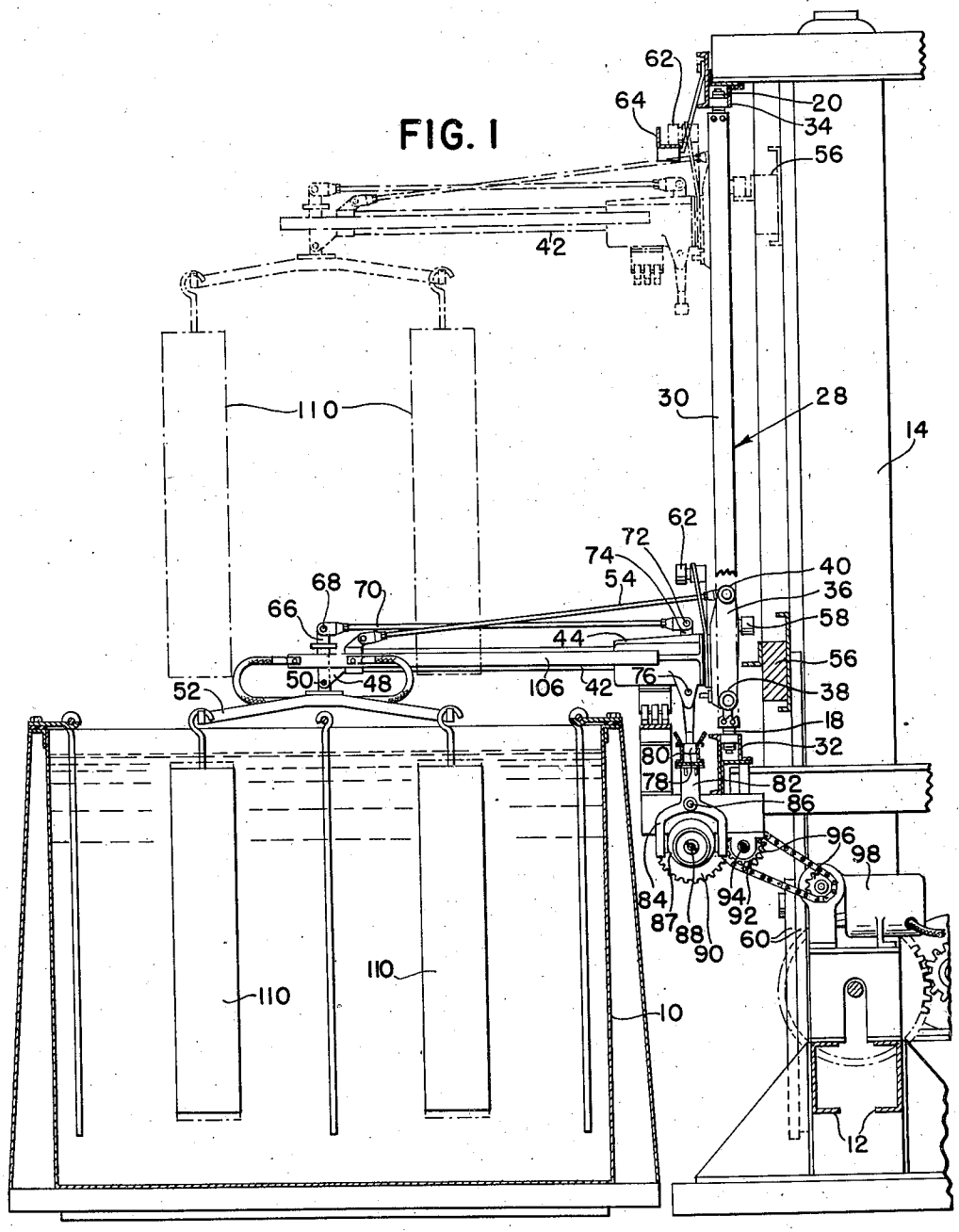
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FLUID TREATMENT EQUIPMENT

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FIG. 1



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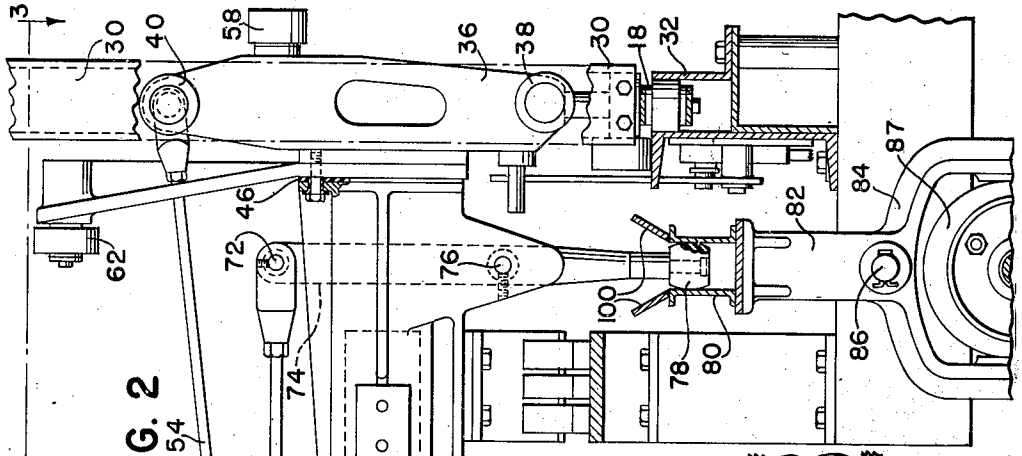


FIG. 2

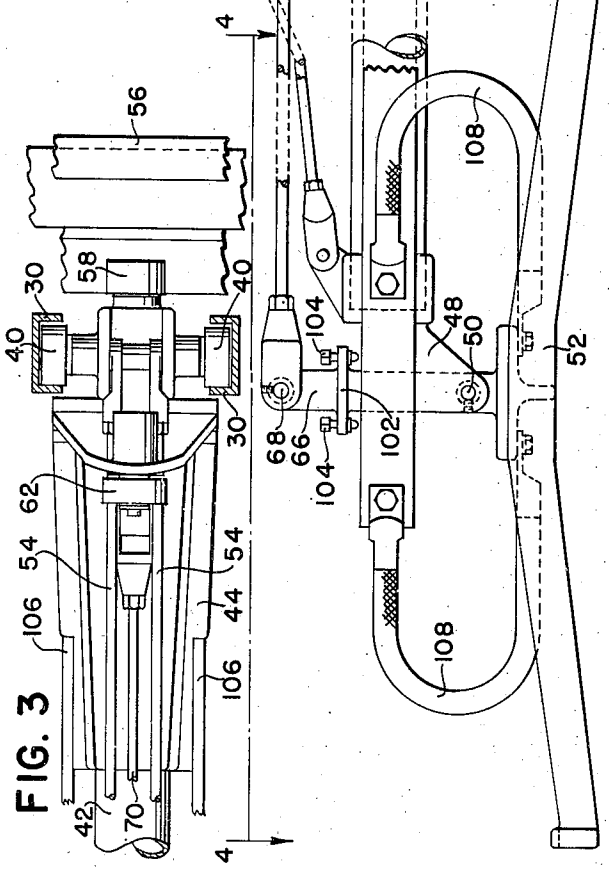


FIG. 3

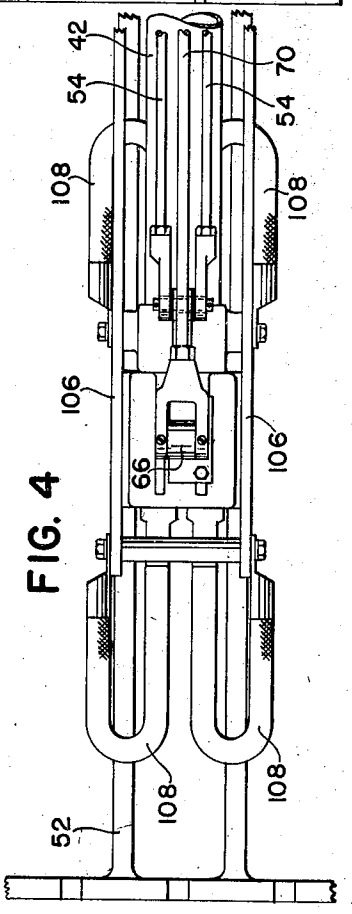


FIG. 4

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FLUID TREATMENT EQUIPMENT

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FIG. 5

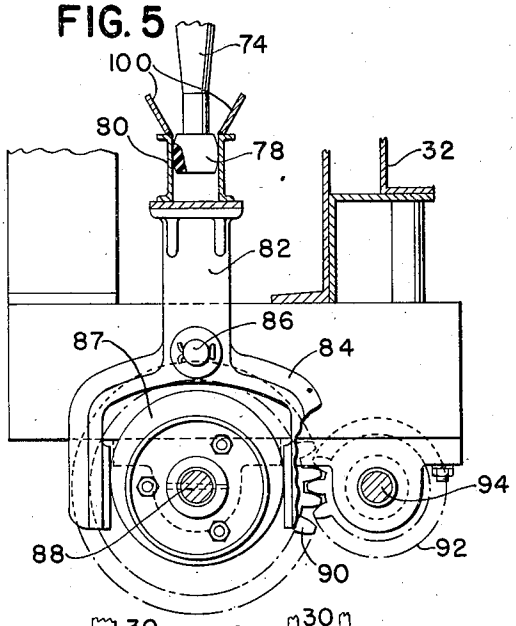


FIG. 6

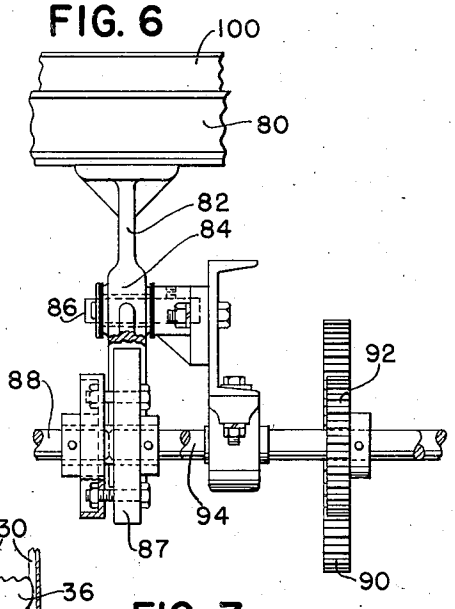


FIG. 7

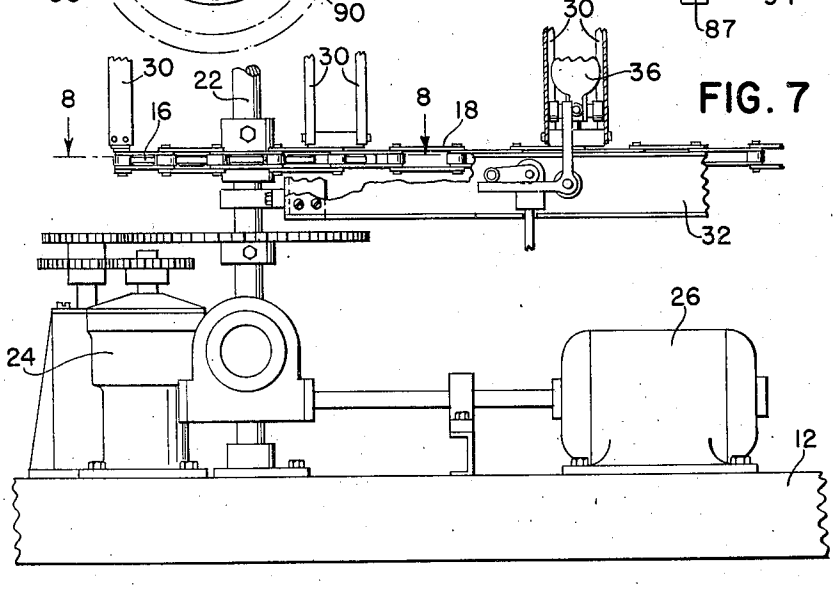
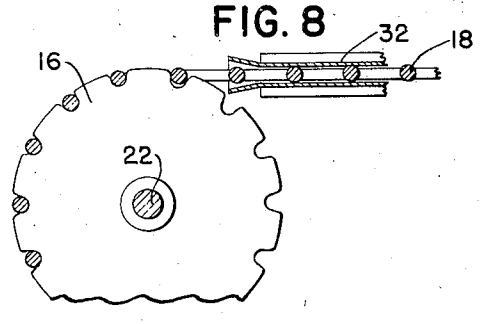


FIG. 8



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UNITED STATES PATENT OFFICE

2,461,113

FLUID TREATMENT EQUIPMENT

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Application October 14, 1946, Serial No. 703,198

3 Claims. (Cl. 134—160)

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This invention relates to processing equipment, and particulary lto automatic processing equipment such as electro-plating apparatus. More particularly still this invention relates to a workholding means for use in connection with this type of apparatus and to means of oscillating or moving the workholding means during its travel through the apparatus.

In an apparatus for treating workpieces in a continuous cycle including steps involving the electrolytic treatment of the articles, there are generally a plurality of baths through which the articles being treated are carried. These baths may include cleaning, pickling, plating, washing and rinsing baths according to the nature of the work cycle being carried out. In most instances it is of benefit to have the solution agitated to an extent which will insure uniform treatment of the workpieces throughout the bath and of all the workpieces in the bath. In other baths, particularly electrolytic baths, there is often an evolution of gas at the surface of the workpiece which, if not removed, forms a barrier which prevents the adequate carrying out of this particular stage of the work cycle.

The particular object of the present invention is to provide relatively simple and efficient means for overcoming or circumventing the aforementioned difficulties to be encountered in a continuous processing cycle.

A particular object of the present invention is to provide an improved and simplified oscillating workpiece support for processing machines.

A further object is the provision of an oscillating workpiece carrier for processing machines of the electrolytic type wherein the electrical connections made to the workpieces are entirely independent of the pivots and operating linkages of the workholder.

Still another object is the provision in a processing machine involving a plurality of baths and means for oscillating the workpiece holders during their passage through the baths.

Still another object is the provision of means for oscillating the workpiece holders individually at the several stations of a continuous processing machine.

It is also an object to provide a mechanism for oscillating the workpiece holders in a processing machine of great length.

These and other objects and advantages will become more apparent upon reference to the following description taken in connection with the attached drawings in which:

Figure 1 is a cross sectional view through a processing machine constructed according to this invention;

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Figure 2 is an enlarged view of the workpiece holding arm of this invention and a portion of the actuating mechanism therefor;

Figure 3 is a plan view indicated by the line 3—3 on Figure 2 and shows the supporting end of the workpiece holding arm;

Figure 4 is a view similar to Figure 3 but taken over the other end of the workpiece holding arm and is indicated by the line 4—4 on Figure 2;

Figures 5 and 6 are views showing the driving connection to the oscillating mechanism and the workpiece supporting arm;

Figure 7 is a view showing one form of driving mechanism for driving the workpiece supporting arms in their travel through their processing machine; and

Figure 8 is a plan view for one of the driving sprockets and is indicated by the line 8—8 on Figure 7.

Referring to the drawings, there is shown a processing machine which may consist of a plurality of tanks 10 having different solutions therein which provide for the successive cleaning, plating and washing of the workpieces according to any of several well known work cycles of this nature. The tanks 10 may be arranged in a line or in a path around the central supporting structure of the machine, and the workpieces are carried therethrough by supporting means which travel around the said main supporting means according to any of several different and familiar devices now in use.

In the drawings the apparatus comprises the longitudinally extending structural members 12 which have extending upwardly therefrom column means as at 14. The column means at the top and bottom thereof carry sprockets, one of which is indicated at 16 in Figure 7 and around the sprockets there pass the chains 18 and 20. The sprockets may be carried on a shaft 22 which is driven through a suitable geared unit indicated at 24 from a motor 26.

Extending between the chains at spaced points therealong are a plurality of vertically extending supporting structures generally indicated at 28 and which comprise a pair of vertically arranged and spaced apart channels 30. The channels 30 are connected at their ends by suitable blocks which are in turn secured to the chains in any suitable manner. The chains 18 and 20 are preferably of the roller type and are guided in the channels or tracks 32 and 34 as best seen in Figure 1.

Carried between the channels 30 is a block or bracket 36 having the rollers 38 at the lower end thereof and the rollers 40 at the upper end thereof which are receivable within the said channels. It will be apparent that the bracket 36 is vertically slidable in the channels 30 and is retained by the said channels in a vertical position at all times. Carried on the bracket 36 and extending laterally therefrom to overlie the tanks 10 is a tubular arm 42 which is secured into a member 44 which is bolted onto the face of the block 36. Preferably, there is electrical insulating means as at 46 so that the arm 42 and member 44 are electrically insulated from the block 36.

At the outer end of the tubular member 42 there is a yoke 48 which pivotally supports, as by the pin 50, a workpiece holding bracket 52 which may be of any of several well-known types and which includes means for hanging or securing workpieces thereon. The outer end of the tubular member 42 and the yoke 50 are supported by a brace 54 which extends between the said yoke and the upper end of the block 36 as best seen in Figures 1 and 2.

The entire workpiece supporting mechanism described above, including the block 36 is vertically movable in the structures 28 as indicated in Figure 1 by an elevating device 56 which is adapted for engagement with the roller 58 extending out the back of the block 36. When the elevating mechanism 56 is raised, as by the arms 60, the entire work supporting assembly is raised to the dotted line position shown in Figure 1 whereupon the workpieces carried thereby can be transferred into the next bath. Optionally, there may be supported on the front of the block 36 an auxiliary roller 62 which engages the track 64 near the top of the machine and which supports the workpiece supporting mechanism during its travel from one bath to another.

For oscillating the member 52 during the time that its supporting workpieces are in the bath, there is an upstanding arm 66 on the said member that extends upwardly through the yoke 48 and has pivoted to the upper end thereof, as by the pivot pin 68, a pitman, or drag link 70 that has its other end pivoted as at 72 to a bar or lever 74 which, in turn, is pivoted as at 76 in the member 44. The lever 74 extends downwardly beyond the member 44 and carries on its lower end the roller 78. The roller 78 is preferably of insulating material such as Bakelite, and may be graphited if desired in order to provide for anti-friction characteristics.

The roller 78 extends into a track 80 formed of a pair of spaced bars which are carried on the arm 82 of a yoke 84 which is pivoted at 86 to a structural member that is rigidly carried with the central supporting means of the apparatus. The yoke 84 spans an eccentric cam member 87 which is adjustably carried on a shaft 88. For rotating the shaft 88 in order to rotate the eccentric 87 and to oscillate the yoke 84, the said shaft includes a gear 90 which meshes with a pinion 92 on another shaft 94. As best seen in Figure 1, the shaft 94 is driven by a sprocket and chain mechanism 96 from the reduced speed output shaft of a geared head motor 98. The motor 98 is suitably rigidly supported on the main supporting means of the apparatus.

When the shaft 88 is driven and the eccentric 87 carried thereby oscillates the yoke 84, the track 80 also oscillates and, through the lever 74, the drag link 70, and the arm 66, also oscillates the work holding member 52. The shaft 88 may

be continuously driven, if desired, or may be intermittently energized in order to provide for oscillation of the track 80 only during the time that the workpiece carriers are in their down position. To facilitate the entry of the roller 78 into the track, the latter may comprise the angular extending guide brackets 100 suitably rigidly secured thereto if desired. For limiting the free angular movement of the work-piece member 52, as for example during the time that it is being loaded or unloaded, the arm 66 may carry a plate 102 which has adjustably mounted therein a pair of stop screws 104 which, when the workpiece supporting member 52 has tilted a predetermined amount, abut the yoke 48.

The electrical connections which are made to the workpieces are conducted thereto independently of the oscillating mechanism by providing a pair of conducting bars 106 which extend between a member 44 and the yoke 48 and which are connected directly with the member 52 through the flexible leads 108.

When the processing apparatus is of fairly great length, having several of the tanks 10 arranged in a line, then the shaft 94 may extend substantially throughout the length of the machine and there may be a plurality of pairs of driving gears 90, 92 connecting the shafts 88 and 94. This divides the load between the said shafts so that each thereof can be of a smaller size, and also insures the proper synchronizing of the said eccentrics 87. However, if it is desired to drive the oscillating machanisms individually for each processing tank, then the shafts 88 and 94 and the track 80 may be discontinuous, there being a pair of shafts, one or more sets of interconnecting gears therefor and a track for each bath in which the workpiece supporting means is to be oscillated, and fully equivalent results will obtain. The aforementioned structure may be employed where there are only a relatively few stations in which the workpieces are to be oscillated, or in instances where it is desired to oscillate the workpiece more rapidly or violently in one bath than in another.

In operation, the workpieces, designated at 110, may be oscillated between any predetermined limits and with any predetermined rapidity depending on the particular construction of the oscillating mechanism, and the device is so constructed, as seen by the dotted line construction in Figure 1 that when the workpiece carrier is elevated, it remains in substantially its neutral position even though the roller 78 is not in engagement with the track 80.

The construction of an oscillating workpiece carrier according to this invention is relatively simple and inexpensive. It will be apparent that the provision of the oscillating track and the drive mechanism therefor will enable a substantially standard machine to be fitted with oscillating workpiece carriers, and that the said carriers will in no way interfere with the operation of the machine according to any work cycle.

It will be understood that this invention is susceptible to modification in order to adopt it to different usages and conditions and, accordingly it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. In a fluid treating machine, mechanism for moving workpieces comprising: a horizontally extending arm, means for moving said arm in a horizontal direction and for halting movement

of said arm in said horizontal direction, means for moving said arm in a vertical direction to a fluid treating work station, a workpiece supporting member, means for pivotally supporting said workpiece supporting member on said arm, means for oscillating said workpiece supporting member about said pivot in a plane which is transverse to the movement of said arm in said horizontal direction, said oscillating movement occurring only after said workpiece supporting member has been moved vertically to its work station, said last-named means including a lever system, said lever system being mounted on said arm and having a downwardly extending free end, an upwardly extending track engageable by said free end when said arm and the workpiece supporting member have been moved to their work station, and means for oscillating said track.

2. In a fluid treating machine, mechanism for moving workpieces comprising: a horizontally extending arm, means for moving said arm in a horizontal direction and for halting movement of said arm in said horizontal direction, means for moving said arm in a vertical direction to a fluid treating work station, a workpiece supporting member, means for pivotally supporting said workpiece supporting member on said arm, means for oscillating said workpiece supporting member about said pivot in a plane which is transverse to the movement of said arm in said horizontal direction, said oscillating movement occurring only after said workpiece supporting member has been moved vertically to its work station, said last-named means including a lever system, said lever system being mounted on said arm having a downwardly extending free end, upwardly flaring spaced bars engageable by said free end when said arm and the workpiece supported thereby have been moved to their work station and means for oscillating said spaced bars.

3. In a fluid treating machine, mechanism for moving workpieces comprising: a horizontally extending arm, means for moving said arm in a

horizontal direction and for halting movement of said arm in said horizontal direction, means for moving said arm in a vertical direction to a fluid treating work station, a workpiece supporting member, means for pivotally supporting said workpiece supporting member on said arm, means for oscillating said workpiece supporting member about said pivot in a plane which is transverse to the movement of said arm in said horizontal direction, said oscillating movement occurring only after said workpiece supporting member has been moved vertically to its work station, said last-named means including a lever system, said lever system being mounted on said arm and having a downwardly extending free end, upwardly flaring spaced bars engageable by the free end when said arm and the workpiece supporting member have been moved to their work station and means for oscillating said bars, said oscillating means including a yoke, a cam engaged by said yoke, and means for rotating said cam.

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