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C. K. LONGENECKER.

SELF OILING STEAM ENGINE.

No. 561,120. Patented June 2, 1896.

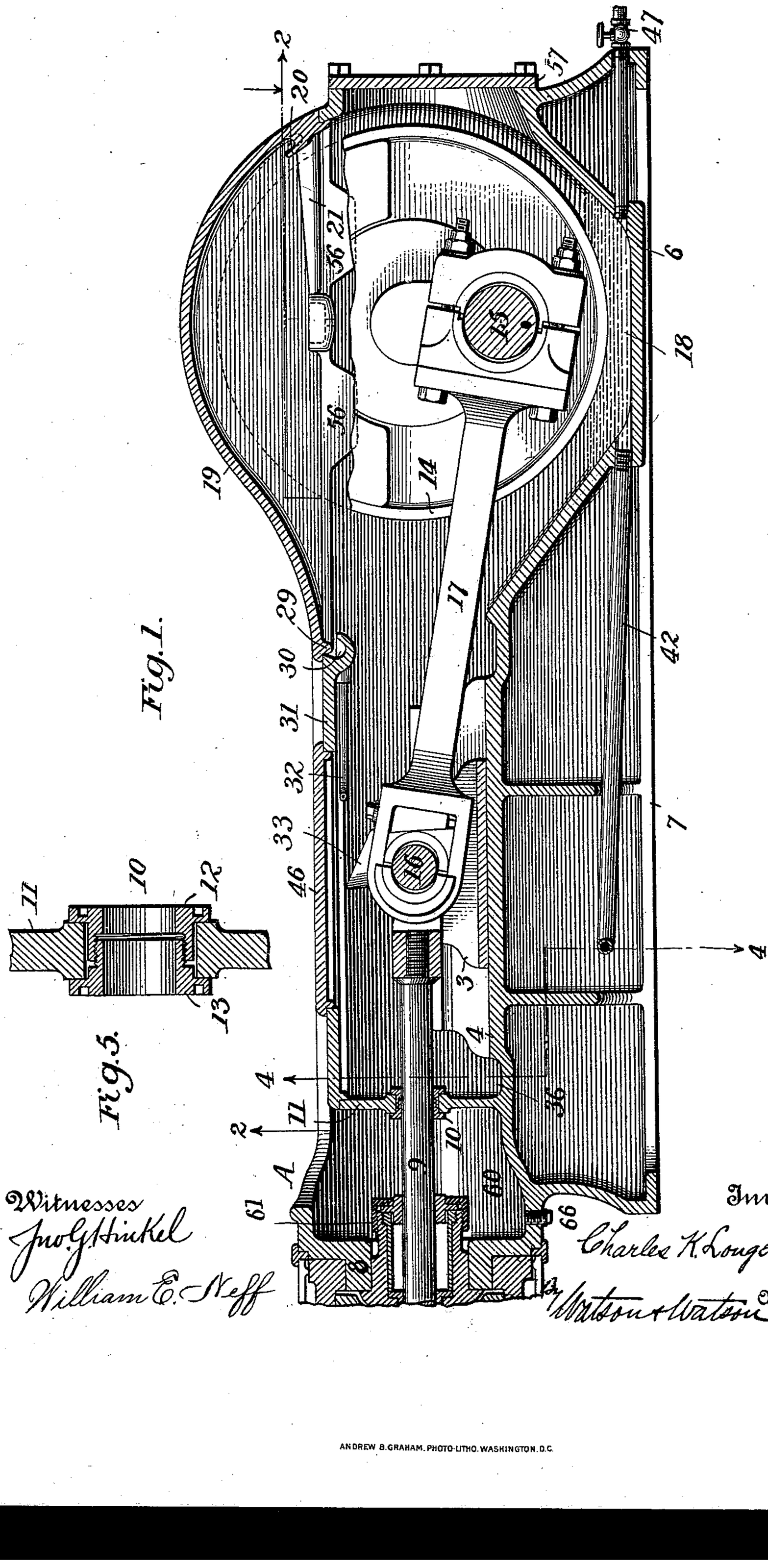

Fig. 1.

Fig. 3.

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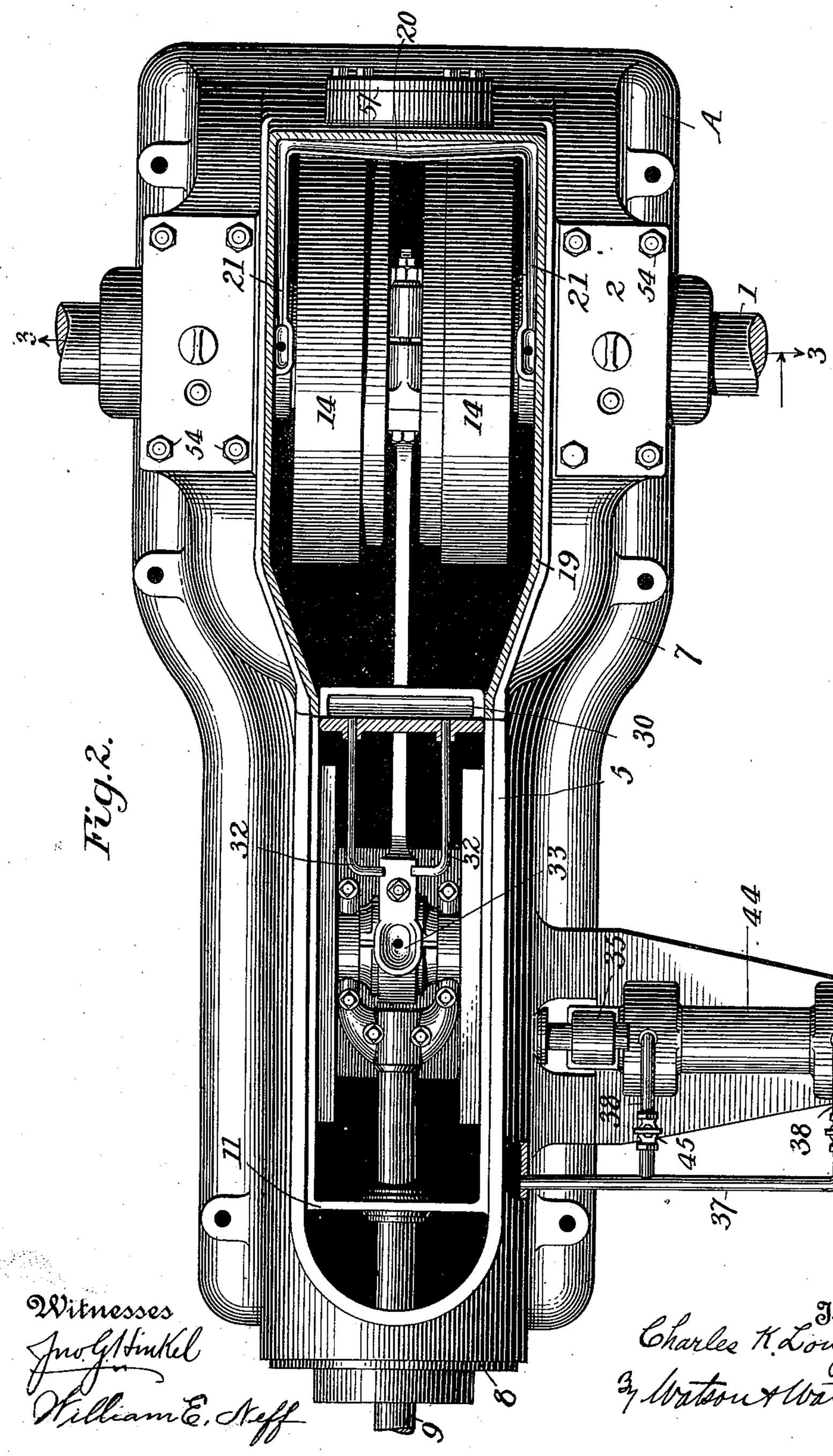

Fig. 2.

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Fig. 3.

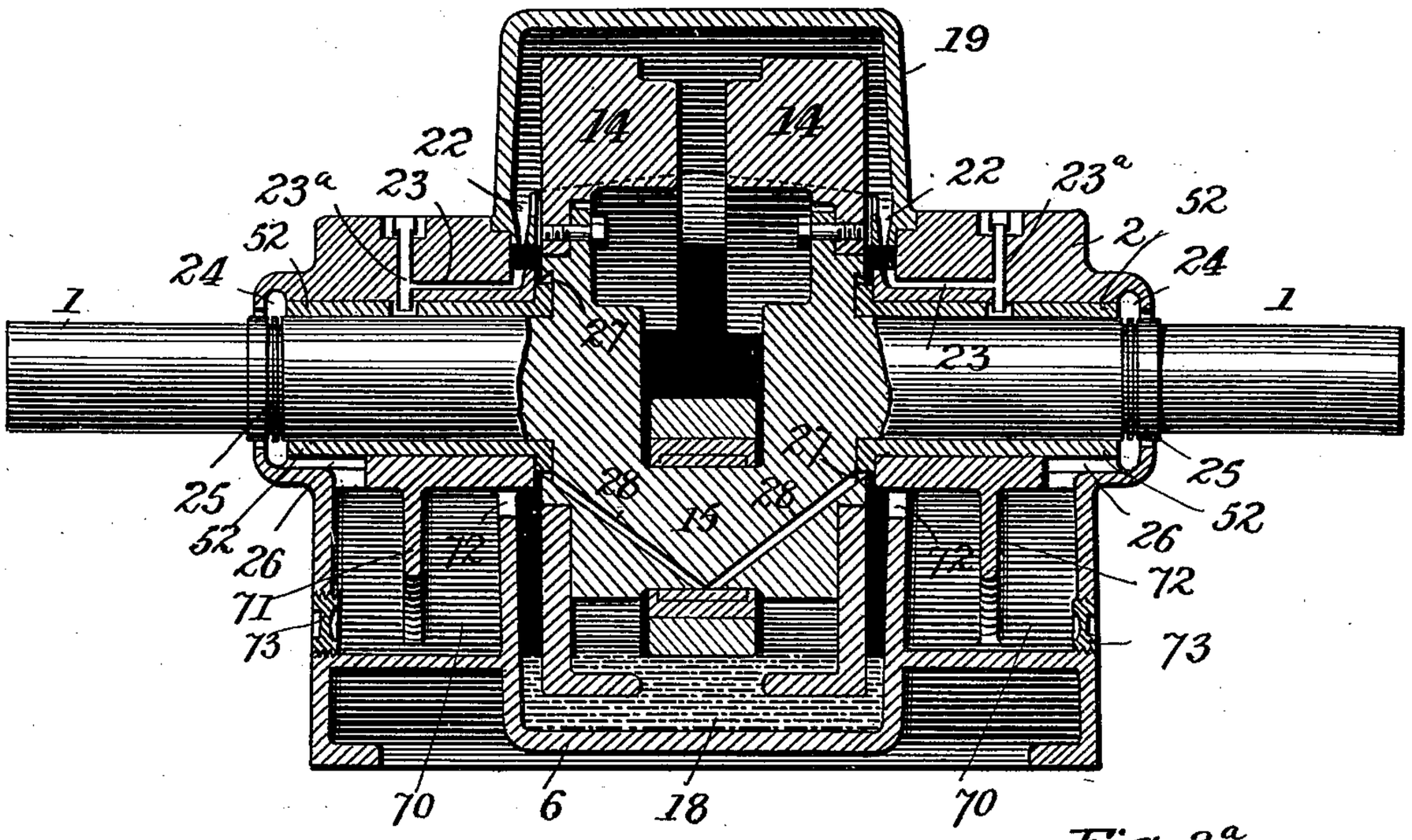

Fig. 3.a

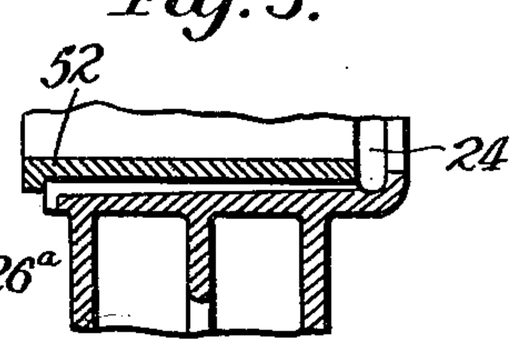

Fig. 4.

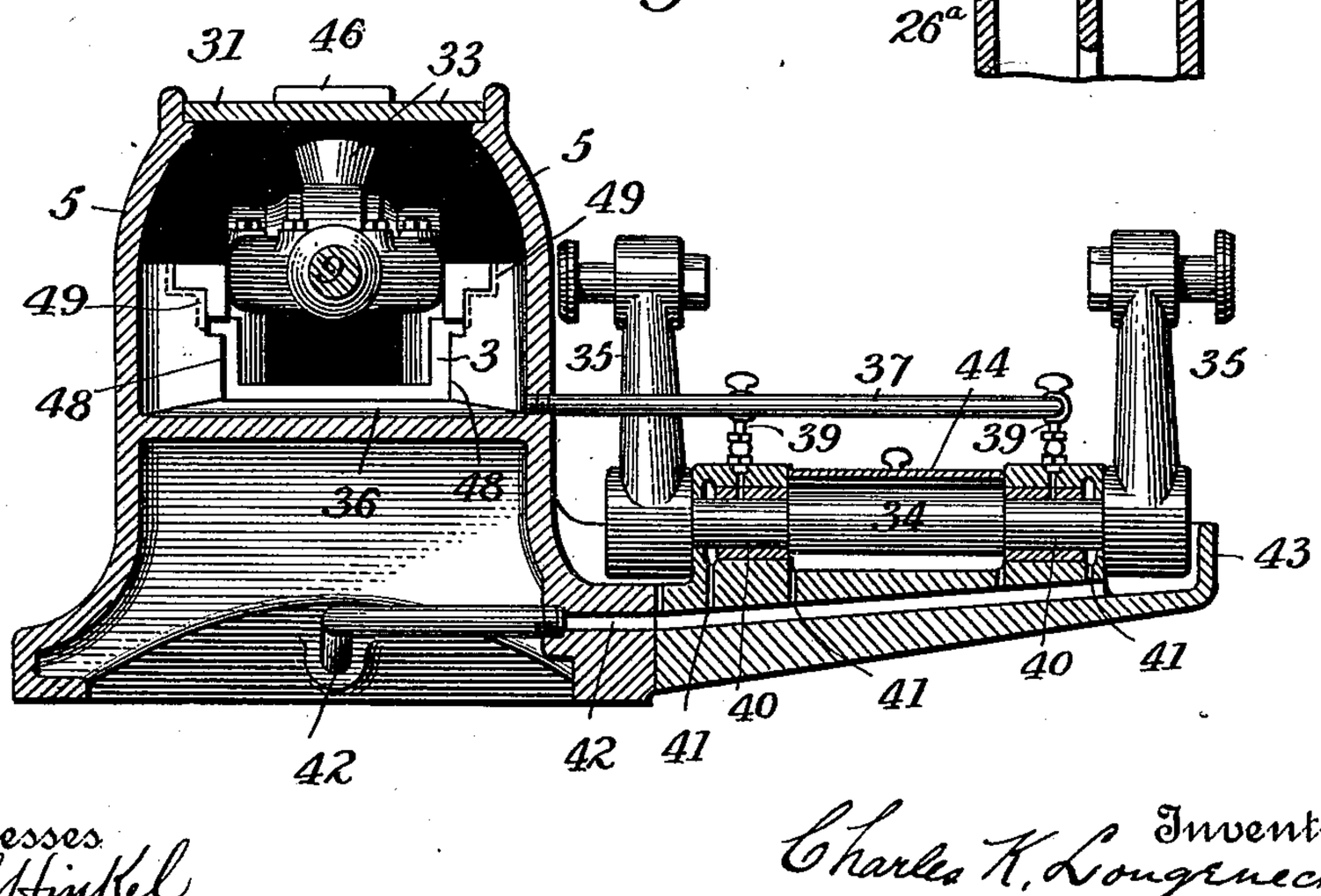

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Fig. 6.

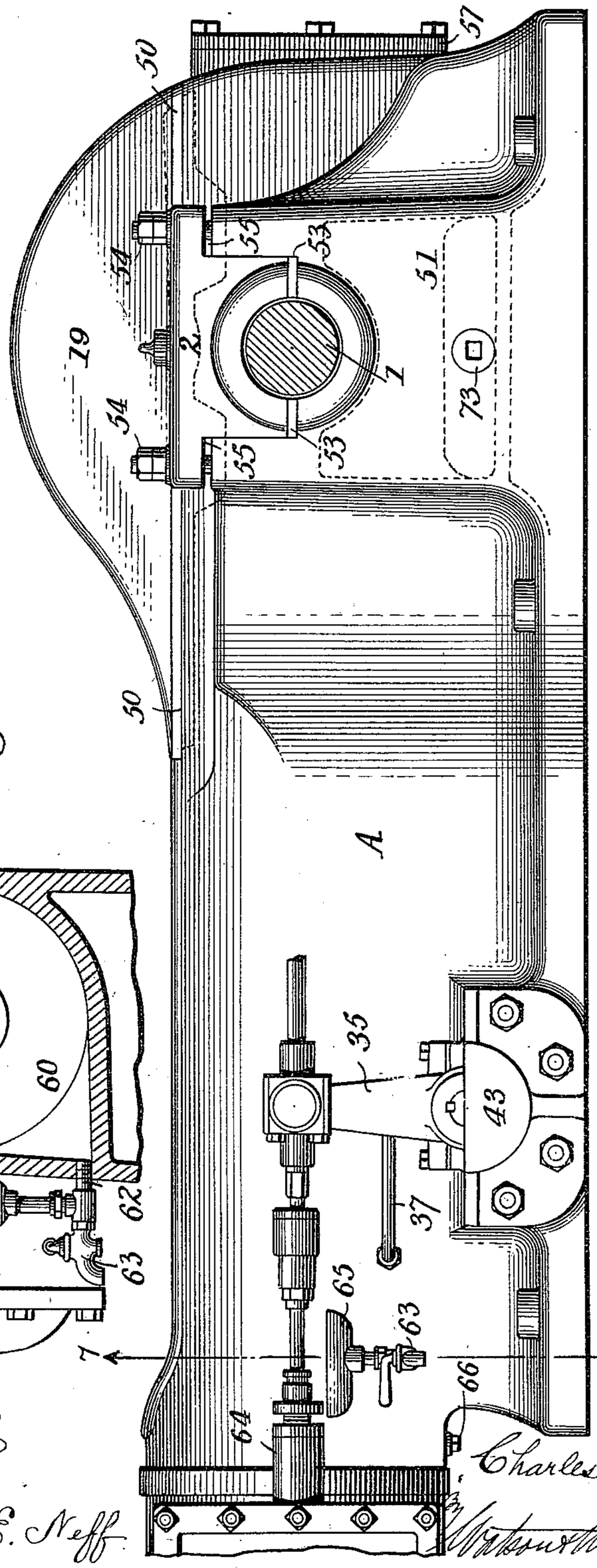
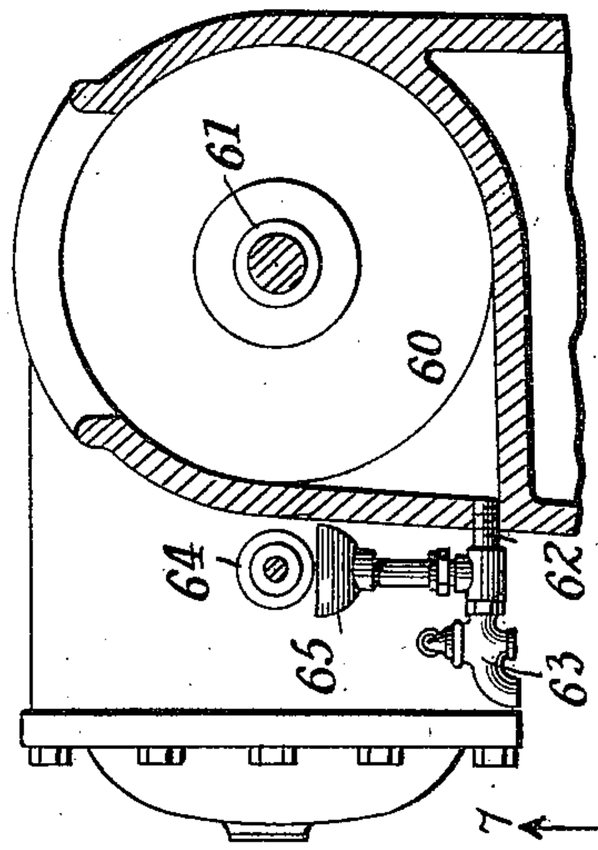


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES K. LONGENECKER, OF BROOKLYN, NEW YORK.

SELF-OILING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 561,120, dated June 2, 1896.

Application filed March 4, 1896. Serial No. 581,813. (No model.)

To all whom it may concern:

Be it known that I, CHARLES K. LONGENECKER, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Self-Oiling Steam-Engines, of which the following is a specification.

My invention relates to self-oiling engines, and more particularly to a construction which is designed to continuously and automatically lubricate the crank-shaft, the crank-pin, the cross-head pin and guides, and the shaft carrying the rocker-arms of the valve-gear.

For a detailed description of the invention reference is had to the specification and to the accompanying drawings, in which—

Figure 1 is a central sectional view of so much of an engine as is necessary to illustrate my invention. Fig. 2 is a plan view of the same, portions of the covers being removed on the section-line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 2. Fig. 3ª is a detail of a modification. Fig. 4 is a section on the line 4 4 of Fig. 1. Fig. 5 is a detail showing the construction of the gland in the partition-plate. Fig. 6 is a side elevation of the trunk or frame, and Fig. 7 is a section on the line 7 7 of Fig. 6.

Referring to the drawings, A indicates the engine-frame, which consists of a hollow box-like trunk, in the larger end of which the crank-shaft 1 is mounted in suitable bearings 2, and in the smaller end of which the cross-head 3 rides on a suitable bed or guide 4. The sides 5 of the frame, the bottom 6, and a suitable base 7 are preferably cast in one piece.

The cylinder, which is not shown in the drawings, is attached to the smaller end 8 of the frame in the usual manner. The piston-rod passes through a gland 10 in a partition-plate 11, arranged between the cross-head guide and the stuffing-box of the cylinder. The partition 11 is preferably cast integral with the frame. The gland 10 fits in a circular opening in the partition 11. The outer surface of the gland is of less diameter than the opening in the partition, so that the gland may readily adjust itself to the line of the piston-rod, which line is liable to change slightly as the bearing of the cross-head wears. The gland is composed of two parts 12 13, united by a screw-joint, as shown in Fig. 5, and having flanges which fit against the faces of the partition-plate. The object of the partition 11 will be stated hereinafter. That portion of the trunk or frame between the partition 11 and the cylinder is open at the top, so that the stuffing-box can be readily inspected. The remainder of the frame is closed to prevent the escape of oil and the admission of dust to the crank-shaft and cross-head bearings. The covers will be described in detail in connection with the description of the self-oiling devices.

The crank-shaft 1, the cranks, and the crank-pin 15 are cast or forged integral. Upon the crank-shaft and attached to the cranks by suitable bolts are crank-disks 14, which are thickened opposite the crank-pin to counterbalance the pin and connecting-rod. The crank-pin is connected with the cross-head pin 16 by the usual connecting-rod 17. The depression 18 in the frame, in which the crank-disks revolve, forms an oil-reservoir. The oil from this reservoir is picked up by the peripheries of the crank-disks and thrown by centrifugal force partly upon the cross-head guide and partly upon the under surface of the covers, and from these surfaces it is distributed to the various bearings of the engine.

The cover 19, which is over the crank-disks, preferably has a circular upper surface concentric with the disks. One portion of this surface inclines to the right and the other portion to the left. The oil which is thrown by the disks upon the under surface of the cover 19 flows to the right and to the left from the summit of the cover. The portion which flows to the right is caught in a transverse duct 20 and divides, one-half going to each side of the cover, as shown in Figs. 1 and 2. Longitudinal ducts 21 convey the oil to the openings 22 over the crank-shaft, and from these openings it is discharged into ducts 23, which lead the oil to vertical ducts 23ª at the central points of the crank-shaft bearings. This oil works inward and outward along the bearings. At the outer edge of the bearing there is a circular groove 24, and opposite this groove one or more circular grooves 25 are cut in the shaft. As the oil works out along the bear-

ing it is thrown off by the edge of the groove 25 and by the ridges between the grooves, if there is a plurality of grooves, by centrifugal force, and caught in the circular channel 24. From the bottom of this channel 24 the oil is conveyed back to the reservoir 18. As shown in Fig. 3, there are settling-reservoirs 70, into which the oil falls from the return-ducts 26. The reservoirs 70 are located under the crank-shaft bearings, and their upper portions are divided by partitions 71, extending downward from the bearings a considerable distance and partially dividing the reservoirs into two compartments. The duct 26 empties in the outer compartments and the oil passes under the partition 71, depositing its dirt in the bottom of each chamber, and then upward and out through an opening 72 in the upper part of the inner wall. From the opening 72 the oil falls into the main reservoir 18 in the crank-pit. I provide suitable openings in the outer walls of the settling-reservoirs to permit of the dirt being cleaned out periodically. As shown, these openings are circular and are closed by screw-threaded plugs 73. In Fig. 3ª I have shown a modification in which the settling-reservoir is dispensed with and the oil from the channel 24 is conveyed directly to the reservoir 18 by a duct 26ª.

The oil which works inward from the ducts 23ª is thrown outward along the faces of the crank-disks by centrifugal force and gathered in circular grooves or gutters 27 and is conveyed thence by ducts 28 to the crank-pin, as shown in Fig. 3. After lubricating the crank-pin the oil drops back into the reservoir or is thrown against the cover 19.

The oil which is thrown against that portion of the cover 19 to the left of the summit runs down and drips off of the rib or bead 29 into a transverse trough 30, which, as shown, is cast integral with a flat cover-plate 31, extending from the partition 11 to the cover 19. From the trough 30 the oil is led by one or more ducts 32 so that it may drip onto the cross-head pin and cross-head bearing. As shown, the connecting-rod is furnished with a cup 33 over the cross-head pin 16, the cup being somewhat elongated and adapted to catch sufficient oil to lubricate the pin as it passes under the discharge-openings of the ducts 32. The ducts 32 discharge at the position occupied by the cup 33 when the piston is at the end of its stroke, and the cup therefore receives oil during about one-fourth of each revolution of the crank-shaft. From the cup 33 the oil passes down through a central perforation onto the pin, and from the pin it drops down onto the cross-head slide. The cross-head slide and pin are thus continuously and automatically lubricated.

The rock-shaft 34, which carries the rocker-arms 35, through which motion is transmitted from an eccentric on the crank-shaft to the slide-valve, is lubricated by the following-described arrangement of ducts: A considerable portion of oil is thrown directly from the crank-disks onto and over the cross-head, and such oil or the bulk of it passes into a trough 36, formed in the casting between the cross-head bearing and the partition 11. Furthermore, a considerable part of the oil which drips from the ducts 32 is carried by the cross-head into the trough 36. From this trough 36 the oil is led by a pipe or duct 37, branches 38, and vertical tubes 39 to the rock-shaft bearings 40. From the rock-shaft bearings the oil passes down through perforations 41 into a return-duct 42, which leads the oil back to the reservoir 18. The casting which supports the rock-shaft has a surrounding flange 43, which forms a dish to catch any oil that does not pass directly through the openings 41, and from the bottom of this dish the oil passes to the return-duct 42 through suitable channels. To prevent the oil from evaporating and to exclude the dust, I provide the rock-shaft with a suitable cover 44. Portions of the tubes 39 are preferably of glass to provide for "sight-feed," and suitable valves 45 are provided for regulating the feed. The troughs and ducts for lubricating the crank-shaft and the cross-head are, as shown, formed upon or connected with the covers 19 and 31. It will be evident that they might be integral with the frame; but I deem it preferable to have them upon the cover-plates, so that they may be readily removed and cleaned. The cover-plate 31 is provided with a central opening and a cover 46. The object of the supplemental cover is to permit inspection of the cross-head and the oil-ducts 32 without disturbing the oil-ducts. A drain-pipe 47 is provided for draining off the oil when it is desired to clean the oil-reservoir.

The partition-plate 11 prevents the oil from being thrown back against the cylinder-head, thus keeping it cool and pure and preventing waste and the disagreeable odor which is caused when the oil is permitted to come in contact with the heated cylinder. It also prevents the water that leaks from the cylinder through the stuffing-box from mixing with the oil. The bottom of the compartment 60 forms a basin in which the drip from the stuffing-box 61 of the cylinder is caught and retained, and from which it may be drawn off at intervals. As shown in Figs. 6 and 7, this water is drawn off through a pipe 62 and faucet 63; but I may provide any other suitable outlet for it. The basin 60 also serves to receive the drip from the valve-rod stuffing-box 64. This is caught in a cup 65, and from this cup it drains through pipe 62 into the basin. I also provide a plug 66 in the bottom of the basin, which may be removed and a permanent drain-pipe attached if desired. The side cross-head guides 48 are lubricated by oil which is thrown over them by the crank-disks and which runs down to the guides through ducts 49, as shown in Fig. 4.

In self-oiling engines as heretofore built the crank-shaft bearings have been divided on an inclined plane, and this has necessitated

making the joint between the casing and the cover inclined also. In such constructions it has been found impossible to prevent the oil from leaking through the lower part of this joint, and in some instances devices have been arranged to catch such oil and conduct it back to the reservoir under the crank-shaft. By my improved construction, as shown particularly in Figs. 1 and 6, the oil is prevented from leaking through the trunk or frame at any point. The joint 50 between the cover 19 and the frame A is substantially horizontal, excepting at the crank-shaft bearings 2. These bearings are in laterally-projecting portions 51 of the frame, and provision is made, as shown in Fig. 3, for conducting all the oil from the bearings back to the reservoir. The bearings are lined with half-cylinders 52 of Babbitt metal, which are separated and prevented from turning by strips 53 of the same material. These strips are clamped tightly in place by the nuts 54, and there is no tendency to leakage along their joints. The only openings in the trunk at which leakage might occur are the joints 55, which are open to permit of adjustment of the bearing, and to prevent access of oil to these joints the sides of the cover 19 are formed with skirts 56, which depend below the joints.

Among the advantages of the construction above outlined it may be stated that the cover is smaller and lighter than covers which are carried down to an inclined joint, and therefore more easily handled. The joint being horizontal it can be more easily planed to a smooth and even surface, and, finally, I am enabled to cast the frame with solid sides extending up above the bearings and thus preventing all possible leakage. To permit of convenient access to the oil-reservoir and the crank-pin, I preferably provide the end of the frame with a removable plate 57.

In the accompanying drawings the fly-wheel, the governor, the cylinder, and various other parts which are not necessary to the illustration of my invention have been omitted. These parts may be of any desired form of construction.

It will also be evident that the mechanical details of construction embodying the invention may be more or less varied without departing from the scope and spirit thereof.

Without, therefore, limiting myself to the precise construction and arrangement illustrated and described, I claim—

1. In a self-lubricating engine, the combination with a hollow frame or trunk, of the crank-shaft journaled in the frame and carrying a crank-disk and crank-pin, a depression in the frame beneath the crank-disk forming an oil-reservoir, a cover-plate inclosing the frame above the crank-disk, a transverse trough 20 arranged to receive the oil from the cover-plate, longitudinal ducts within the cover between the trough 20 and the inner ends of the crank-shaft bearings, ducts in said bearings for conveying the oil to the middle of the crank-shaft journals, and ducts within the frame leading from the outer ends of the crank-shaft journals back to the reservoir, whereby the crank-shaft journals are continuously lubricated without exposing the lubricant to the outer atmosphere, substantially as described.

2. In a self-oiling engine, the combination with the frame having an oil-reservoir and the crank-shaft journaled in the frame and provided with a crank-disk, of means for automatically feeding the oil from the reservoir to the crank-shaft bearings, circumferential gutters 24 in the outer ends of the crank-shaft bearings, circumferential grooves and an intermediate ridge on the crank-shaft opposite said gutters, and ducts leading from said gutters back to the oil-reservoir, substantially as described.

3. In a self-oiling engine, the trunk having integral sides and bottom, and removable covers, one end of said trunk having bearings for the crank-shaft and a depression forming an oil-reservoir, and the other end of said trunk having a cross-head guide, and a partition-plate 11 provided with a gland through which the piston passes, the space within said trunk being entirely inclosed to prevent the evaporation of oil and the access of dust to the bearings, substantially as described.

4. In a self-oiling engine, a trunk or frame, inclosing, and having bearings for, the cross-head and crank-shaft, and having a closed partition between the cross-head bearing and the cylinder, said partition being provided with a gland for the piston-rod, whereby the oil within the trunk is preserved from the heat of the cylinder, and the leakage from the cylinder is prevented from mingling with the oil, substantially as described.

5. In a self-oiling engine, the combination with a closed trunk or frame, a cross-head movable within the trunk in suitable bearings, means for supplying oil continuously and automatically to the cross-head, a trough 36 arranged to receive oil from the cross-head and crank-disks, a rock-shaft to which the valve-gear is connected, ducts leading from the trough 36 to the rock-shaft bearings, and ducts leading from the rock-shaft bearings back to the source of oil supply, substantially as described.

6. In a self-oiling engine, the frame or trunk having the upper edges of its sides substantially horizontal on both sides of the crank-bearings, in combination with a cover extending over the crank-shaft and closing the frame, the joint between the frame and cover being horizontal, substantially as described.

7. In a self-oiling engine, the frame or trunk having its sides extending above the crank-bearings and terminating in substantially horizontal edges, in combination with a cover closing the frame above the crank-shaft, said cover being provided with skirts which extend below the openings of the bearings and pre-

vent the access of oil to said openings, substantially as described.

8. In a self-oiling engine, the combination with the frame having an oil-reservoir in the crank-pit, and the crank-shaft journaled in the frame, of means for automatically feeding oil from said reservoir to the crank-shaft bearings, settling-chambers under said bearings, said settling-chambers being provided with partitions 71 which divide their upper portion into two compartments, ducts leading from the crank-shaft bearings to the outer compartments of the settling-chambers, and openings leading from the upper portions of the inner compartments back to the oil-reservoir, substantially as described.

9. In a self-oiling engine, the hollow frame or trunk, the partition-plate in said frame between the cylinder and the cross-head bearings, the drip-basin included between said cylinder-head and partition-plate, means for conducting the drip from the valve-rod stuffing-box to said basin, and means for drawing off the accumulated water from said basin, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES K. LONGENECKER.

Witnesses:
JULIAN SCHOLL,
F. WM. HEISLER.