control the operation, the trigger 30 can be pivoted and furnished with a finger 35 controlling a valve 36 which will admit the pressurised fluid behind the piston 33 for thrusting the plunger 31 forwardly and thus the circlip into a desired location. Circlips will automatically gravitate down to the delivery position.

The plunger can be spring returned or the fluid pressure be arranged to normally act on the front face of the piston and operation of the valve cause the pressure to be applied to the rear of the piston. This arrangement would be suitable for pneumatic means where the pressurised air in front of the piston could be exhausted to atmosphere each time a circlip is ejected.

It will be understood that one container 8 may be adapted to deliver to more than one point and such an arrangement is shown in FIG. 5, wherein three guide bar receiving ends 7 are shown in successive arrangement leading from a single container. It will be understood that a separate guide track 10 is required for delivering to each bar end 7 so that circlips will pass up one track to become located on the first bar end 7 and other circlips will pass along their own guide tracks 10 to each of the other bar ends 7. Any circlips which fail to register with the bar ends will automatically fall off the ends 10*a* of the guide track.

In some cases it may be policy to use a rigid and/or flexible conduit as the guide means for the circlips from about the point 9 outwardly to the point of dispensing, in place of this portion of the bar 2. One type of conduit is shown in section in FIG. 6 where a conduit 37 has an inwardly projecting rib 38 to register the circlips. Alternatively, a guide bar, such as bar 2, may be located in a plain conduit. The purpose of having the conduit 37 is so that the circlips will be totally enclosed and thereby dust and other particles will be prevented from adhering to them. FIG. 7 shows a circlip 40 positioned on the bar 2 with its jaws 38, 38 positioned in the guide grooves 39, 39 of the bar 2.

It will be understood that other fixing devices, other than circlips, may be dispensed from the container in the above manner, it being understood that such devices are of a type that can be fed along a guide bar or element without rotation and capable only of delivery or movement off the bar or element at a predetermined delivery point.

Instead of using a vibrated container other forms of containers may be employed which can be adapted to cause loose circlips to pass therefrom singly to the guide means and gravitate to the dispensing point. Such a container may be a rotary or part-rotary, e.g. oscillated, device or include such means therein or be of other known construction. Moreover, vibrating means may be provided by a small electric motor to given mechanical vibration or may be an out-of-balance motor of known type for causing vibrations.

What I claim is:

1. Apparatus for feeding and orienting circlips and other devices having a substantially flat annular body with a circumferential gap therein forming a pair of spaced jaws, said apparatus comprising a substantially vertically disposed bowl mounted for vibratory movement, means for vibrating said bowl, a helical ramp extending around the sidewall of said bowl and upwardly from the bottom thereof to a location adjacent to the upper edge thereof, said ramp terminating at its upper end at an edge extending transversely thereof within said bowl whereby unoriented circlips are returned to said bowl, a guide bar having a horizontal portion of upright T-shaped cross section extending through an opening in the side wall of said bowl into said bowl, the inner free end of said guide bar being tapered to substantially a point contact with said edge of said ramp whereby the closed portions of circlips traveling on said ramp may override the tapered end of said guide bar and said tapered end of said guide bar may enter the gaps in the circlips, the horizontal part of said T-shaped cross section of the untapered portion of said guide bar being wider than the gaps in the circlips, and a deflector positioned over said ramp and upstream with respect to said point contact of said guide bar with said ramp, said deflector permitting movement of only a single layer of circlips from said ramp on to said tapered end of said guide bar.

2. Apparatus as defined in claim 1 in which said guide bar has a downwardly extending portion outside of said bowl of T-shaped cross-section.

3. Apparatus as defined in claim 1 in which said guide bar has a downwardly extending tubular portion outside of said bowl, said tubular portion having an inwardly extending ridge adapted to fit into the gaps in the circlips and hold them in alinement.

4. Apparatus as defined in claim 1 in which said deflector is a leaf spring attached at one end to the side wall of said bowl, said apparatus comprising means secured to the side wall of said bowl for adjusting the free end of said spring over said ramp.

5. Apparatus as defined in claim 1 comprising a plurality of vertically spaced apart parallel ramps and a plurality of guide bars mounted for cooperation therewith.

6. Apparatus as defined in claim 1 in which said guide bar has a downwardly extending portion outside of said bowl, said apparatus comprising a horizontally disposed fixed plate positioned at the lower end of said downwardly extending portion of said guide bar, said guide bar having a groove therein adjacent to said plate permitting the removal of circlips from said guide bar.

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