May 9, 1933. L. B. GRUMAN 1,907,647

STROKE ADJUSTING MEANS

Original Filed June 14, 1928 2 Sheets-Sheet 1

Fig. 2.

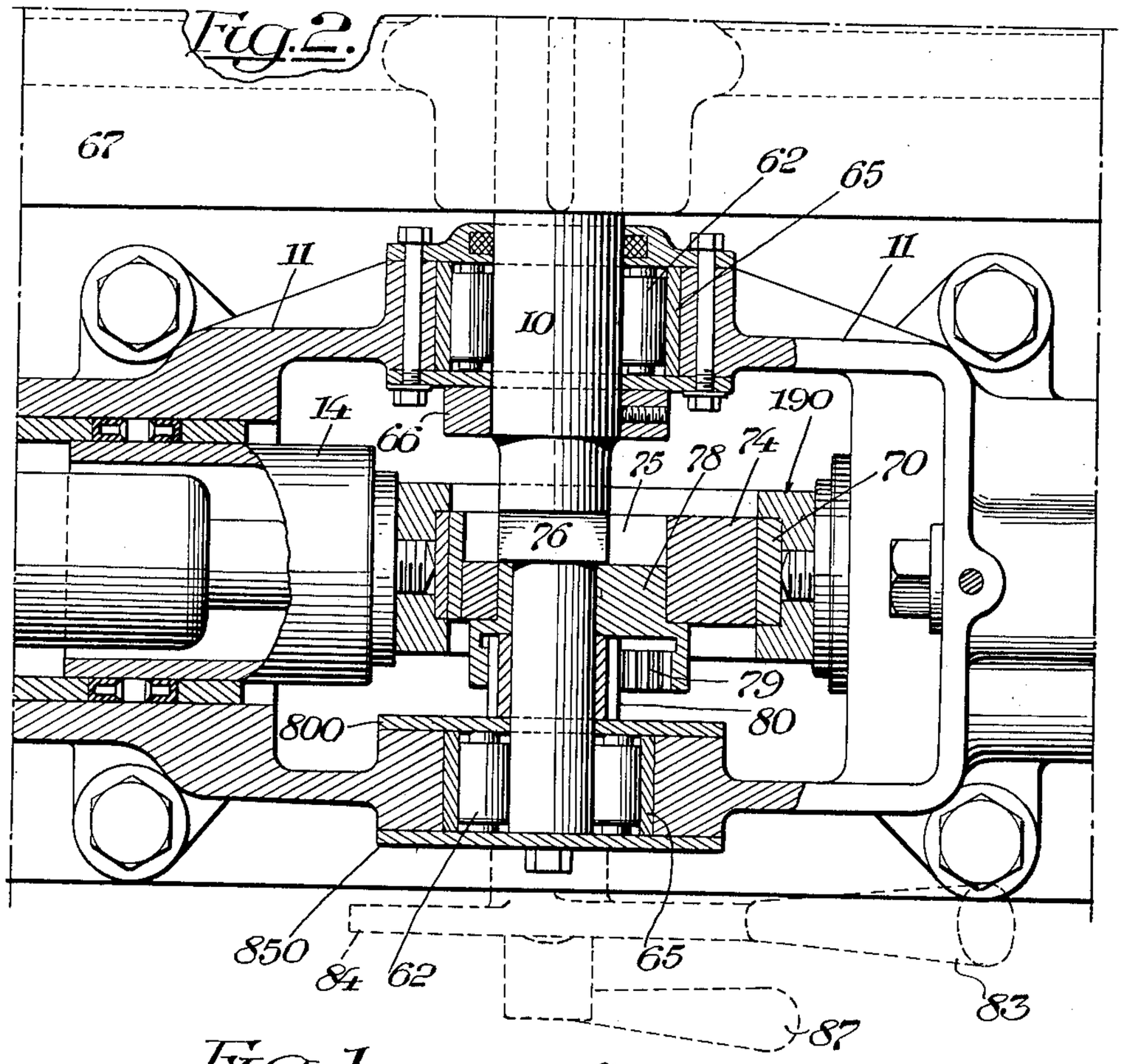

Fig. 1.

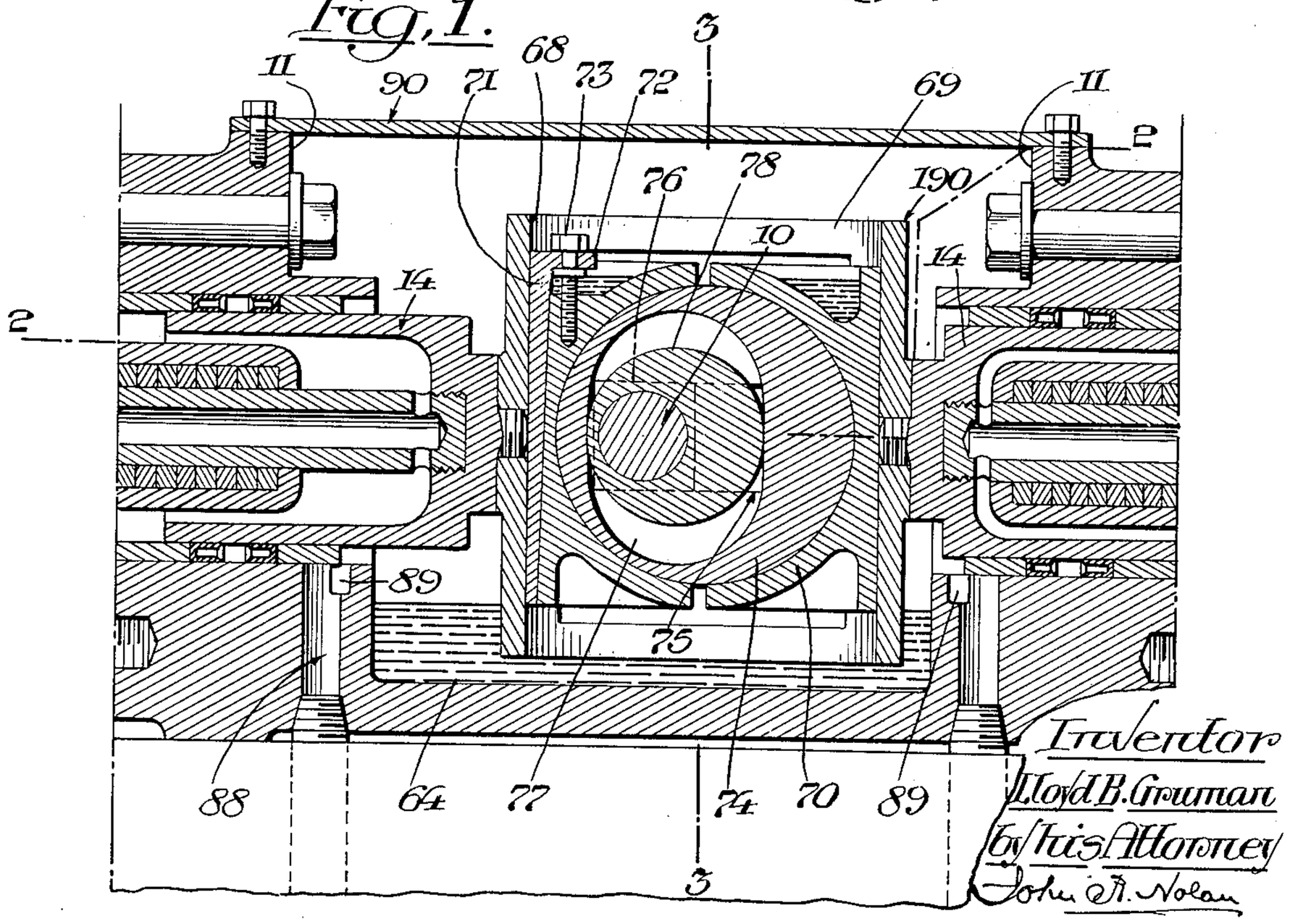

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Fig. 4.

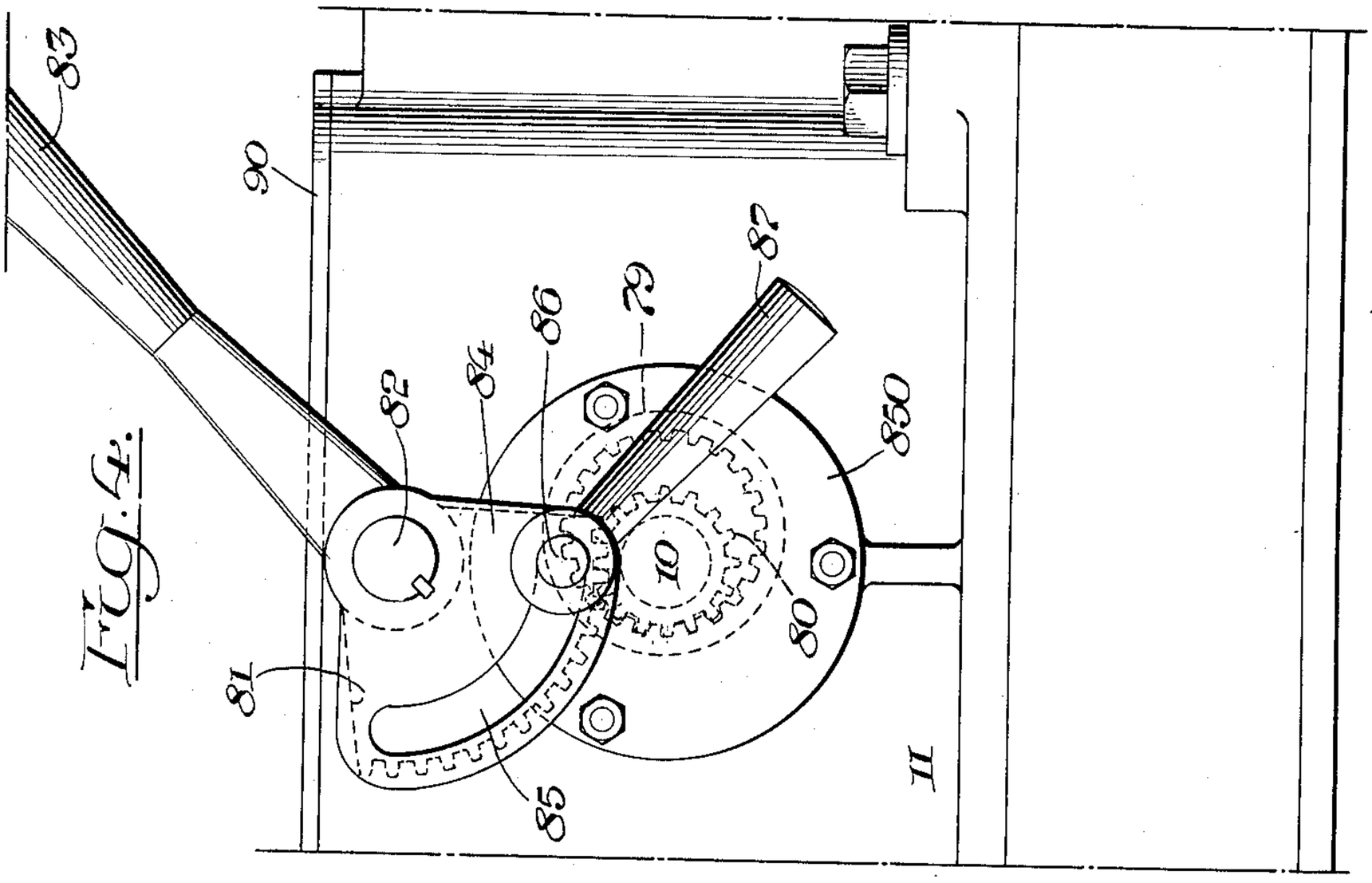
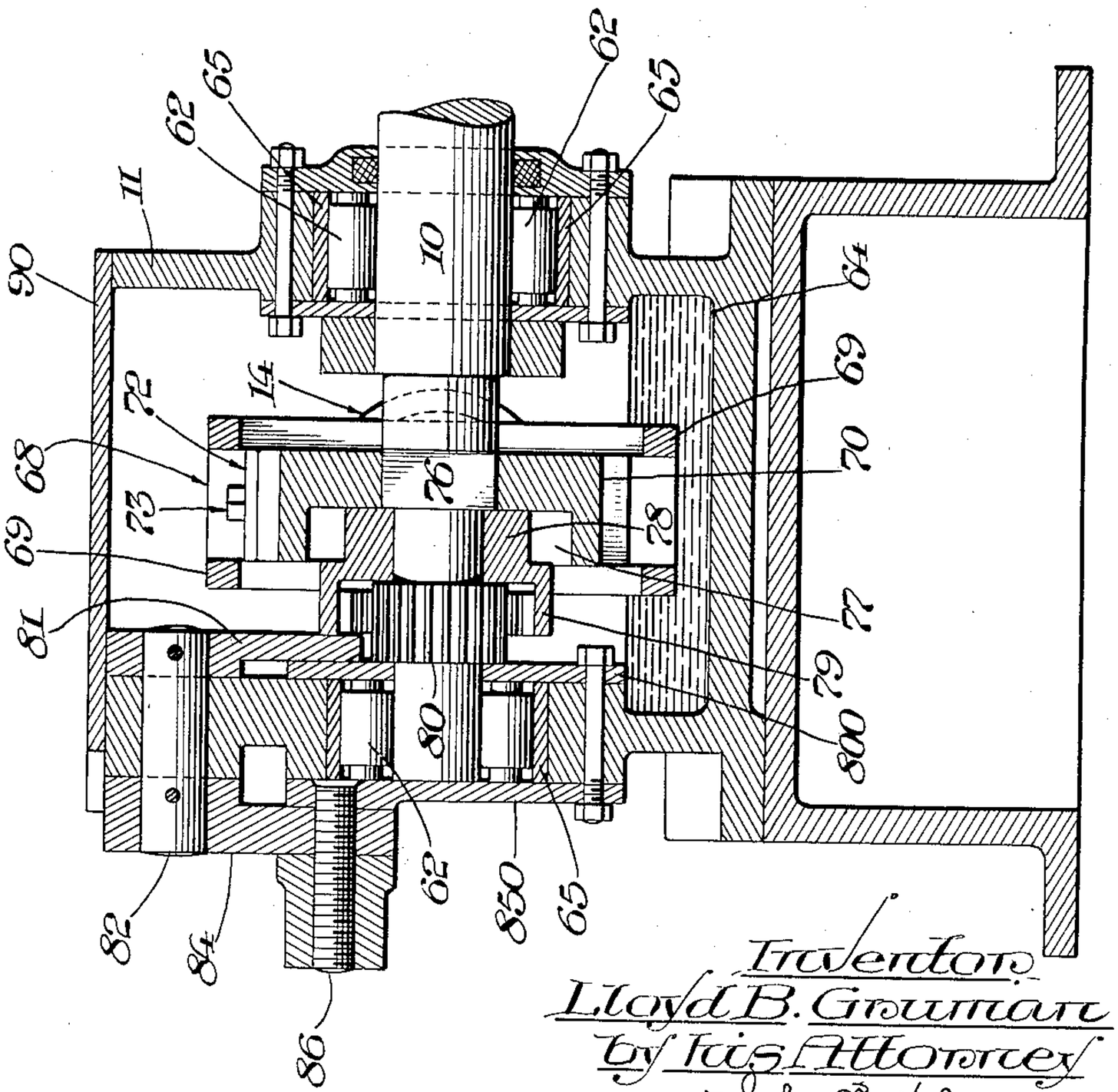


Fig. 3.



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UNITED STATES PATENT OFFICE

LLOYD B. GRUMAN, OF NEWARK, NEW JERSEY

STROKE ADJUSTING MEANS

Original application filed June 14, 1928, Serial No. 285,273. Divided and this application filed June 17, 1932. Serial No. 617,768.

This application is a division of my co-pending application Serial No. 285,273, filed June 14, 1928, for Pumps (Patent No. 1,868,498, dated July 26, 1932).

The object of the present invention is to provide simple and efficient mechanism whereby the stroke of a reciprocating element or elements, as, for example, the piston or pistons of a pump, can be readily adjusted at will from zero to maximum, and this when such element is either active or idle, thereby not only affording provision for a wide range of pressures and capacities, but also enabling the easy progressive starting of the pump or other apparatus to which the mechanism is applied.

The invention comprises features of novelty which, in a preferred embodiment of the invention, will be hereinafter described; the scope of the invention then being defined in the appended claims.

In the drawings—

Figure 1 is a vertical section of stroke-adjusting mechanism embodying the principle of my invention; such mechanism being shown as applied to the pistons of a pump.

Fig. 2 is a horizontal section, as on the line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical section, as on the line 3—3 of Fig. 1.

Fig. 4 is a partial side elevation of the stroke-adjusting mechanism.

The invention is herein illustrated as embodied in a pump of the duplex type wherein the respective pistons, 14, are in axial alignment and are adapted to operate in alternation with respect to the intake and discharge of the liquid.

The operating shaft 10 is mounted intermediate the pistons on a large diameter roller bearing 62 at the respective sides of a suitable casing 11, which casing at this location is constructed to provide an oil reservoir 64. Said bearings include races 65 mounted in the walls of the casing and held in place by suitable end cover plates and packing caps. The shaft being mounted in this manner after the bearings are assembled, is held in place by a set collar 66. In the present instance the shaft is provided with a large fly wheel 67 adapted to be belted with a suitable motor. The shaft extends through a yoke or cross-head 190 to which, in the present instance, the pump pistons 14 are rigidly secured. This yoke or cross-head comprises an open rectangular structure, including vertical guide walls 68 and connecting side bars 69. Slidably mounted for independent vertical movement in the walls 68 of the cross-head is an eccentric bearing structure 70 which is vertically divided into two halves. A vertically-adjustable wedge 71 is preferably interposed between one of the guide walls of the cross-head and the adjacent bearing section so that by vertically-adjusting the wedge the wear between the sliding surfaces may be taken up. To this end, the wedge is provided at its upper end with a perforated lug 72 in which is mounted a vertical adjusting screw 73 that enters a tapped socket in the top of the adjacent bearing section. Rotatably seated in the eccentric opening of the bearing is a relatively large driving eccentric 74 which in its rotation imparts a compound vertical and horizontal motion to the eccentric bearing 70, thereby effecting relative vertical movement of the bearing in the cross-head and also horizontal reciprocation of the cross-head and the attached pump pistons.

The driving eccentric 74 is provided with an oblong slot 75 in which is slidably fitted a square section 76 of the driving shaft 10, thereby affording capacity for limited movement of the eccentric transversely of the shaft to vary the eccentricity of the eccentric in relation to the axis of the shaft. The driving eccentric is also provided with an elongated cavity 77 extending at right angles to the length of the slot, which cavity contains an adjusting eccentric 78 which is free to rotate on the drive shaft. This eccentric 78 has formed therein an internal gear 79 that meshes with a gear 80 also free to rotate on the drive shaft 10, which latter gear, in turn, meshes with a sector gear 81. This sector gear is fast on a stud shaft 82 which is journaled in the adjacent casing wall and is provided at one side of the casing with a handle 83 by the manipulation of which the sector

gear may be swung through a predetermined arc, thus effecting the partial rotation of the gear 80 and perforce moving the internal gear and correspondingly adjusting the eccentric 78. The handle is provided with a sector extension 84 having therein an arcuate slot 85 through which extends from the adjacent roller bearing cover (850) on the casing a screw 86 having a suitable clamping handle 87 by the manipulation of which the adjusting handle may be locked in any predetermined position of adjustment.

The adjusting eccentric 78 offsets the center line of the driving eccentric from the center line of the driving shaft at any desired distance up to the maximum stroke of the adjusting eccentric, and the sliding connection between the drive shaft and the driving eccentric allows the latter to slide on the shaft to the maximum extent. The adjusting eccentric, although free to rotate on the drive shaft during adjustment, rotates as a unit with the driving eccentric and the shaft. The eccentric 78 with its internal gear, revolves around the gear 80, which is held in place by the adjacent bearing plate 800 and fixed sector gear 81. When the stroke is set at zero the central line of the driving eccentric coincides with the center line of the driving shaft and rotates thereith as a unit, while the cross-head and, perforce, the pump pistons remain idle, this saving the wear and tear on the pump parts.

By the construction just described it will be seen that by properly manipulating the handle 83 to adjust the eccentric 78 in relation to the axis of the operating shaft 10, the stroke of the yoke or cross-head can be varied from zero to maximum, while the pump is idle or in motion, and that the eccentric can then be effectually locked in the desired position of adjustment.

The oil level in the reservoir 64 is such that the driving eccentric 74 in its rotation dips into the oil and carries it to the associated moving parts. The pump casing has drain pockets 88 and drain ports 89 to carry off any leakage of liquid past the packing rings of the pistons, so that the liquid will not escape to the oil reservoir. The casing also has a suitably-disposed removable cover 90 to facilitate inspection of the oil reservoir, and the driving and transmitting mechanism.

While I have herein illustrated my invention as embodied in a pump, it is to be understood that the invention is of general utility and is not necessarily limited to pump application. It is also to be understood that my invention is not limited to the form and details of construction herein disclosed as the mechanism may be variously modified within the principle of the invention and the scope of the appended claims.

I claim—

1. The combination with a rotary operating element, of a reciprocative element, an eccentric bearing slidably associated with said reciprocating element, a driving eccentric operatively mounted in said bearing and rotatable with yet movable transversely of said rotary operating element, an adjusting eccentric rotatably fitted in the said driving eccentric and loose on said rotary operating element, and means for adjusting said adjusting eccentric about the axis of the rotary operating element and locking the latter eccentric in predetermined positions of adjustment.

2. The combination with a rotary operating element, of a reciprocative element, an eccentric bearing slidably associated with said reciprocative element, a driving eccentric operatively mounted in said bearing and rotatable with yet movable transversely of said rotary operating element, an adjusting eccentric operatively fitted in the driving eccentric and loose on said rotary operating element, said adjusting eccentric having an internal gear, a pinion loose on the rotary operating element and meshing with said internal gear, an operating handle, a gear member thereon in mesh with said pinion, and means for securing said handle in predetermined positions of adjustment.

3. The combination with a rotary operating element, of a horizontally reciprocative element, an eccentric bearing associated with said reciprocative element and having capacity for vertical movement relative thereto, a driving eccentric operatively mounted in said bearing and rotatable with yet horizontally slidable on said rotary operating element, said eccentric having an elongated opening therein, an adjusting eccentric operatively fitted in said opening and loose on said rotary operating element, and means for adjusting said adjusting eccentric about the axis of the rotary operating element and locking the latter eccentric in predetermined positions of adjustment.

4. The combination with a casing constructed to provide a basal oil reservoir, a shaft extending transversely of said casing, bearings for said shaft, a horizontally-reciprocative cross-head within said casing, an eccentric bearing slidable vertically in said cross-head, a driving eccentric operatively mounted in said eccentric bearing and rotatable with said shaft yet slidable thereon in a horizontal path, said driving eccentric being constructed and arranged to dip into the contents of the oil reservoir, an adjusting eccentric loose on said shaft and rotatably fitted in the said driving eccentric, and means for adjusting said adjusting eccentric about the axis of said shaft and locking the latter eccentric in predetermined positions of adjustment.

5. In a pump having oppositely extending pistons, and an operating shaft located be-

tween said pistons, a head connecting said pistons, an eccentric bearing slidable in said head, a driving eccentric operatively mounted in said eccentric bearing and rotatable with, yet slidable on the said shaft, an adjusting eccentric loose on said shaft and rotatably fitted in the said driving eccentric, and means for adjusting said adjusting eccentric about the axis of the shaft and locking the latter eccentric in predetermined positions of adjustment.

Signed at New York in the county and State of New York this 16th day of June A. D. 1932.

LLOYD B. GRUMAN.