No. 808,456. PATENTED DEC. 26, 1905.

R. W. KING.

TRANSOM LIFTER.

APPLICATION FILED MAR. 3, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

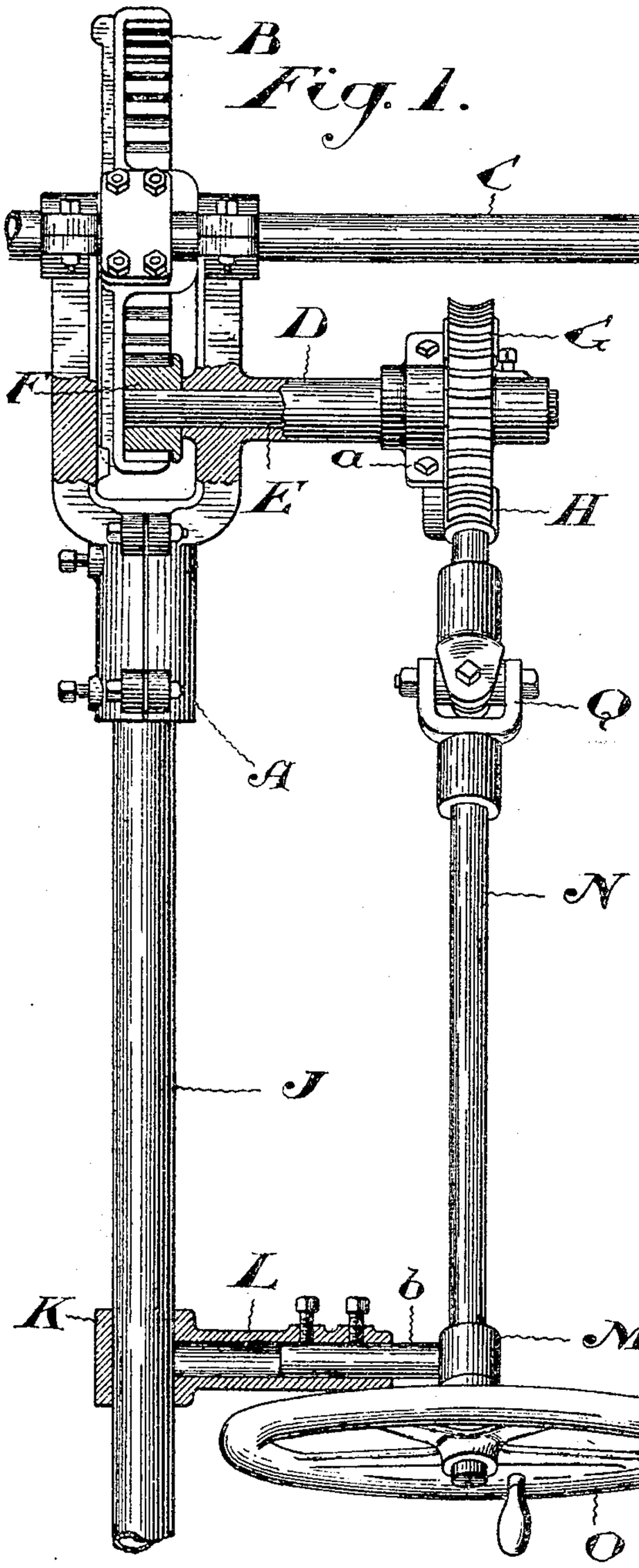
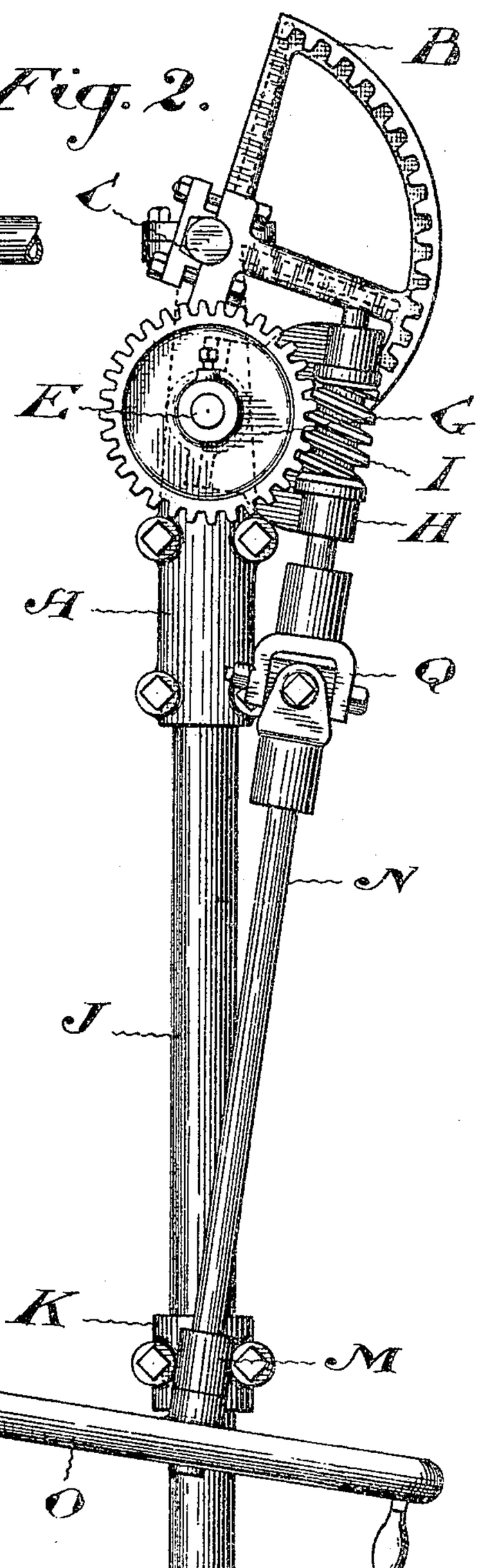


Fig. 2.



WITNESSES:

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2 SHEETS—SHEET 2.

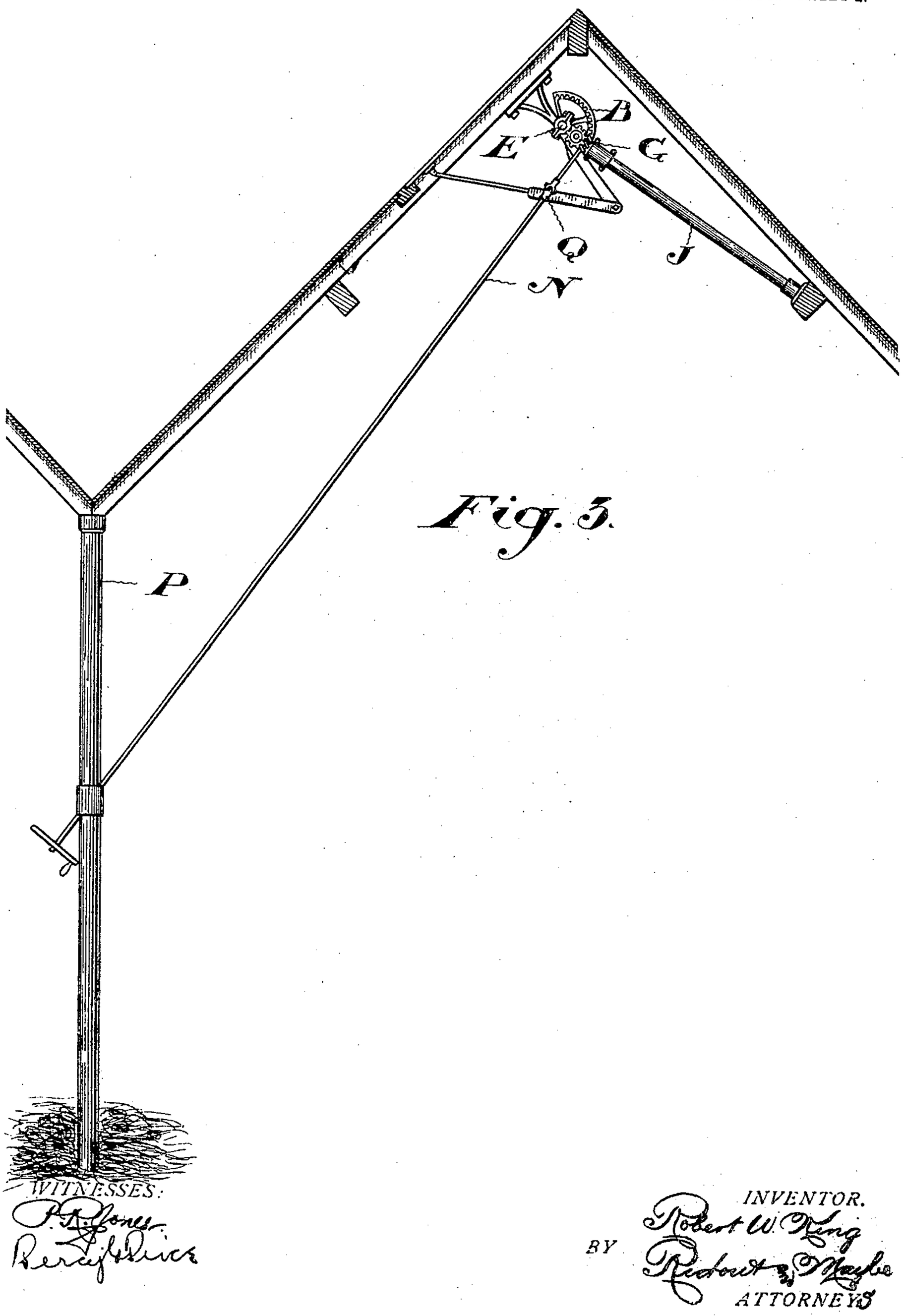

Fig. 3.

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UNITED STATES PATENT OFFICE.

ROBERT WILLIAM KING, OF TORONTO, CANADA.

TRANSOM-LIFTER.

No. 808,456. Specification of Letters Patent. Patented Dec. 26, 1905.

Application filed March 3, 1905. Serial No. 248,269.

To all whom it may concern:

Be it known that I, ROBERT WILLIAM KING, of the city of Toronto, county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Transom-Lifters, of which the following is a specification.

This invention relates to means for operating a horizontal shutter-operating rock-shaft, such as shown and described in my United States Patent No. 589,603, dated September 7, 1897. In that patent automatic means operated by water-pressure controlled by a thermostat are shown for operating the said shutter-operating shaft. In some localities where sufficient water-pressure cannot be obtained manually-controlled means must be substituted; and the object of the present invention is to devise light, strong, convenient, and simple yet powerful means for operating the said shaft.

With this object in view my invention consists, essentially, in the details of construction of the gearing of the apparatus and the means whereby the operating-shaft may be led to any desired position, substantially as hereinafter more specifically described and then definitely claimed.

Figure 1 is a front sectional elevation of my approved apparatus. Fig. 2 is a side elevation of the same, and Fig. 3 a similar view showing the framing of the apparatus secured entirely to the roof of a greenhouse.

In the drawings like letters of reference indicate corresponding parts in the different figures.

A is the framing of the apparatus, forked to embrace the internal segment-gear B. This segment-gear is secured to the shutter-operating shaft C, which is suitably journaled, as shown, in the upper ends of the forks of the framing. This shutter-operating shaft may be connected with the shutters substantially in the manner set forth in my United States Patent No. 589,603, already referred to—that is, by a crank-arm R fast on the shaft and pivoted to a connecting-rod pivoted to the shutter. One of the jaws of the fork of the framing is provided with a lateral extension D, in which is journaled the pinion-shaft E. The inner end of this shaft has a pinion F secured thereto, meshing with the internal gear B. The outer end of the shaft has a worm-wheel G secured thereto.

H is a bearing for the worm I, which is suitably journaled therein. This bearing is rotatable and slidable upon the extension D of the framing, a cap *a* provided with suitable bolts enabling the bearing to be clamped in any desired position.

Suitably secured to the framing is a post J, the lower end of which may extend down to the ground, as shown in Figs. 1 and 2, or may be connected with one of the purlins or other part of the structure. (See Fig. 3.) When arranged as shown in Figs. 1 and 2, a collar K is placed on the post. This collar is made adjustable on the post either slidably or rotatably in any desired manner. In the drawings I show the collar split and provided with bolts by means of which it may be clamped upon the post in any desired position. Extending laterally from the collar is a sleeve L. A bearing M has a laterally-extending cylindrical stud *b* formed thereon, adapted to enter the sleeve L. This stud is rotatable or slidable within the sleeve and may be clamped in any desired position by set-screws, as shown.

An operating-shaft N is secured to the worm I and is journaled at its lower end in the bearing M. This operating-shaft is provided with a hand-wheel O or other means by which it may be rotated when desired.

In Fig. 3 I show the sleeve L clamped upon the post P, which may be one of the posts supporting the building.

My device presents several points of advantage over those heretofore employed. As I desire, when necessary, to suspend the apparatus on the roof of a greenhouse, (see Fig. 3,) which roof is made of the lightest possible construction, it is essential that the leverage of power of the apparatus be obtained with a minimum weight of material, and it is further essential that the parts shall be as small as possible, so as to obstruct a minimum amount of light. Heretofore gearing has been attached to a shutter-operating shaft, which has been of such construction that the journal of the operating-pinion was at a point farther distant from the shutter-operating shaft than the outer edge of the main gear-wheel. I by employing an internal gear bring the journal of the pinion closer to the shutter-operating shaft than the radius of the internal gear. This enables me to employ a much smaller and lighter framing, as will be realized when it is understood that the weight of the connecting-framing between the two shafts may be decreased directly in proportion to the square root of the respective

distances between them. Further, an internal gear is a much stronger form of gear in proportion to its weight than an external gear, since the bases of the teeth where fracture is liable to occur widen rather than narrow as they recede from the pitch-line, whereas the reverse is the case in an external gear. Thus my internal gear-wheel may be made proportionately lighter than an external gear. A corresponding degree of strength with lightness may be obtained in the operating-pinion by making it of steel, malleable iron, or other metal stronger than the main gear, which is preferably of cast-iron. Another point of advantage in this machine is that the worm or other gear compounding the leverage is carried by the main framing, thus requiring a lighter connection with the hand-wheel than in other forms where the leverage of the machine has been compounded at the operating end. By arranging the bearing of the worm so that it may be swung on the part of the frame supporting it I obtain a very neat, light, and compact bearing, with the additional advantage that the hand-wheel-operating shaft may be swung round at any angle. This enables it to be carried down to a bearing on the framing-supporting post, as shown in Figs. 1 and 2, or it may be brought to some other post, as shown in Fig. 3, and the framing-supporting post connected to some part of the roof. Of course the adjustability of the lower bearing for the operating-shaft coacts with the arrangement of the worm-bearing to effect this result. This construction is very convenient, as, where a number of greenhouses adjoin one another the hand-wheels of the operating-shafts may be brought close together, so that the ventilation for several houses may be managed from a common point. The worm-gear also forms a simple locking device, whereby the shutters are held in different positions, as the worm-wheel must stay at the position to which it has been moved by the action of the worm.

Should it be desired to throw the machine out of action, in order to have the shaft operated automatically or for any other reason, the worm-bearing may be slipped back on the extension D to draw the worm out of mesh with the worm-wheel. The shutter-operating shaft is then left perfectly free.

It will be noted that a universal joint Q is shown in the operating-shaft. I have found that, particulary with a short shaft, it is very hard to aline the bearings sufficiently accurately to avoid all possibility of the shaft binding in one or the other. Indeed, experimental machines made with a rigid operating-shaft have been rejected by users for this reason. By using the universal joint all trouble is avoided and the operating-shaft may be easily rotated, even though the bearings be considerably out of alinement, without binding and without straining any of the parts. Even should the bearings be in accurate alinement trouble may be caused by the shaft being out of true. Further, as the shaft must be coupled after the machine is set up it is difficult to get the shaft true without the aid of an expert. The universal joint I employ also obviates this difficulty.

What I claim as my invention is—

1. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearing of the two shafts being thus a less distance apart than the radius of the internal gear; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; and an operating-shaft connected to the said worm.

2. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearing of the two shafts being thus a less distance apart than the radius of the internal gear; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a post; a collar movable thereon; a sleeve extending laterally from the collar; a bearing for the operating-shaft; a stud on said bearing journaled within the sleeve; and means for clamping the stud and sleeve together.

3. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearing of the two shafts being thus a less distance apart than the radius of the internal gear; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a post connected with the framing; and a bearing for the lower end of the operating-shaft secured to the said post.

4. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearing of the two shafts being thus a less distance apart than the radius of the internal gear; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a post connected with the framing; a collar movable thereon; a sleeve extending laterally from the collar; a bearing for the

operating-shaft; a stud on said bearing journaled within the sleeve; and means for clamping the stud and sleeve together.

5. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearings of the two shafts being thus a less distance apart than the radius of the internal gear; power-increasing gear carried by the said framing and adapted to operate the pinion-shaft; an operating-shaft adapted to operate the power-gear; a post; and a bearing for the lower end of the operating-shaft carried by the said post.

6. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearings of the two shafts being thus a less distance apart than the radius of the internal gear; power-increasing gear carried by the said framing and adapted to operate the pinion-shaft; an operating-shaft adapted to operate the power-gear; a post connected with the framing; and a bearing for the lower end of the operating-shaft carried by the said post.

7. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; an internal gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the internal gear, the bearings of the two shafts being thus a less distance apart than the radius of the internal gear; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable and laterally movable on part of the framing; and an operating-shaft connected to the said worm.

8. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; a gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft and meshing with the gear; power-increasing gear carried by the said framing and adapted to operate the pinion-shaft; an operating-shaft adapted to operate the power-gear; a post connected with the framing; and a bearing for the lower end of the operating-shaft carried by the said post.

9. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; a gear secured to the shaft; a pinion-shaft journaled in the framing; a pinion secured to the said shaft; a worm-wheel secured to the pinion-shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a post; a collar movable thereon; a sleeve extending laterally from the collar; a bearing for the operating-shaft; a stud on said bearing journaled within the sleeve; and means for clamping the stud and sleeve together.

10. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; a short shaft journaled in the framing; gearing between the two shafts; a worm-wheel on the short shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a post; a collar movable thereon; a sleeve extending laterally from the collar; a bearing for the operating-shaft; a stud on said bearing journaled within the sleeve; and means for clamping the stud and sleeve together.

11. In shaft-operating apparatus a framing; an oscillating shaft journaled therein; a short shaft journaled in the framing; gearing between the two shafts; a worm-wheel on the short shaft; a worm meshing therewith; a bearing for the worm rotatable on part of the framing; an operating-shaft connected to the said worm; a universal joint in the shaft; a post; a collar movable thereon; a sleeve extending laterally from the collar; a bearing for the operating-shaft; a stud on said bearing journaled within the sleeve; and means for clamping the stud and sleeve together.

Toronto, February 27, 1905.

ROBERT WILLIAM KING.

In presence of—
J. EDW. MAYBEE,
P. R. JONES.