

Feb. 24, 1953

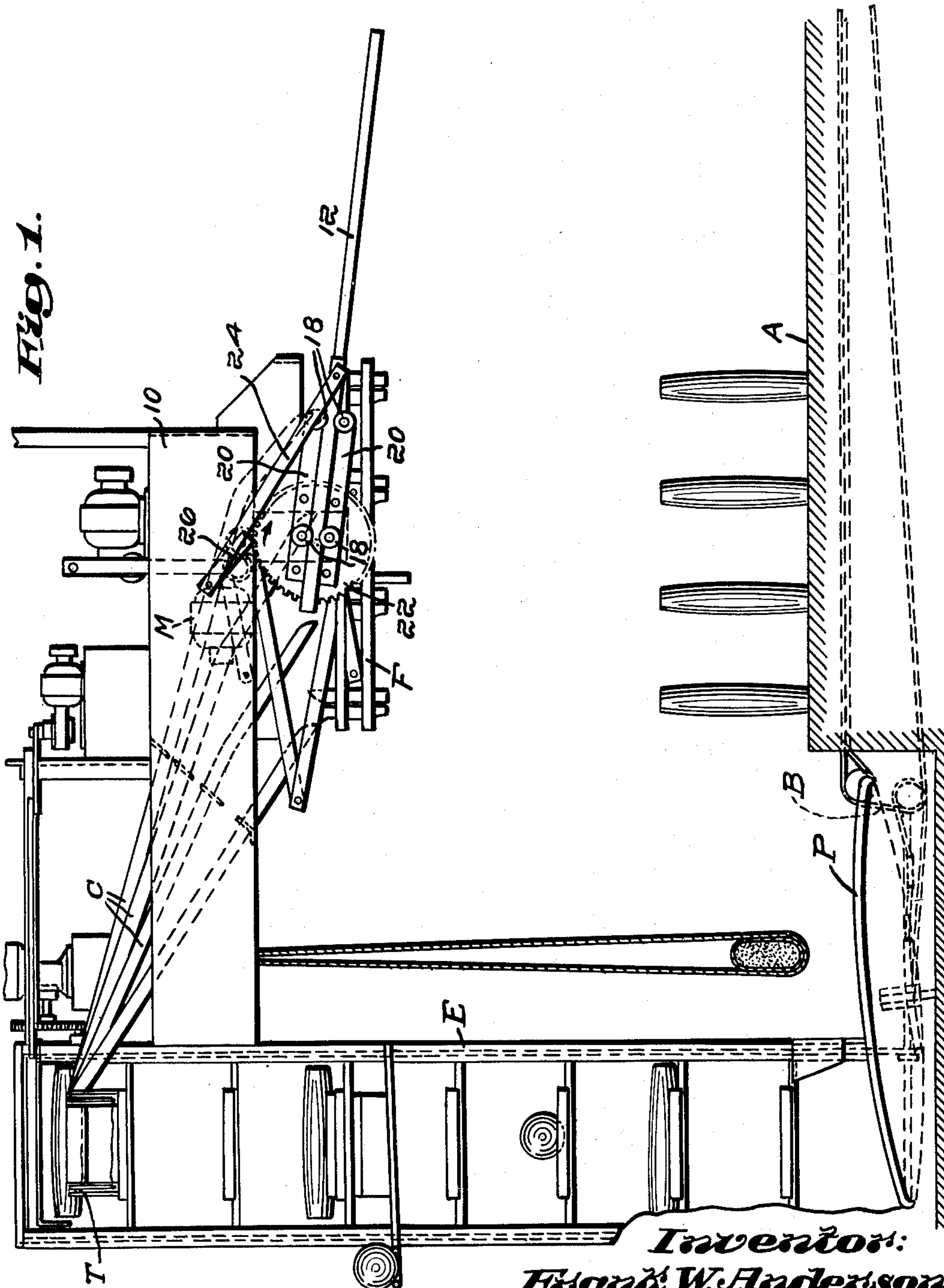
F. W. ANDERSON

2,629,595

ALLEY SWEEP

Filed Oct. 20, 1950

4 Sheets-Sheet 1



*Inventor:*

*Frank W. Anderson,*

*by Emory, Booth, Farnsland,  
Miller & Weidner*

*Attys*

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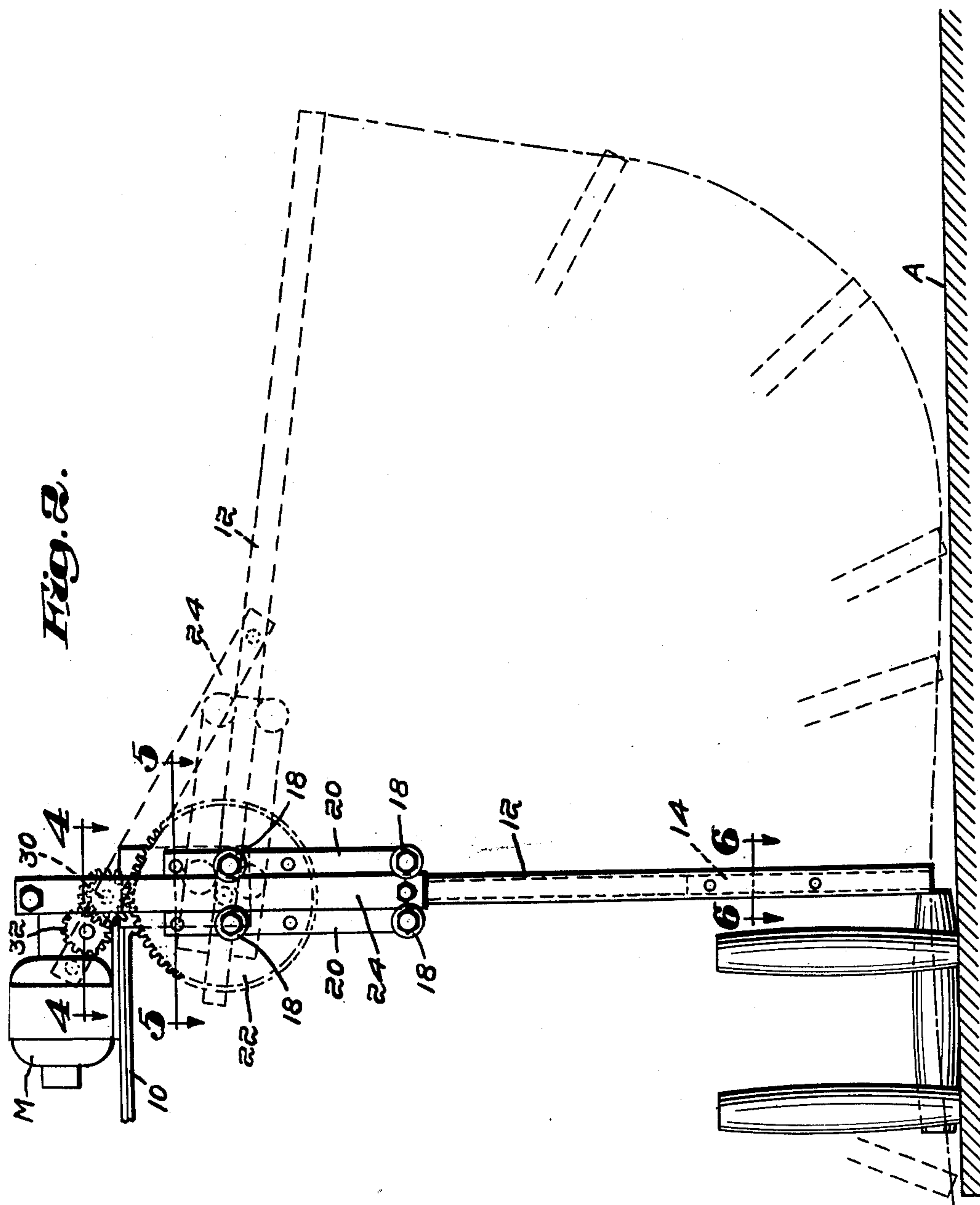
F. W. ANDERSON

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ALLEY SWEEP

Filed Oct. 20, 1950

4 Sheets-Sheet 2



**Inventor:**  
**Frank W. Anderson,**  
by *Emery Booth, Foreman*  
*Miller & Weidner, Attys*

Feb. 24, 1953

F. W. ANDERSON

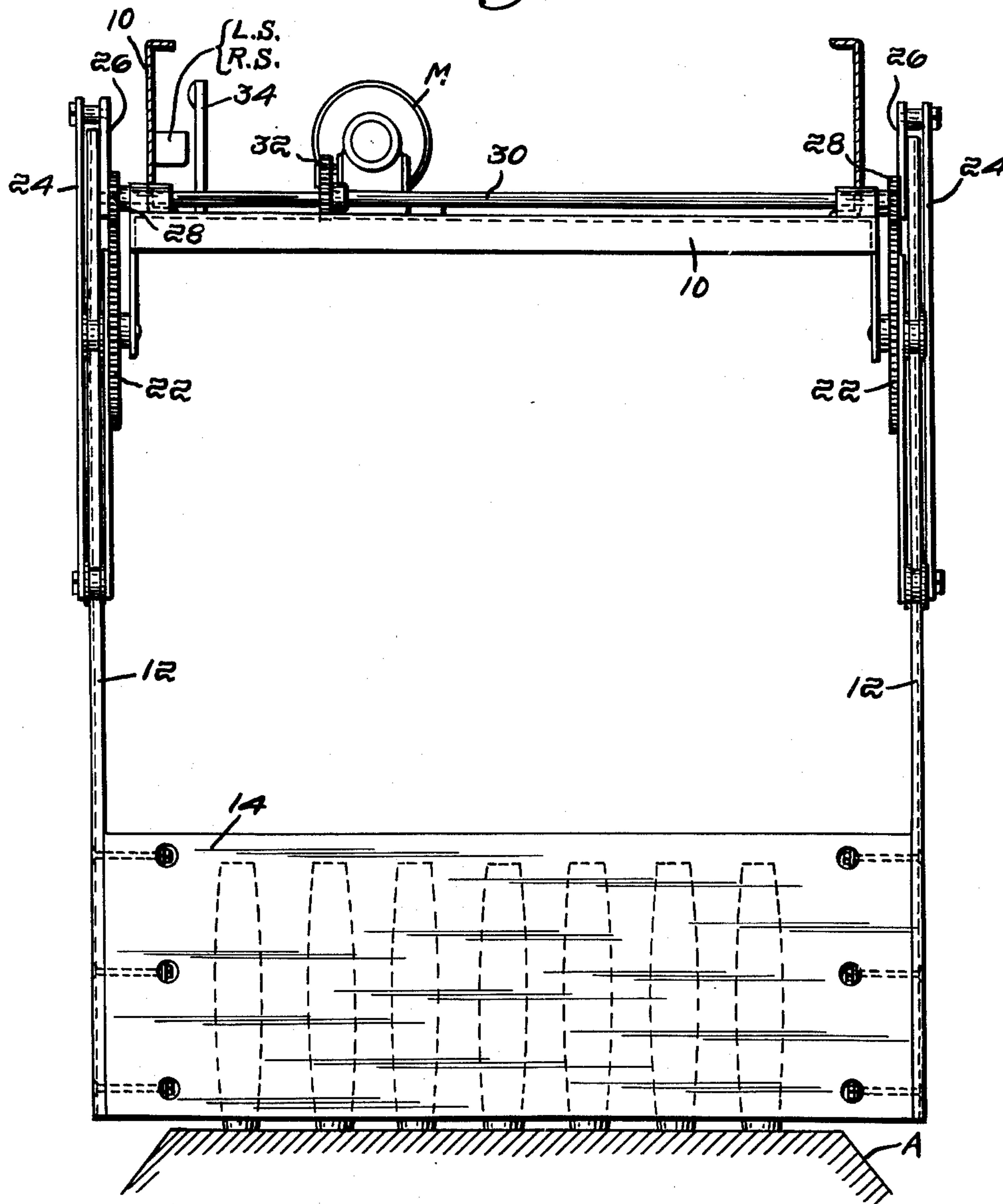
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ALLEY SWEEP

Filed Oct. 20, 1950

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*Fig. 3.*



*Inventor:*  
*Frank W. Anderson,*  
*By Emory, Booth, Townsend,*  
*Attorneys*

Feb. 24, 1953

F. W. ANDERSON

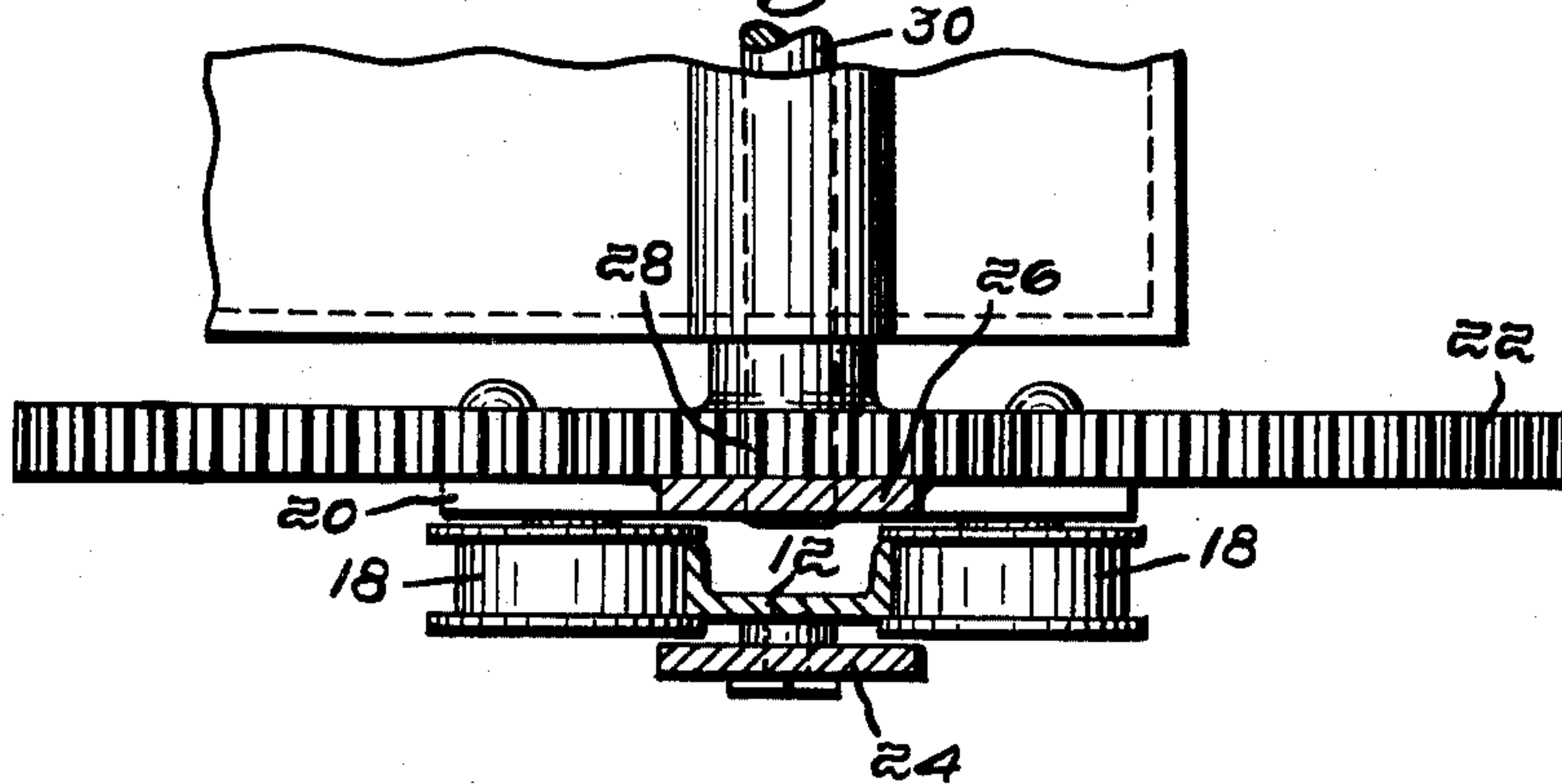
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ALLEY SWEEP

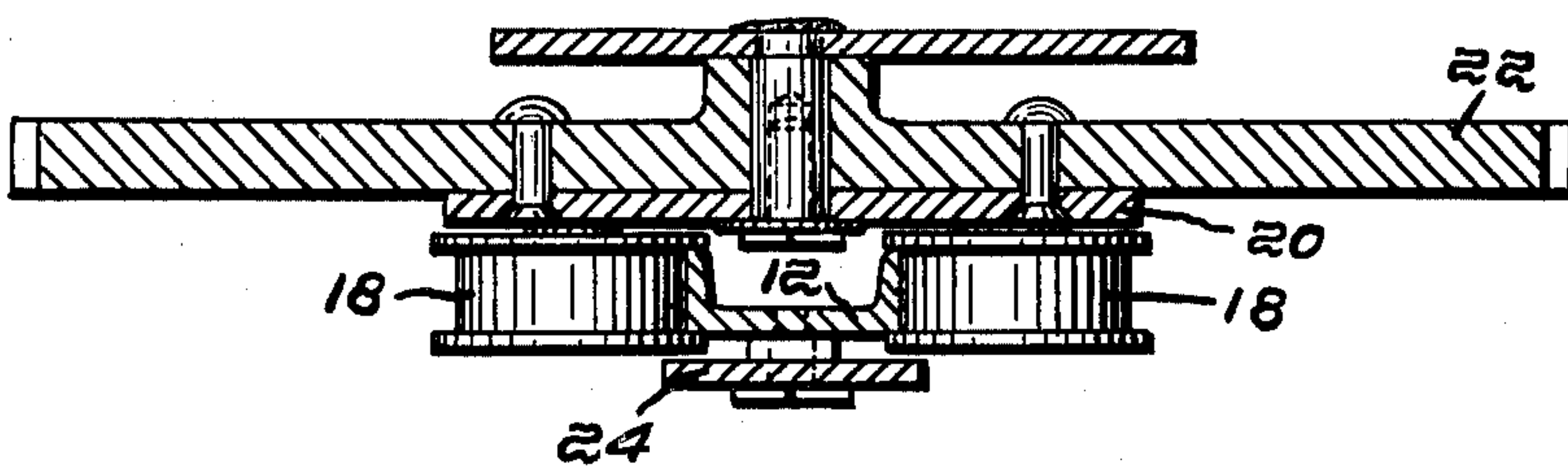
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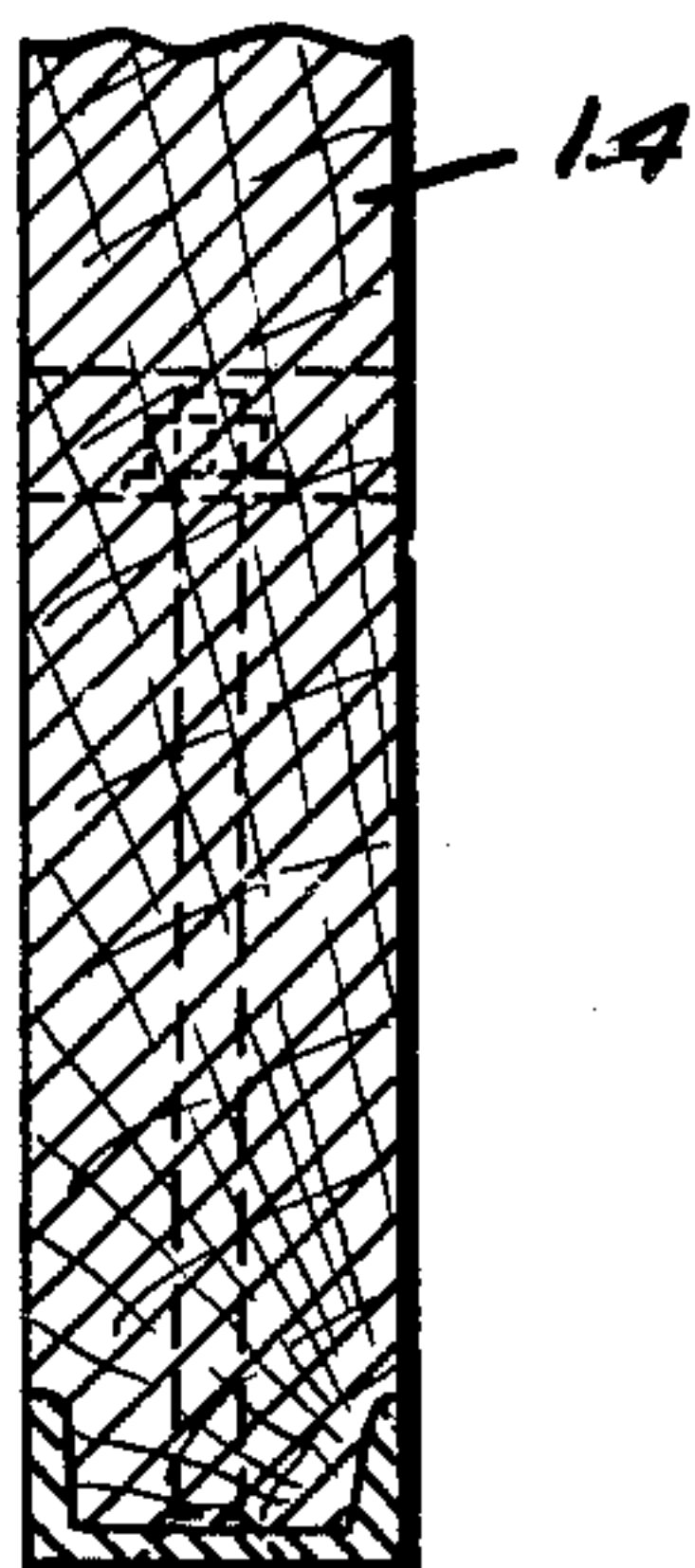
**Fig. 4.**



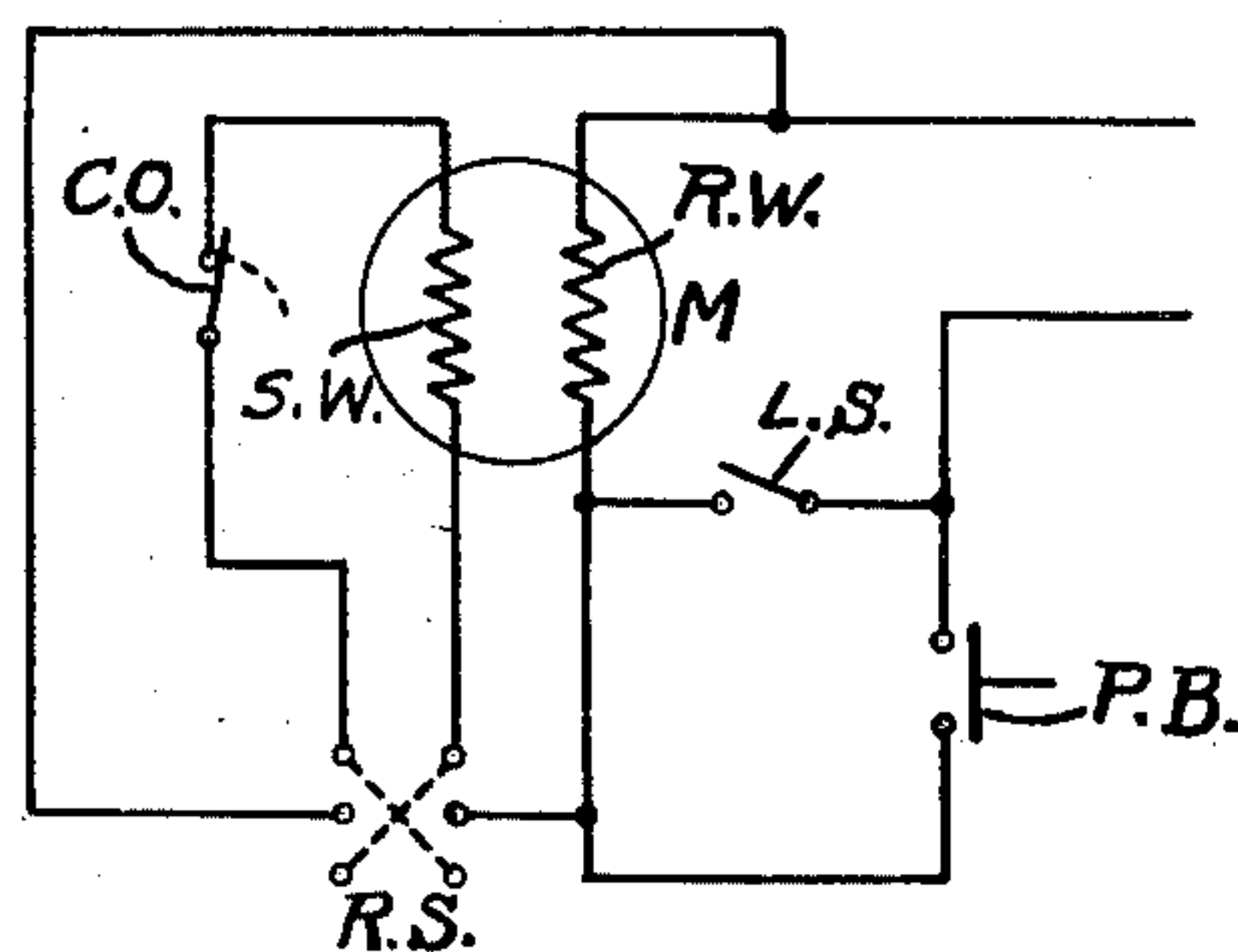
**Fig. 5.**



**Fig. 6.**



**Fig. 7.**



**Inventor:**

**Frank W. Anderson,**

*By* Emory Booth,  
Townsend, Miller, Alchick & Flagg



## UNITED STATES PATENT OFFICE

2,629,595

## ALLEY SWEEP

Frank W. Anderson, North Weymouth, Mass., assignor to Murphy Automatic Pinsetter Company, Inc., Somerville, Mass., a corporation of Massachusetts

Application October 20, 1950, Serial No. 191,298

4 Claims. (Cl. 273—54)

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This invention relates to a device for clearing a bowling alley of the pins remaining thereon at the end of the frame and discharging them to the pit. Such a device, adapted to be controlled from the head of the alley, would ordinarily be used and coordinated with other mechanisms comprising an automatic machine for handling the pins, such as those disclosed in my copending applications, Serial Nos. 133,385 and 133,386, and I have here illustrated in a general way in Fig. 1 elements of such a machine which are described more in detail in those applications.

The purpose of the invention is to provide such an alley clearing device or sweep which will be suspended from a suitable support over that portion of the alley on which the pins are placed, and which for convenience I shall herein refer to as the table, the support and the sweep proper being so arranged that there is no obstruction either at the front or the sides of the table or along the gutters at the sides of the alley, the sweep having a positively determined movement by driving devices which also provide for its mounting on the support in which movement it moves down from an overhead position, sweeps rearwardly along the table substantially parallel to the surface thereof to push the pins off into the pit and then returns to an elevated position of rest.

My invention will be well understood by the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation with parts in section showing the sweep in connection with other elements of an automatic pin handling machine, the sweep being elevated in its idle position;

Fig. 2 is a similar view on an enlarged scale simplified by the omission of parts and showing the sweep mechanism in another position;

Fig. 3 is a front elevation thereof;

Figs. 4, 5, and 6 are enlarged sections on the correspondingly numbered lines of Fig. 2; and Fig. 7 is a wiring diagram.

Referring now to Fig. 1 of the drawings, I there show in a general way the table of the alley A having the pins set up thereon, and at the rear of the table the pit P into which the pins are delivered from the gutters by belts B and from the table by the sweep to be described. In the pit is a suitable mechanism for delivering the pins one by one to the elevating conveyor E, which carries them to an overhead collecting rack or "tray" T, in which a set of ten pins is accumulated. At the proper time these are discharged through chutes C to a setter frame F which receives them in triangular array. To commence a new frame the setter frame F descends, releases its load of pins to the alley and retreats to the up position shown.

The setter frame F and the sweep which forms

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the subject matter of the present invention are carried by a support 10 cantilevered out over the table end of the alley, or otherwise supported in such manner that, as clearly seen in Fig. 1, the alley in the vicinity of the table, including the sides thereof, is unobstructed. Herein I shall term such a support an overhead support.

The sweep comprises two arms 12 depending from and supported at their other ends by combined supporting and driving mechanisms located on the support 10, and hereinafter to be more fully described, and a crossbar or sweep board 14 (see Fig. 3) extending between the lower ends of the arms. When the sweep is operating, the sweep board 14, at the distal ends of arms 12, descends from the position of Fig. 1 along a path indicated by the dot-and-dash line of Fig. 2, approaching closely to the alley in front of the position of the foremost pin, and then moves rearwardly over the table substantially parallel to its surface to the edge of the pit, as shown in the dotted position at the left in Fig. 2. The sweep then returns with an idle stroke to its former elevated position and in the embodiment of the invention here illustrated this return stroke is along the same path as the descending stroke, the driving mechanism being reversed. It may be pointed out here that the path referred to is predetermined by the supporting driving mechanism. The sweep is not guided by the alley or by the surfaces of the gutters, and it cannot become displaced by riding up over a pin and thus fail to sweep it into the pit.

The movement of the sweep is effected by two coordinated driving mechanisms and in the present instance we may conveniently refer to them as a reciprocating mechanism and a swinging mechanism.

Referring to Figs. 2, 4 and 5, the arms 12 may conveniently be in the form of channel irons and their flanges are guided between upper and lower pairs of rolls 18 which in the present instance are mounted on two parallel bars 20, secured to a gear 22 and located parallel to a diameter thereof at opposite sides of that diameter. For a moment let us disregard the gear and consider the rolls as if they were stationary. The rolls form a guide in which the arms 12 may be reciprocated and herein this is effected by a connecting rod 24 driven by a crank 26 (see Figs. 1 and 3), the latter being mounted on gear 28 on shaft 30, which shaft is driven through gearing 32 from an electric motor M. As the crank 26 moves counterclockwise from its position in Fig. 1, the arms 12 of the sweep move rectilinearly in the guides.

The gear 28 meshes with the gear 22 which carries guide rollers 18. Thus, as the latter gear rotates, the guide-way formed by the rolls 18 swings



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from the position shown in full lines in Fig. 1, through the full line position in Fig. 2 and clockwise beyond the same, to provide a resultant movement of the arms which carry the lower edge of the sweep board 14 along the path illustrated by the dot-and-dash line in Fig. 2.

While the details of the mechanism may be varied and the proportion of the parts for a given installation may be determined by a competent designer and laid out on a drawing board, I may state that in the particular machine illustrated the pinions 28 are  $3\frac{3}{8}$ " in pitch diameter and the gear 22 12 inches. The crank 26 is  $4\frac{1}{2}$  inches between centers and the connecting rod 24 24 inches. With this proportion of parts in the machine illustrated the path of the lower edge of the sweep board 14 above the table of the alley is, as shown in Fig. 2, approximately but not exactly rectilinear. A rectilinear movement could be obtained but the variation permits the use of stock gears instead of special gears.

The movement of the sweep is provided for by energizing the motor and reversing it at the proper time and bringing it to rest when the sweep has returned to elevated position. Referring to Fig. 7, the motor may be energized in the first instance by means of a push button P. B. 6 located at the head of the alley. Reversing switch R. S. being properly positioned current goes to the running winding R. W. and the starting winding S. W. of the motor M. The motor starts to move. As soon as it does so, and before the push button is released, it causes the closing of the limit switch L. S. The usual cutout switch C. O. de-energizes the starting winding after the motor has attained speed. When the sweep arrives at the edge of the pit the reversing switch is shifted, causing reversal of the motor. When it returns to the up position of Fig. 1 the limit switch L. S. is opened, interrupting the current to the motor, and the reversing switch is returned to its other position ready for a new operation.

Referring to Fig. 3 I there show an arm 34 mounted on shaft 30 to move in timed relation with the sweep, and which may be connected by any suitable mechanical means not here necessary to disclose in detail, so that it will operate at proper times the limit switch L. S. and the reversing switch R. S., indicated in Fig. 3 by the showing of a suitable box or casing so marked.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, as is in fact clear in several matters from the description itself. Reference is to be had to the appended claims to indicate those principles of the invention exemplified by the particular embodiment described and which I desire to secure by Letters Patent.

I claim:

1. A pin clearing mechanism for bowling alleys comprising an overhead support above the table of the alley, a sweep comprising a pair of arms and a cross member at their lower ends to push the pins off the table to the pit, and means on the support cooperating with the upper ends of the arms to suspend the same swingably from the support and comprising two cooperating driving devices simultaneously acting on the arms and effecting a resulting movement of the arms compounded of swinging and reciprocating move-

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ments thereof through a path positively determined by said driving devices and carrying the cross member from an elevated position downwardly and along the length of the table substantially parallel to the surface thereof and back to the elevated position.

2. A pin clearing mechanism for bowling alleys comprising an overhead support above the table of the alley, a sweep comprising a pair of arms and a cross member at their lower ends to push the pins off the table to the pit, and means on the support cooperating with the upper ends of the arms to suspend the same from the support and comprising guides for the arms in which the arms may slide, means for swinging said guides to alter the angle of the arm sliding thereon relatively to the face of the alley, and means for reciprocating the arms in the guides to effect a resultant movement of the arms through a path positively determined by said driving devices and carrying the cross member from an elevated position downwardly and along the length of the table substantially parallel to the surface thereof and back to the elevated position.

3. A pin clearing mechanism for bowling alleys comprising an overhead support above the table of the alley, a sweep comprising a pair of arms and a cross member at their lower ends to push the pins off the table to the pit, and means on the support cooperating with the upper ends of the arms to suspend the same from the support and comprising for each arm a pair of intermeshing gears, one having a connection to the arm including a driving crank and the other a sliding guiding connection with the arm, the two connections correlated to effect a resultant movement of the arms through a path positively determined by said driving devices and carrying the cross member from an elevated position downwardly and along the length of the table substantially parallel to the surface thereof and back to the elevated position.

4. A pin clearing mechanism for bowling alleys comprising an overhead support above the table of the alley, a sweep comprising a pair of arms and a cross member at their lower ends to push the pins off the table to the pit, and means on the support cooperating with the upper ends of the arms to suspend the same from the support and comprising for each arm a pair of intermeshing gears one having guide rollers at opposite sides of the diameter in which the arm may slide and the other a crank and a connecting rod to the arm to reciprocate it between the rollers, the two connections correlated to effect a resultant movement of the arms through a path positively determined by said driving devices and carrying the cross member from an elevated position downwardly and along the length of the table substantially parallel to the surface thereof and back to the elevated position.

FRANK W. ANDERSON.

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