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R. E. RUNDELL

2,353,189

RESPOTTER MECHANISM

Original Filed Oct. 16, 1940

2 Sheets-Sheet 1

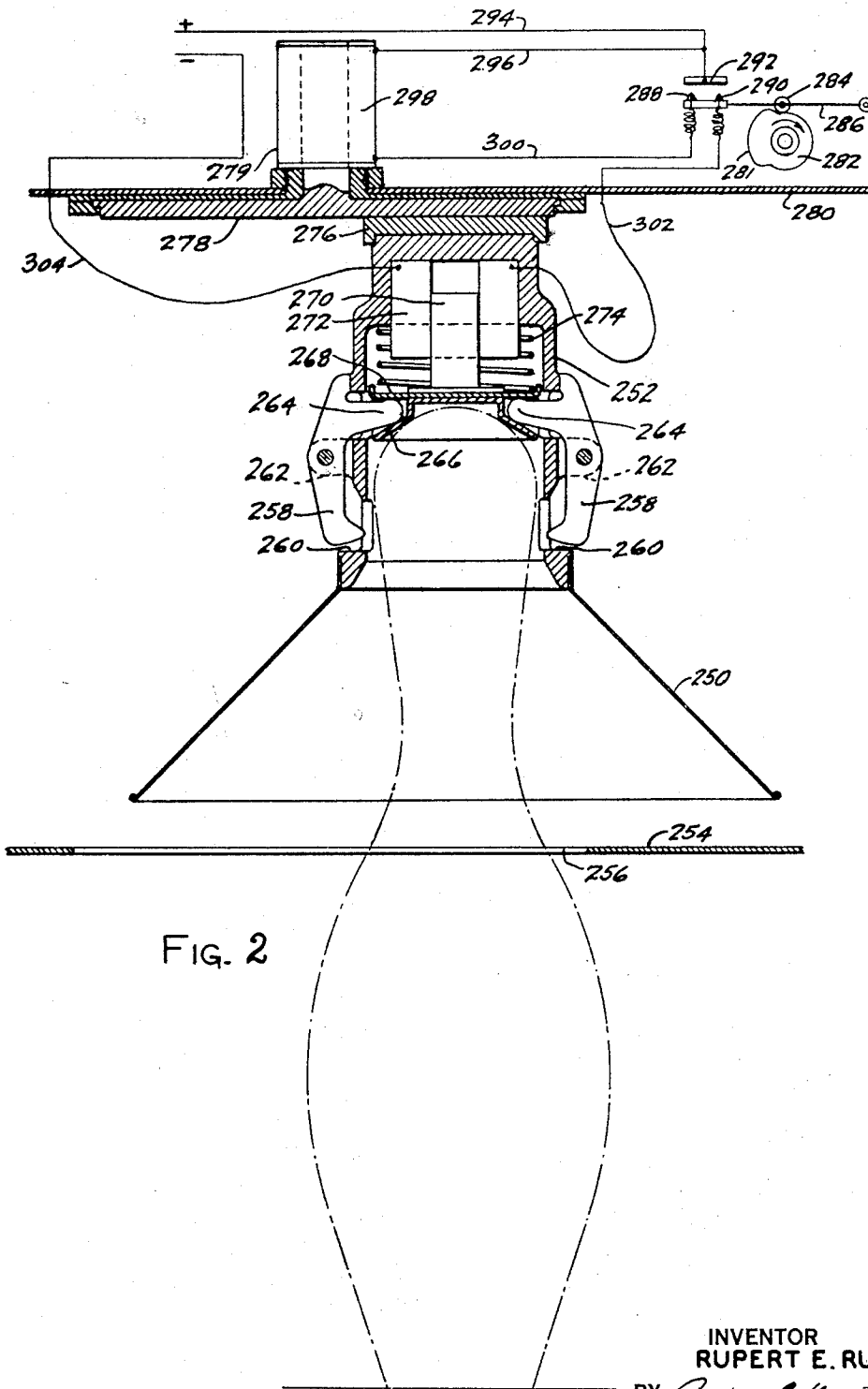


FIG. 2

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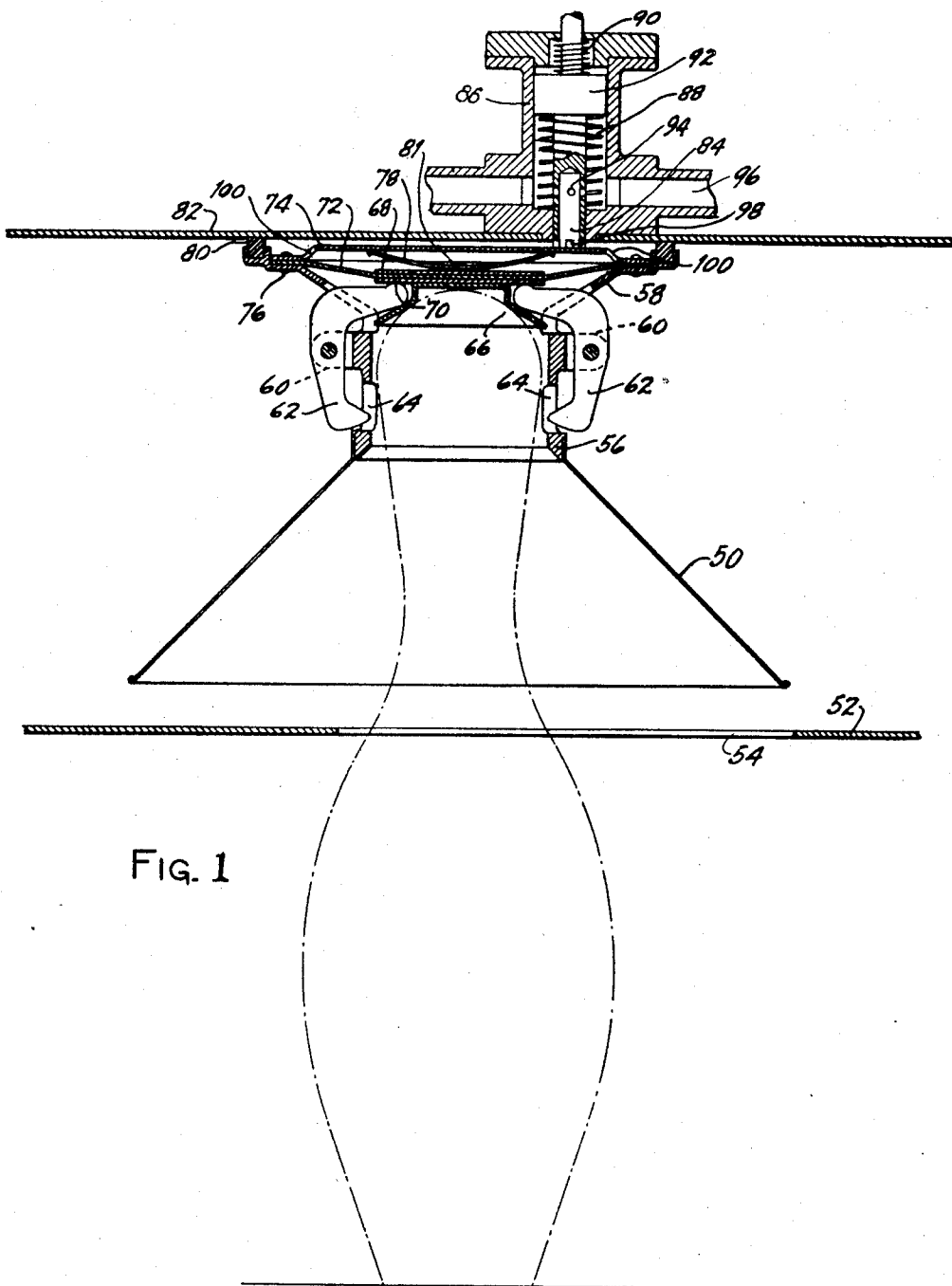


FIG. 1

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2,353,189

RESPOTTER MECHANISM

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Original application October 16, 1940, Serial No. 361,371. Divided and this application December 8, 1942, Serial No. 468,207

13 Claims. (Cl. 273—42)

This invention relates to bowling pin setters of the type having a respotter device for picking up the standing pins after a ball is thrown to permit removal of the fallen pins, more particularly to the pin holders thereof.

This application is a division of my application, S. N. 361,371, filed Oct. 16, 1940, now Patent 2,310,996 granted Feb. 16, 1943.

Still another object is to provide the pin holders of the respotting device, which may consist of cups or receptacles mounted on the carrier and arranged to engage the head ends of standing pins following the throwing of the ball and elevate the same to permit sweeping of the fallen pins into the pit of the alley, with diaphragms which control the operation of grippers for gripping the standing pins. In this connection a further object is to provide for suction actuation of the diaphragm of each cup, which may be free to move horizontally upon engaging an off-spot pin to center itself with respect to the same, at any position to which the cups may be displaced by engagement with the heads of off-spot pins.

The grippers of the respotter may be actuated electromagnetically, and it is a further object to provide electromagnetic devices for this purpose. The cups of the respotter, which may be free to move upwardly upon engaging the head ends of the pins upon the alley during the descent of the carrier and are displaced horizontally by engagement with the heads of off-spot pins, are maintained in elevated position by an electromagnet which is energized while the grippers are being actuated to grip the pins through the agency of a solenoid.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations hereinafter fully described and then specifically set forth in the claim hereunto appended.

In the accompanying drawings which form a part of this specification and in which like characters of reference indicate the same or like parts:

Fig. 1 is a vertical section of one of the pin holders or cups of the respotter having its funnel in engagement with an off-spot pin; and

Fig. 2 is a sectional view of a modified form of respotter cup having its funnel in engagement with an off-spot pin and equipped with a solenoid for actuating the grippers and an electromagnet for retaining the cup in the elevated position to which it is lifted by engagement with the head end of a standing pin.

Referring to Fig. 1, wherein is shown one of a series of cups or receptacles of the respotter, each of the cups has a funnel 50 normally resting upon a lower support or plate 52 which is supported from the carrier and suitably perforated at 54 to admit the head end of the standing pins during the lowering of the carrier following the throwing of a ball. The funnel 50 is fastened to a base member 56 which has a suitable flange 58 and lugs 60 in which are pivotally mounted the grippers 62. The jaws of the grippers are arranged to enter the perforations 64 in the base member 56 and grip the head end of the pin. The other ends of the grippers are disposed within slots in the flange 58 and engage an abutment member 66 which is fastened, together with disks 68 and 70, to a flexible diaphragm 72 which may be formed of rubber, Neoprene, canvas or other suitable impervious material. The rim of the diaphragm is secured between the flange 58 and a cover 74 by suitable rivets 76. A leaf spring 78, which is connected at its mid section to the diaphragm by a rivet 81 passing through the disks 68, 70 and the diaphragm, has its ends disposed in engagement with the cover member 74 and is thereby suitably stressed to urge the grippers into open position for admission of the head end of a pin. At the margin of the flanged member 58 there is provided a circular sealing ring 80 which is arranged to engage the plate 82 when the cup is elevated by a standing pin. It may be noted that the members 52 and 82 are fastened to a carrier in the manner shown in the patent to G. J. Schmidt, No. 2,217,709, issued October 15, 1940, whereby each of the cups is supported by the carrier in position to engage and to be elevated by a standing pin to bring its sealing ring 80 into engagement with a member 82. It will be noted that the funnel normally rests on the member 52 and has a limited horizontal movement thereon whereby the pocket will be centered with respect to off-spot pins on the bed of a bowling alley by engagement of the funnel 50 with the standing pin during the descent of carrier. When the sealing ring engages the member 82 it provides in effect a suction chamber above the cover 74. A plunger 84, which has a sliding air tight fit in a casing 86, fastened to the member 82 normally projects into engagement with the cover 74 and is pressed upwardly during the descent of the carrier with the members 52 and 82 thereon, whenever the cup engages a standing pin. Normally, the member 84 is maintained in a position projecting from the casing 86, by balanced springs 88 and 90 engaging

a collar 82 fastened on the member 84 whereby holes 94 in the tubular portion at the lower end of the latter are held in a position in which they are closed by the casing 86. When the member 84 is pressed upwardly, the holes communicate with a duct 96 in the casing 86 and the notches 98 in the lower end of member 84 permits the application of suction through the perforations 100 in the cover 74 to the diaphragm whereby atmospheric pressure on the exterior face of the diaphragm urges it upwardly and thereby closes the grippers 62 upon the head end of the pin. Since the construction of the plunger 84 and casing 86 and the mechanism for applying suction thereto is similar to that shown in the patent to G. J. Schmidt, No. 2,217,709, referred to above, further description is deemed unnecessary except to note that with the construction just described, suction will be applied to the diaphragm in any position to which the funnel or hood 50 may be displaced by engagement with an off-center or off-spot pin on the bowling alley.

Referring to Fig. 2, the hood 250, which is one of a series of ten or any other desired number corresponding to the number of bowling pins upon the bed of the alley, is fastened to a cup 252, and the hood normally rests on a bottom plate 254 having a perforation 256 which admits the head end of a standing bowling pin on the alley. The cup 252 is provided with grippers 258 which are movable through slots 260 into engagement with the head end of a pin within the cup. The grippers are pivoted upon lugs 262 and are provided with tails 264 which project into engagement with a cup shaped member 266 which has a downwardly bent flange underlying the tails 264. Member 266 and plate 268, the latter overlying the tails 264 of the grippers are fastened to the core 270 of a solenoid 272 arranged within the base of the cup. A spring 274 engaging the plate 268 urges the solenoid core downwardly and thereby rocks the grippers into open position through the engagement of the plate 268 and the member 266 with the tails 264 of the grippers. The funnel 250 normally rests on the member 254 and has a limited horizontal movement thereon to permit displacement of the funnel and its cup into centered relationship to an off-spot bowling pin which it is shown engaging in Fig. 1 upon the bed of the alley. The funnel or hood 250 and its cup are also free to move vertically off the plate 254 upon engaging the head end of a standing bowling pin on the alley during the descent of the carrier upon which the plate 254 is supported in a manner similar to that shown in the patent to G. J. Schmidt, No. 2,217,709. As the carrier descends the pin engages the member 266 and thus raises the cup until the steel plate 276 at its upper end is brought into contact with the core 278 of the electromagnet 279. The electro-magnet 279 and its core 278 are supported on the plate 280 fastened together with the plate 254 to the carrier, in the manner shown in Patent No. 2,217,709, referred to above. At this time the raised lobe 281 on a cam 282 which is suitably driven in timed relationship to the operation of the carrier, engages the cam follower 284 on the contact member 286 and raises the contacts 288 and 290, which are carried thereon and insulated from each other, into engagement with a contact 292. A supply line or main 294 connected to a suitable source of current, is connected to contact 292 and has a lead 296 connected in parallel to the winding of the electro-

magnet 288 which is connected by lead 300 to the contact 288. The contact 288 is connected to one end of the winding of the solenoid 272 by a lead 302 and the other end of the solenoid winding is connected to the line 304 which is connected like main 294 to the source of current. Thus the grippers are closed upon the head end of the pin and the plate 276 of the cup is retained electromagnetically on the core 278 of the electro-magnet while the pins are raised off the alley to permit the sweeping of the fallen pins. The cam lobe 281 maintains the contacts 288 and 290 in engagement with the contact 292 until the table again descends and deposits the pins once more upon the bed of the alley, at which time the cam follower 284 rides off the cam lobe and the grippers are opened and the plate 276 is released from the electromagnet core 278. The funnel 250 then re-engages the plate 254 when the carrier then again ascends.

In addition to the materials mentioned above as suitable for the diaphragm, leather or corrugated metal may be used. It may be noted that besides preventing rubbing of the diaphragm by the grippers, the plate 70 shown in Fig. 1 assures uniform movement of the grippers into engagement with the pin. If the grippers directly engaged the diaphragm unequal movement thereof might result if any of the portions engaging the grippers should collapse while closing the grippers. The plate 68 shown in Fig. 1 may be made much smaller than the plate 70 if desired, without affecting the operation of the grippers.

What is claimed is:

1. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers on said funnel adapted to grip a bowling pin within said funnel, and means for actuating said grippers to grip the end of a bowling pin within said funnel.

2. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers on said funnel adapted to grip a bowling pin within said funnel, means for actuating said grippers to grip the end of a bowling pin within said funnel, said means including a flexible diaphragm engaging said grippers, a spring urging said diaphragm into position to open said grippers, and a suction chamber behind said diaphragm adapted to move said diaphragm into position to close said grippers and grip the bowling pin upon application of suction to said chamber.

3. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers on said funnel adapted to grip a bowling pin within said funnel, means for actuating said grippers to grip the end of a bowling pin within said funnel, said means including a member engaging said grippers, and a solenoid having a core connected to said member and adapted to displace said member sufficiently upon ener-

gization of the solenoid to close said grippers and thereby grip the pin within said funnel.

4. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers on said funnel adapted to grip a bowling pin within said funnel, means for actuating said grippers to grip the end of a bowling pin within said funnel, said funnel being yieldable vertically upon engagement with the handle end of a pin upon an alley.

5. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers on said funnel adapted to grip a bowling pin within said funnel, means for actuating said grippers to grip the end of a bowling pin within said funnel, and said means including a yielding member arranged to engage the end of a pin upon the alley and adapted to close said grippers upon said pin.

6. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers carried by said funnel and adapted to grip a bowling pin within said funnel, and a solenoid controlling the operation of said grippers when energized.

7. In a bowling pin setter, the combination with a support, of a funnel mounted on said support and having a limited horizontal movement thereon permitting the same to be displaced by contact with an off-spot bowling pin on the bed of an alley into centered relationship therewith, grippers carried by said funnel and adapted to grip a bowling pin within said funnel, a solenoid controlling the operation of said grippers when energized, said funnel being elevated vertically upon contacting the head of a bowling pin upon an alley, and an electromagnet for maintaining said funnel in its elevated position.

8. In a bowling pin setter, the combination with bowling pin gripper mechanism, of a support for said gripper mechanism having a limited horizontal movement and adapted to engage a standing pin on the bowling alley and be displaced by contact with an off-spot bowling pin on the alley to move said gripper mechanism into centered relationship with the off-spot bowling pin, and means arranged externally of said support for actuating said gripper mechanism

at any displaced or undisplaced position of said support.

9. In a bowling pin setter, the combination with bowling pin gripper mechanism, of a support for said gripper mechanism having a limited horizontal movement and adapted to engage a standing pin on the bowling alley and be displaced by contact with an off-spot bowling pin on the alley to move said gripper mechanism into centered relationship with the off-spot bowling pin, and means arranged externally of said support for actuating said gripper mechanism at any displaced or undisplaced position of said support, to grip the bowling pin.

10. In a bowling pin setter, the combination with bowling pin gripper mechanism, of a support for said gripper mechanism having a limited horizontal movement and adapted to engage a standing pin on the bowling alley and be displaced by contact with an off-spot bowling pin on the alley to move said gripper mechanism into centered relationship with the off-spot bowling pin, means arranged externally of said support for actuating said gripper mechanism at any displaced or undisplaced position of said support, to grip the bowling pin, and then release the same upon the bowling alley.

11. In a bowling pin setter, the combination with bowling pin gripper mechanism, of a support for said gripper mechanism having a limited horizontal movement and adapted to engage a standing pin on the bowling alley and be displaced by contact with an off-spot bowling pin on the alley to move said gripper mechanism into centered relationship with the off-spot bowling pin, and electromagnetic means for actuating said gripper mechanism at any displaced or undisplaced position of said support.

12. In a bowling pin setter, the combination with a receptacle having a limited horizontal movement and adapted to engage a standing pin on the bowling alley and be displaced by contact with an off-spot bowling pin on the alley, of a magnetizable member on said receptacle, an electromagnet arranged to engage said member at various positions of said receptacle, and mechanism for energizing said electromagnet to cause adhesion of said member to said electromagnet.

13. In a bowling pin setter, the combination with bowling pin gripper mechanism, of a support for said gripper mechanism having a limited horizontal movement and adapted to be displaced by contact with an off-spot bowling pin on the alley to move said gripper mechanism into centered relationship with the off-spot bowling pin, and fluid-actuated means for actuating said gripper mechanism at any displaced or undisplaced position of said support.

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