July 6, 1926.

1,591,208

M. E. BOERNGEN

MECHANICAL MOVEMENT

Filed Jan. 19, 1925

3 Sheets-Sheet 1

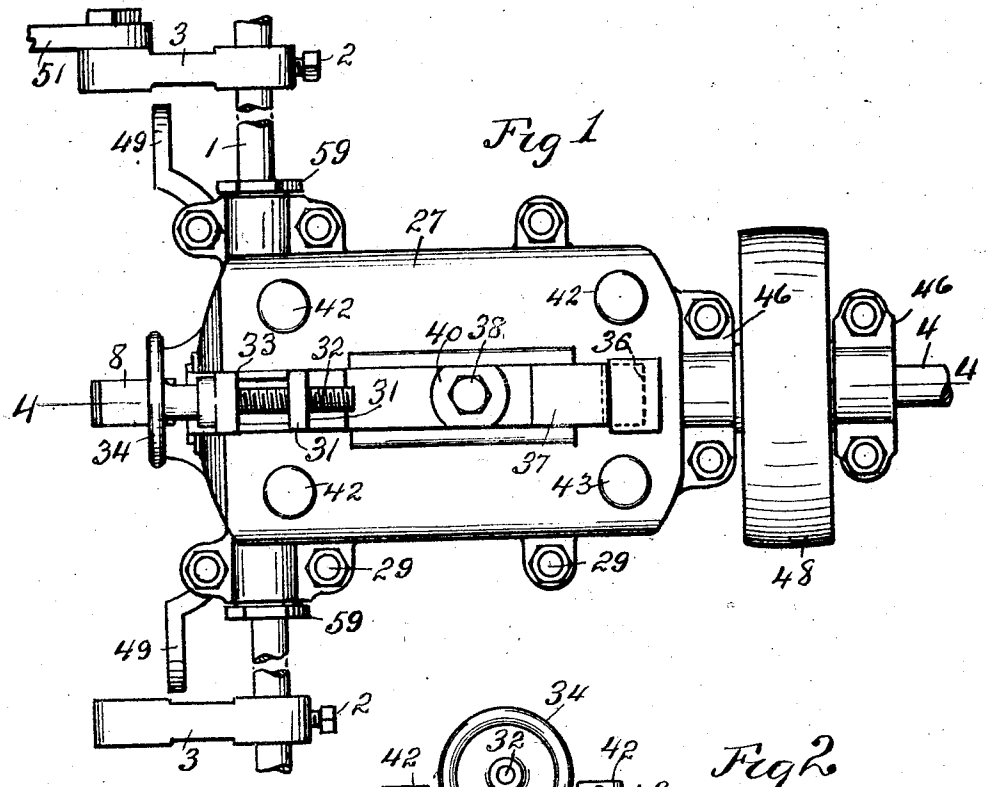


Fig 1

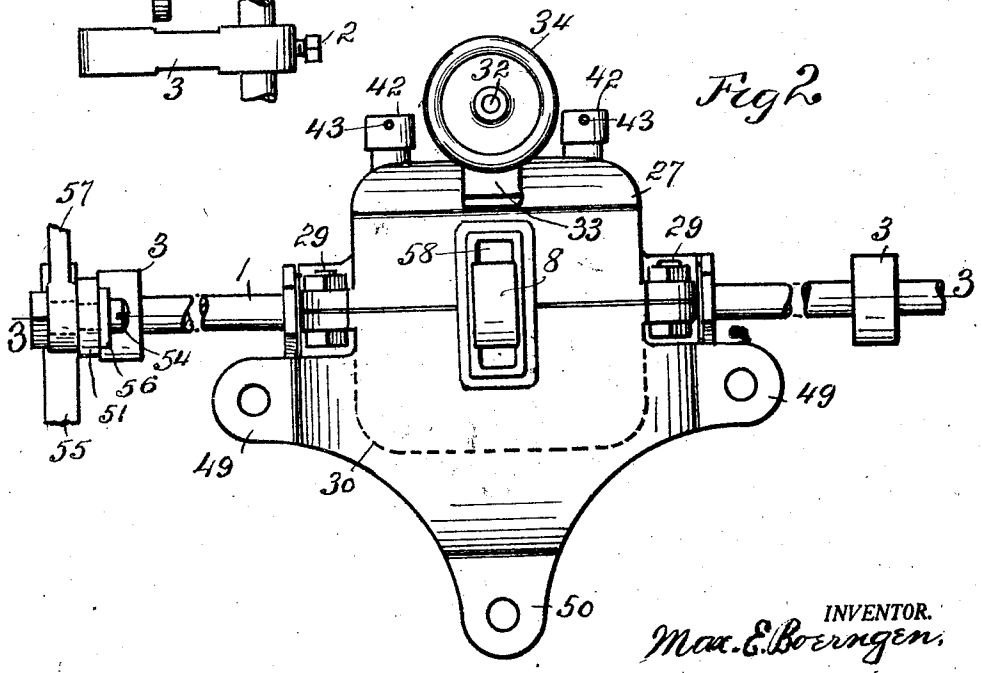


Fig 2

Witness:

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INVENTOR.

Max. E. Boerngen.

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His ATTORNEY.

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Fig 3

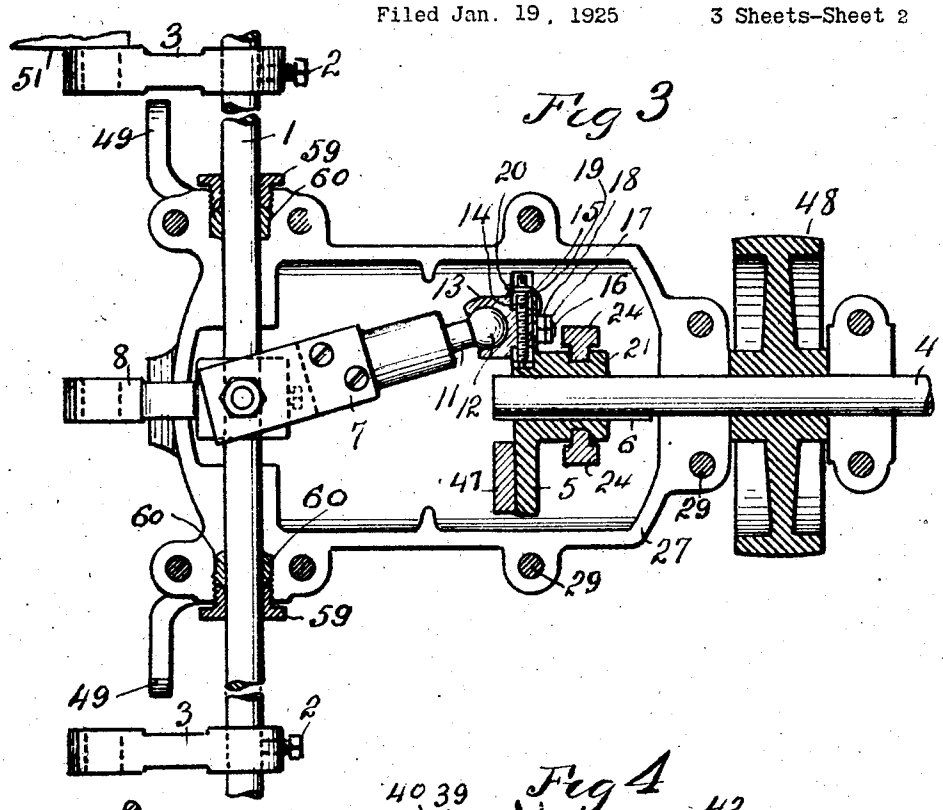
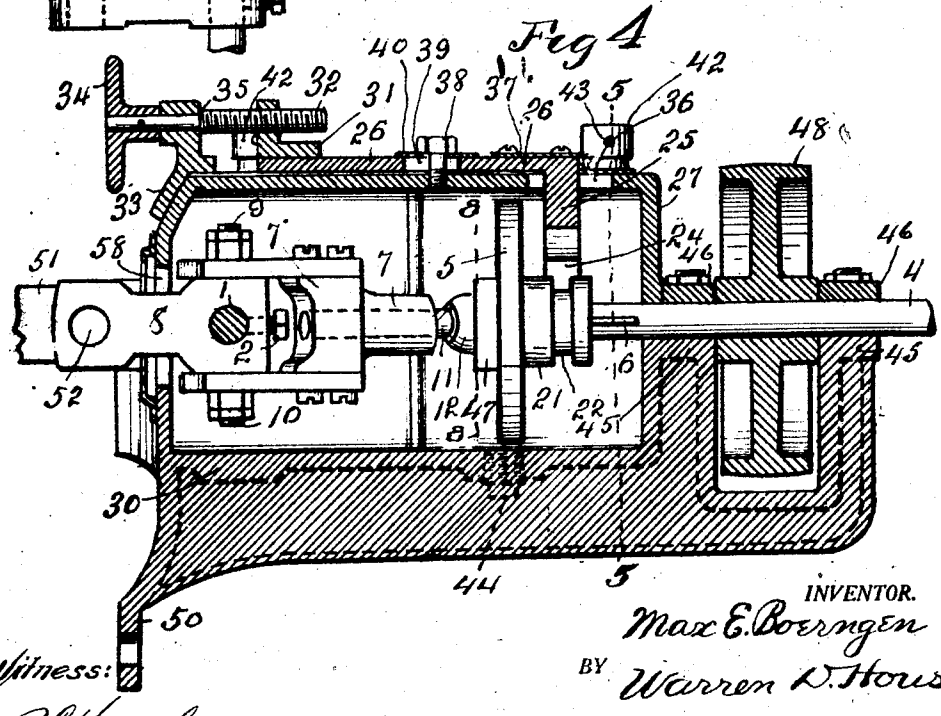



Fig 4




Witness:

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Fig 5.

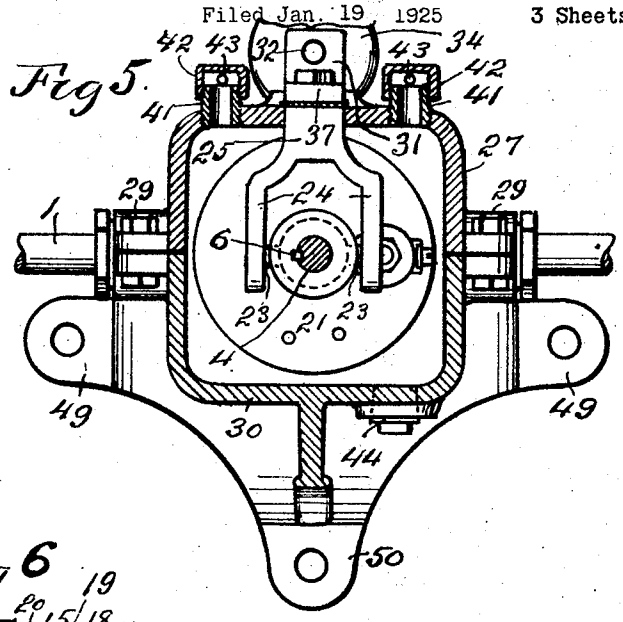



Fig 6

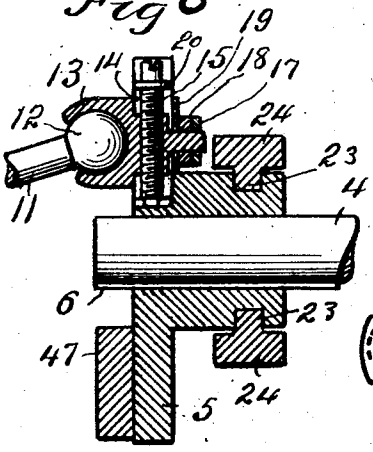



Fig 7

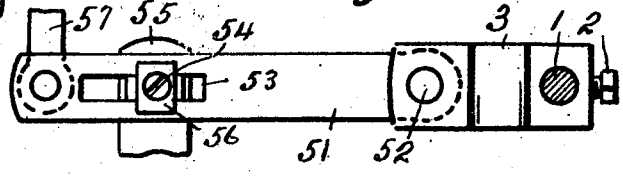
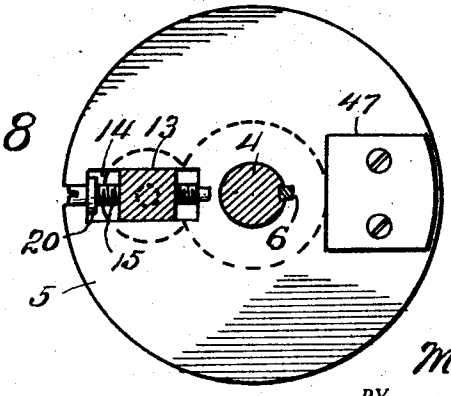



Fig 8




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Warren D. House
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Witness:
R. C. Hamilton

Patented July 6, 1926. 1,591,208

# UNITED STATES PATENT OFFICE.

MAX E. BOERNGEN, OF KANSAS CITY, MISSOURI.

## MECHANICAL MOVEMENT.

Application filed January 19, 1925. Serial No. 3,369.

My invention relates to improvements in mechanical movements.

One of the objects of my invention is to provide novel means for oscillating a driven member from a rotating driving member.

A further object of my invention is to provide novel means by which the stroke of the oscillating member may be changed in length.

A further object of my invention is to provide novel means by which the stroke of the oscillating member may be changed in length, while the driving member is rotating.

A further object of my invention is to provide a novel mechanical movement of the kind described, which is simple, relatively cheap to make, which is durable, not liable to get out of order, and which is capable of being run at very high speed.

My invention is adapted to be used in connection with many devices which require to have an oscillating movement imparted to them in effecting their functions and where a high rate of speed of operation is desirable, as for instance, the jogging of screens used in the manufacture of flour, or for vibrating screens used in screening other materials. My invention may be applied to a very large number of devices which require to have a vibrating movement imparted to them.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, which illustrate the preferred embodiment of my invention:—

Fig. 1 is a top view of my improved apparatus adapted for use in connection with vibrating flour sifting screens.

Fig. 2 is a front elevation of the same.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2.

Fig. 4 is a vertical section.

Fig. 5 is a cross section on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged cross section of the head and parts connected therewith.

Fig. 7 is a side view of one of the arms which is fastened to the oscillating shaft, the latter being shown in cross section, and to members by which the stroke of the driven device may be changed.

Fig. 8 is a cross section on the line 8—8 of Fig. 4.

Similar reference characters designate similar parts in the different views.

The elements of my improved mechanical movement may comprise the following described parts.

1 designates a horizontal oscillating driven member, which may have attached to it by set screws 2 any desired number of crank arms 3.

A rotary driving member which may comprise a horizontal rotary shaft 4 is spaced apart from and perpendicular to the driven member 1. As shown, the axes of the members 1 and 4 intersect each other.

Means for effecting oscillation of the shaft 1 comprises the following described parts. A head 5, which may be a disk, is splined to the shaft 4 by a feather 6, whereby the head rotates with the shaft and is longitudinally slidable thereon. 7 designates a connecting member having a bifurcated end, the arms of which embrace the upper and lower sides of a crank arm 8, mounted on the shaft 1, to which it is secured by a set screw 2, Figs. 3 and 4. The crank arm 8 has two vertical threaded studs 9 and 10, which extend respectively through the arms of the member 7 and which form the axis of said member, said axis being in intersection with the axes of the shafts 1 and 4 at the point of intersection of said axes with each other.

The connecting member 7 is connected to the head 5 by a universal joint device comprising a member 11, which is rotatably and longitudinally slidably mounted in the rear end of the member 7. Said member 11 has a partly spherical head 12, which is fitted for universal revolving movement in a socket provided in the forward end of a member 13, which is radially adjustable in a radial slot 14, provided in the head 5, see Figs. 3 and 6, and which has a threaded hole in which is fitted a radial screw 15 rotatably mounted in the head 5. The member 13 has a rearwardly extending threaded stem 16, on which bears a lock nut 17, which

in turn bears against a nut 18, which bears against a washer 19, which in turn bears against the rear side of the head 5. By loosening the nuts 17 and 18, the member 13 may be radially adjustable by turning the screw 15, in the proper direction. The screw 15 has a flange 20, which bears against the head 5 at the outer end of the slot 14.

When the member 13 is adjusted outwardly and inwardly, the length of stroke of the crank arms 3 and 8 is respectively lengthened and shortened.

When the head 5 is adjusted lengthwise forwardly and rearwardly, on the shaft 4, the stroke of the arms 3 and 8 is also respectively lengthened and shortened.

For longitudinally adjusting the head, 5, while the latter is revolving, the hub 21 of the head is provided with an annular peripheral groove 22, in which extend two inwardly extending pins 23, mounted on two arms 24, of a downwardly extending arm 25, of a horizontal plate 26, longitudinally slidable on an upper housing member 27, which is bolted by bolts 29 to a lower housing member 30. The plate 26 has secured to its top and forward end an angle plate 31, Fig. 4, having a horizontal threaded hole, in which is fitted a horizontal adjusting screw 32, which is rotatably mounted in a bracket 33, fastened to the housing member 27. A hand wheel 34 is fastened to the screw 32. The hand wheel with a shoulder 35 on the screw 32, are at opposite sides of the bracket 33, and hold the screw from lengthwise movement. The arm 25 of the plate 26 extends through a slot 36 in the top of the housing member 27. A plate 37 fastened to the top of the plate 26, serves to cover the slot 36. A screw 38, Fig. 4, extends through a slot 39 in the plate 26 and has its lower end fastened in the housing member 27. A washer 40 through which the screw 38 extends, covers the slot 39.

A plurality of externally threaded tubes 41 are fastened in the top of the member 27, Fig. 5 and Fig. 1, so as to carry off vapor produced by the rapid rotation of the parts contained in the casing formed by the members 27 and 30, and have mounted on them a screw cap 42, provided with lateral holes 43, disposed above the tubes 41. The holes 43 carry off the vapor produced from oil contained in the casing.

A drain hole in the bottom of the member 30 has fitted in it a removable screw plug 44, Figs. 4 and 5.

The member 30 has a U-shaped rear portion, the two arms of which have their upper ends provided with longitudinal grooves in which is rotatably mounted the shaft 4. The arms are designated by 45, Fig. 4. Above said arms are mounted upper bearing members 46.

A counterbalance weight 47 is fastened to the head 5 diametrically opposite the member 13, Figs. 3 and 8.

A driving pulley 48 is fastened to the shaft 4.

The forward end of the housing member 30 is provided with two lateral arms 49 and one downwardly extending arm 50, Figs. 2 and 5, by which the apparatus may be fastened to a suitable upright support.

Referring to Fig. 7, 51 is a horizontal bar, which is pivoted at its rear end by a horizontal bolt 52, extending through the crank arm 3. The bar 51 has a longitudinal slot 53, through which extends a fulcrum screw 54, which is fastened in an upright supporting bar 55, which is adjustable on any suitable support, not shown, lengthwise of the slot 53. A washer 56 on the screw 54 holds the bar 51 on said screw.

As many of the crank arms 3 may be mounted on the shaft 1, as may be desired. The crank arm 8 extends through a vertical slot 58 provided in the front end of the casing, Fig. 4.

When the bar 1 is oscillated, the bar 51 will also be oscillated, thereby moving the bar 57 upwardly and downwardly, Fig. 7, by adjusting the bar 55, and the fulcrum screw 54, longitudinally of the bar 51, the stroke of the forward end of the latter may be varied.

The shaft 1 is rotatably mounted between the housing members 27 and 30, in the same manner as is the shaft 4.

Screw-threaded packing collars 59 mounted on the shaft 1, are fitted in screw-threaded holes in opposite sides of the casing. The function of these collars, which bear against packing 60 is to keep the oil in the casing from passing out therefrom along the shaft 1.

In the operation of my invention, when the shaft 4 is rotated it will rotate with it the head 5, which will carry with it the member 13 having the ball head 12 mounted therein, which will in turn, through the member 11 revolve the rear end of the member 7 in a planetary manner. This movement of the member 7 will effect oscillating of the shaft 1, which will in turn rock the crank arms 3 and 8, thereby vibrating upwardly and downwardly whatever device it is desired to vertically oscillate. The means connecting the shafts 1 and 4, permit of very rapid movement of said shafts.

The adjusting screw 15 is set to fix the member 13 to obtain the desired length of stroke of the crank arms 3. If it is desired to change this stroke, to a shorter stroke, the screw 32 is turned by the hand wheel 34 in a direction such that the head 5 will be adjusted rearwardly on the driving shaft 4. The screw is turned in the opposite direction to lengthen the stroke. This means of adjustment is operable when the apparatus

is in operation. One of the advantages of my improved construction is that the parts connecting the shafts 4 and 1 can not come to rest in any position in which motion can not be transmitted from the shaft 4 to the shaft 1 by such connecting parts.

I do not limit my invention to the structure shown and described, as many modifications, within the scope of the appended claims, may be made without departing from the spirit of my invention.

What I claim is:—

1. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a head carried by and rotatable with the driving member, a connecting member pivotally connected to said oscillating member on an axis intersecting the point of intersection of said driven and driving member, and a universal joint device fastened to and revoluble with said head and rotatably and longitudinally slidably connected with said connecting member.

2. In a mechanical movement, an oscillating driven member, and a rotary driving member having intersecting axes, a connecting member pivotally connected to the driven member on an axis intersecting the point of intersection of the axes of said driven and driving members, a head carried by and rotatable with said driving member, and a universal joint device fastened to said head and radially adjustable thereon toward and from said driving member, and rotatably and longitudinally slidably connected to said connecting member.

3. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a head longitudinally adjustable on and rotatable with said driving member, a connecting member pivotally connected to said driven member on an axis intersecting the point of intersection of said axes, and a universal joint device fastened to and revoluble with said head and rotatably and longitudinally slidably connected with said connecting member.

4. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a head adjustable longitudinally on and rotatable with said driving member, a connecting member pivoted to said driven member on an axis intersecting the point of intersection of said axes, and a universal joint device rotatably connected with and longitudinally slidably connected with said connecting member and radially adjustable toward and from said driving member on and revoluble with said head.

5. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a connecting member pivoted to said driven member on an axis intersecting the point of intersection of said axes, a head carried by and rotatable with said driving member, a screw radially disposed in said head, and a universal joint device comprising two members having universal joint connection between them, one of said members of the joint device having threaded with said screw and being radially adjustable on said head and revoluble therewith, the other member of the joint device being rotatably connected to said connecting member and longitudinally slidably connected therewith.

6. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a connecting member pivoted to said driven member on an axis intersecting the point of intersection of said axes, a head rotatable with and longitudinally adjustable on said driving member, means for longitudinally adjusting said head, operable when the latter is revolving, and a universal joint device mounted on and revoluble with said head, and rotatably and longitudinally slidably connected with said connecting member.

7. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a connecting member pivotally connected to the driven member on an axis intersecting the point of intersection of said axes, a head rotatable with and longitudinally adjustable on said driving member, means for so adjusting said head operable when the head is revolving, and a universal joint device revoluble with said head and radially adjustable thereon and rotatably and longitudinally slidably connected with said connecting member.

8. In a mechanical movement, an oscillating driven member, a rotary driving member, the axes of said members intersecting each other, a connecting member pivotally connected to said driven member on an axis which intersects the point of intersection of said axes, a head revoluble with and longitudinally adjustable on said driving member, means for so adjusting said head operable when the head is revolving, a screw radially mounted in said head, and a universal joint device having threaded connection with said screw and radially adjustable thereby on said head, and rotatably and longitudinlly slidably connected with said connecting member.

9. In a mechanical movement, an oscillating driven member, a rotary driving member, a head rotatable with and longitudinally adjustable on said driving member, means connecting said head with said

driven member by which the driven member has an oscillating movement imparted to it from said head, said connecting means having means connected with said head, by which the stroke of said driven member may be changed and by which said head may be permitted to be longitudinally adjusted on said driving member, an adjusting screw and means actuated by said screw for longitudinally adjusting the head on said driving member.

In testimony whereof I have signed my name to this specification.

MAX E. BOERNGEN.