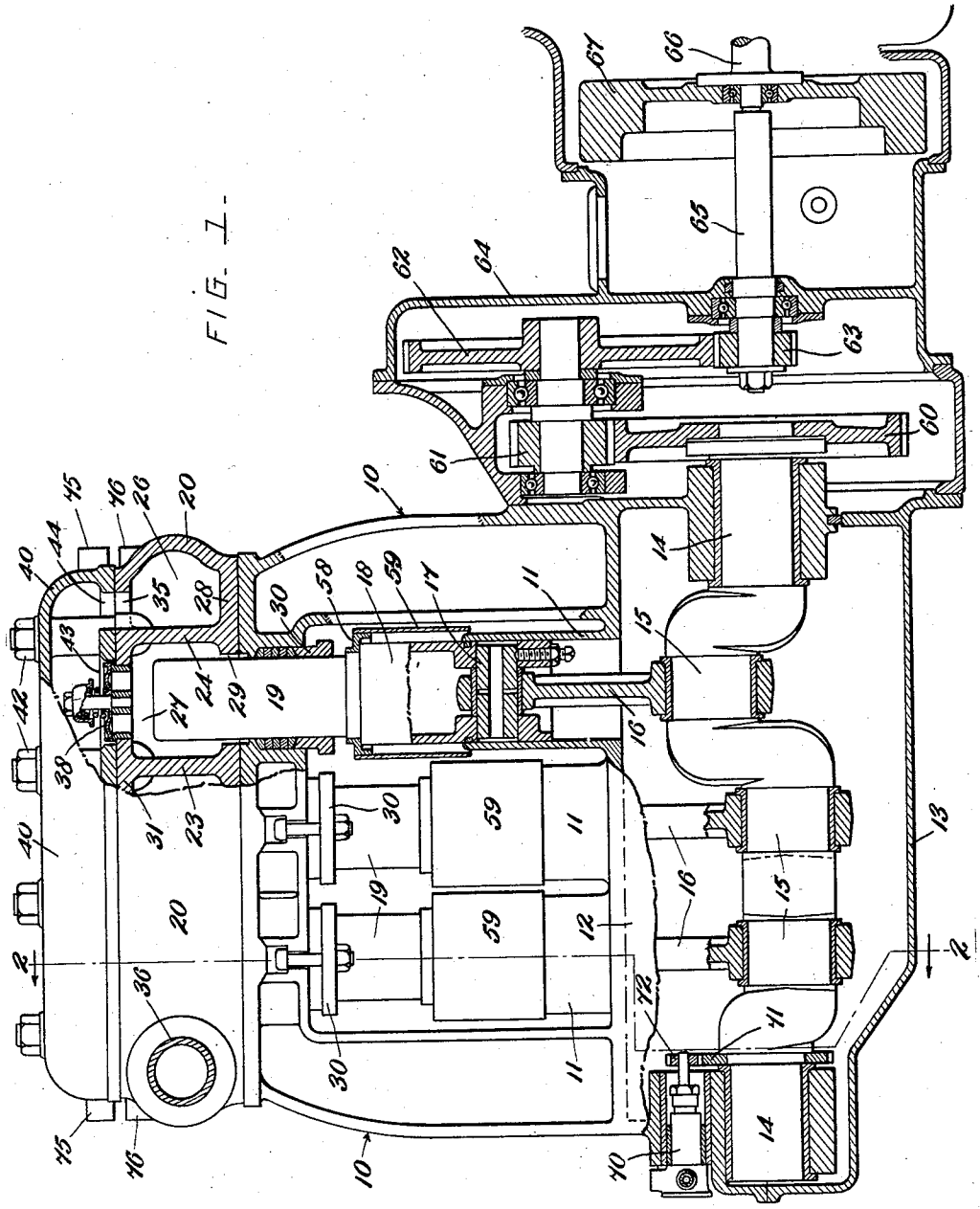
March 18, 1930. C. I. LONGENECKER 1,751,413

MULTIPLE CYLINDER RECIPROCATING WATER PUMP

Filed April 23, 1928 3 Sheets-Sheet 1

FIG. 1.



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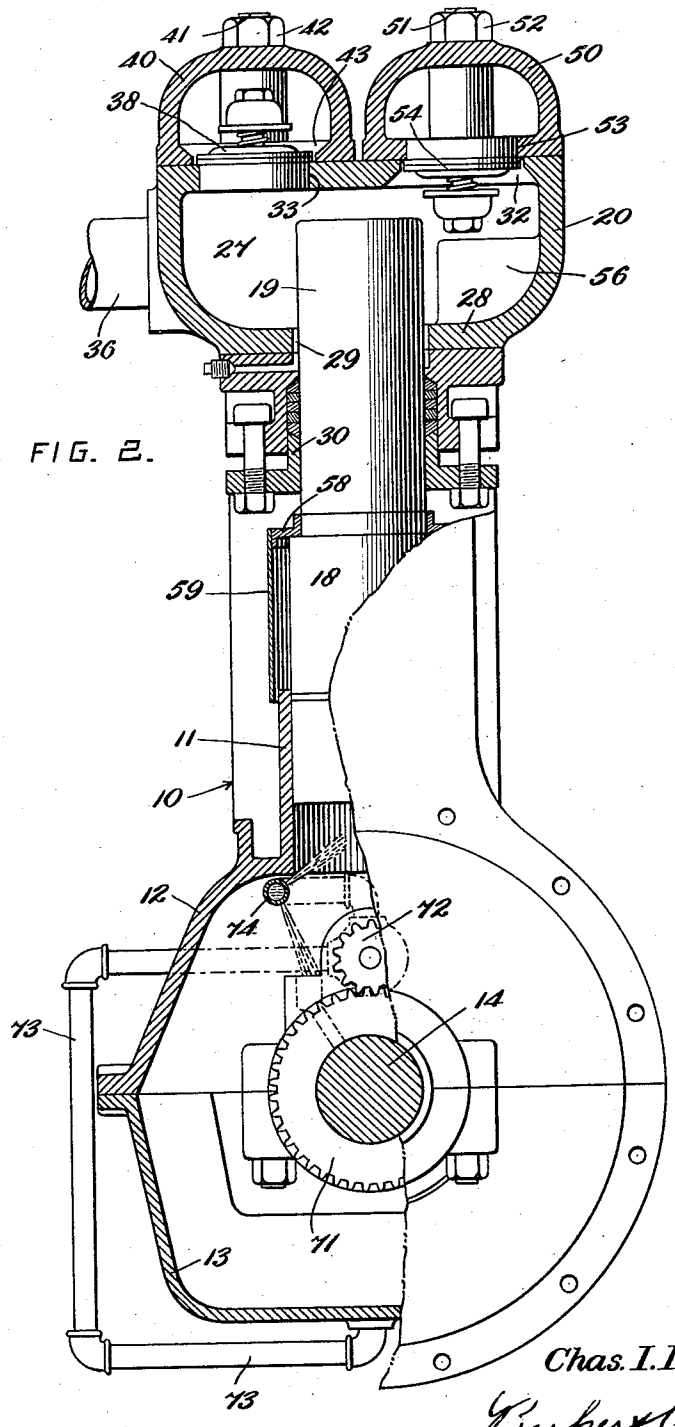


FIG. 2.

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MULTIPLE CYLINDER RECIPROCATING WATER PUMP

Filed April 23, 1928 3 Sheets-Sheet 3

FIG. 3.

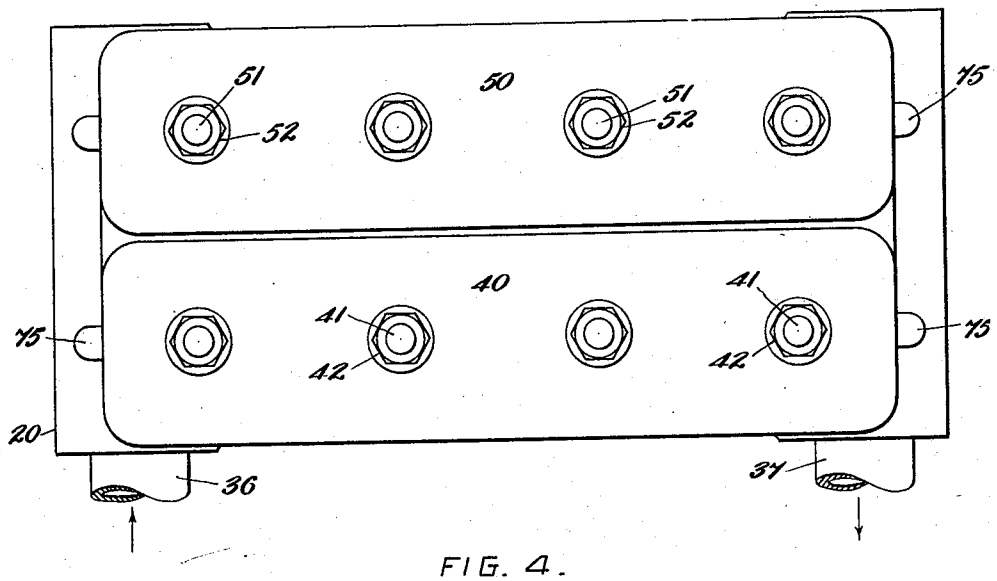


FIG. 4.

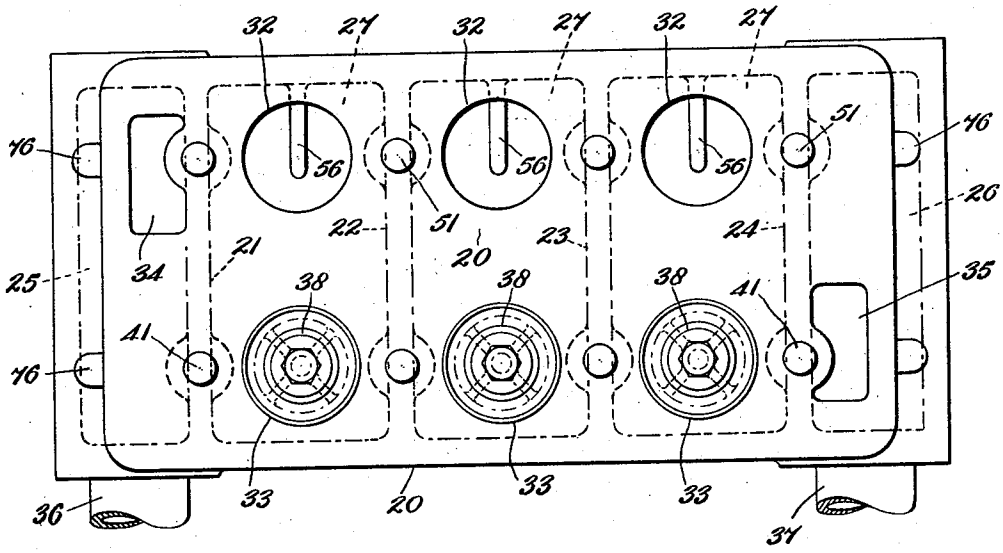
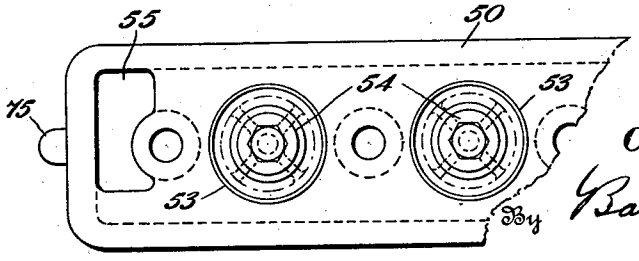


FIG. 5.



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UNITED STATES PATENT OFFICE

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MULTIPLE-CYLINDER RECIPROCATING WATER PUMP

Application filed April 23, 1928. Serial No. 272,078.

This invention relates to multiple cylinder reciprocating water pumps and has for one of its objects to provide an apparatus of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in use than those which have been heretofore proposed.

A further object of the invention is to provide a pump of the character described in which the working chambers are disposed above the crank shaft as distinguished from the usual type of pump in which the cylinders are arranged in the base below an exposed overhead crank shaft whereby it is possible to provide a construction in which lubrication problems are reduced to a minimum while at the same time the intake and discharge valves may be arranged in a very accessible position to the end that they may be easily exposed to view for examination, cleaning, or renewal in case of damage.

In the case of a pump constructed in accordance with the present invention in which the water box containing the working chambers is disposed above the crank shaft and the crank casing, which latter contains lubricating oil for the working parts, it becomes important to prevent leakage of the water from the working chambers into the crank case with consequent dilution of the oil and impairment of its lubricating qualities, and it is a further object of the invention to provide means whereby such leakage and contamination of the lubricating oil may be prevented.

A still further object of the invention resides in the provision of an intake and discharge manifold or manifolds for housing the intake and discharge valves, which manifolds are readily detachable from the water box to expose the said valves without in any way disturbing the supply and discharge pipes.

With the above and other objects in view which will appear as the description proceeds the invention consists in the novel details of construction and combinations of parts more fully heretofore disclosed and particularly pointed out in the appended claims.

Referring to the accompanying drawings forming a part of this specification, in which like reference characters designate like parts in all the views, Fig. 1 is a composite side elevational longitudinal sectional view of a pump constructed in accordance with the present invention.

Fig. 2 is an enlarged transverse sectional view taken approximately on the plane indicated by the line 2—2 of Fig. 1 with a portion of the frame and crank casing being shown in elevation.

Fig. 3 is a top plan view of the water box and intake and discharge manifolds.

Fig. 4 is a view similar to Fig. 3 but with the intake and discharge manifolds removed, and

Fig. 5 is a fragmentary inverted plan view of the intake manifold removed from the pump.

Referring more particularly to the said drawings numeral 10 indicates generally a framework which preferably takes the form of a casting and which is provided with a plurality of upwardly extending longitudinally aligned cylindrical guides 11 and with a crank case 12 having the lower removable section or oil pan 13. Suitably journaled in the crank case 12 is a crank shaft 14 having a plurality of crank throws 15 which are connected through the medium of the connecting rods 16 and wrist pins 17 to cylindrical guides or pistons 18 which are slidably mounted within the cylinders 11 of the frame. The said pistons 18 are provided with the upwardly extending trunks or plungers 19 which constitute the compressing or working members of the pump as will appear more fully below.

Mounted upon the upper portion of the frame 10 above the longitudinally aligned guides or cylinders 11 is a water box 20 which may take the form of a hollow cast member provided with transverse partitions 21, 22, 23 and 24 dividing the said box into an intake chamber 25, an exhaust chamber 26 and three working chambers 27, as will be clear from Figs. 1 and 4. The bottom wall 28 of the water box 20 is provided with three openings 29, through which the plungers or trunks 19 may freely pass into the working chambers

27 and as is clearly shown in Figs. 1 and 2 these trunks or plungers pass through suitable glands or stuffing boxes 30 whereby leakage of water from the working chambers is prevented or reduced.

The upper wall 31 of the water box is provided with an intake port 32 and with a discharge port 33 for each of the working chambers 27. This said wall 31 is further provided with an intake passage 34 communicating with the intake chamber 25 and with a discharge passage 35 communicating with the discharge chamber 26, as clearly shown in Fig. 4. An intake pipe 36 communicates with and supplies water to the intake chamber 25, and a discharge pipe 37 commmunicates with and discharges water from the discharge chamber 26.

Into the discharge ports 33 of the water box 20 there are pressed or otherwise suitably secured the discharge valves 38 which may be of any suitable construction. As will be readily understood these valves open outwardly from the chambers 27 of the water box and control the flow of water from the said chambers. The said discharge valves are covered and housed by a discharge manifold 40, which preferably takes the form of a hollow casting which fits upon the upper surface of the water box and is detachably secured in place by a plurality of studs 41 and nuts 42. The bottom wall of the said manifold is provided with a plurality of openings or ports 43 which register with the ports 33 of the water box and through which portions of the discharge valves 38 project, as is clearly shown in Figs. 1 and 2. The bottom wall of the said discharge manifold 40 is further provided with a discharge passage 44, see Fig. 1, which registers with the passage 35 of the water box 20 whereby water may pass from the discharge manifold into the discharge chamber 26 of the water box and thence through the discharge pipe 37 to its point of use.

An intake manifold 50 is positioned upon the upper surface of the water box 20 adjacent to the discharge manifold 40 and is detachably secured in place by studs 51 and nuts 52. The bottom wall of the intake manifold is provided with ports or openings 53, which register with the intake ports 32 of the water box and suitable intake valves 54, which may be and preferably are of similar construction to the discharge valves 38, are pressed or otherwise secured in place in the said openings 53. The bottom wall of the intake manifold 50 is further provided with a passage 55 which is adapted to register with the passage 34 of the water box whereby communication is afforded between the intake chamber 25 of the said box and the intake manifold as may be readily understood.

From the construction which has just been described it will be clear that the discharge valves 38 are normally carried by the upper wall of the water box 20 and are covered and housed by the discharge manifold 40 which is readily removable so that the said valves may be easily exposed for cleaning and renewal in case of damage or wear. Likewise the intake valves 54 are carried by the bottom wall of the intake manifold 50 which latter manifold is also readily removable so that these valves may be readily exposed to inspection and repair.

It sometimes happens in actual practice that after long use the intake valves 54 may become loosened from the intake manifold 50 and will tend to drop into the working chambers 27 of the water box where they will be struck by the reciprocating plungers 19 with consequent damage to the parts. In order to prevent the dropping of these valves in case they become loose from the intake manifold I provide the water box 20 with a plurality of ribs or fins 56, one in each of the working chambers 27 and disposed immediately below the intake valves 54 so that in the event of the said valves becoming loose and tending to drop into the chambers they will rest upon these said ribs and be prevented from contacting with the reciprocating plungers 19.

While as above mentioned the plungers 19 pass through glands or stuffing boxes 30 which are intended to prevent leakage of water from the working chambers, it frequently happens that these glands wear to such an extent that more or less water will leak past the packing, and if no means is provided to prevent it the said water will find its way down past the pistons 18 and into the crank case 12 where it will form an emulsion with the lubricating oil, thereby reducing the lubricating qualities of the said oil. In order to prevent this I provide at the base of the plungers 19 where they join the pistons 18 a ring 58 which carries a downwardly extending sleeve or tube 59, which sleeve or tube telescopes over the outer surface of the upwardly extending stationary cylinders or guides 11. As will be readily understood such construction would prevent any leakage from finding its way into the case past the pistons 18.

The pump, of course, may be driven in any suitable manner, as for example by means of the reduction gears 60, 61, 62 and 63 mounted in a suitable housing 64, the latter of the said gears being mounted upon a power shaft 65 driven from any suitable source of power, as for example the crank shaft 66 of an internal combustion engine not shown. Said crank shaft may be provided with a fly wheel 67, which may house any suitable clutch mechanism not shown for connecting and disconnecting the pump from the engine.

Lubrication of the crank shaft, crank pins and the connecting rods as well as the cylindrical guides 11 and pistons 18 may be ac-

complished by the well splash system, or through the well-known pressure system, the latter being shown. An oil pump 70 is provided at the left hand end of the crank case as shown in Fig. 1, which pump may be driven thru the medium of the gears 71 and 72 from the crank shaft. Oil contained in the crank casing is withdrawn by the said pump through the pipe 73 and is discharged through a pipe 74 to spray upon the walls of the cylindrical guides 11 and upon the crank throws 15, as will be readily understood.

The operation of the pump will be readily apparent to those skilled in the art, it being understood, of course, that as the crank shaft 14 is rotated the pistons 18 will be reciprocated through their respective connecting rods 16 and the plungers 19 carried by the said pistons will be moved up and down within their respective working chambers 27. Upon the down stroke of the plungers the suction created thereby will open the intake valves 54 and allow water from the supply pipe 36 to flow through the intake chamber 25, the inlet passages 34 and 55, to the interior of the intake manifold and thence through the intake valves 54 into the working chambers 27. Upon the upward stroke of the plungers water will be forced out of the working chambers 27 through the discharge valves 38 into the discharge manifold 40 from whence it will pass through the passages 44 and 35 to the discharge chamber 26 of the water box 20 and thence through the discharge pipe 37 to its point of use.

It will thus be seen that this invention provides a multiple cylinder reciprocating pump in which the working chambers and the valves are arranged above the operating crank shaft where the said valves are readily accessible for inspection and repair. Furthermore, that under normal operating conditions these valves are effectively housed by readily removable intake and discharge manifolds and that provision is made for preventing leakage of water from the working chambers into the crank case where it would contaminate the lubricating oil.

The manifolds 40 and 50 are provided with lugs or projections 75 at each end thereof, which in the operative position of the manifolds register with similar lugs or projections 76 formed on the water box 20. As clearly shown in Fig. 1 the lugs 75 and 76 are slightly spaced, whereby a suitable tool may be introduced between them for the purpose of prying the manifolds loose, should they stick after long continued use. The lugs 75 furthermore afford means whereby the manifolds may be readily gripped and raised, after having been loosened.

While separate intake and discharge manifolds 40 and 50 have been illustrated, obviously they may, if desired, be combined into a single casting without in any way affecting the operation or other structural features of the pump.

While one form of the invention has been illustrated and described it is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure, except as may be required by the claims.

What is claimed is:

1. In a pump of the class described, a frame; a water box mounted on said frame, provided with inlet and outlet connections and a working chamber; a plunger working in said chamber; inlet and discharge valves communicating with said chamber; and an inlet and discharge manifold detachably secured to said water box, housing said valves.

2. In a pump of the class described, a frame; a water box mounted on said frame, provided with inlet and outlet connections and a plurality of working chambers, each having an inlet and a discharge port; plungers working in said chambers; discharge valves mounted in and controlling the discharge ports of said water box; a discharge manifold detachably secured to said water box, housing all of said discharge valves; an inlet manifold detachably secured to said water box, having ports registering with the inlet ports of said box; and inlet valves mounted in and controlling the ports of said inlet manifold.

3. In a pump of the class described, an upright frame; a water box mounted upon the top of said frame, provided with inlet and outlet connections and a plurality of working chambers; vertically reciprocating plungers working in said chambers; inlet and discharge valves controlling the passage of water to and from said chambers; a detachable discharge manifold surmounting said water box and housing said discharge valves; and a separate detachable inlet manifold surmounting said water box, housing said inlet valves.

4. In a pump of the class described, a frame; a water box surmounting said frame, provided with an inlet chamber, a discharge chamber, and a plurality of working chambers; plungers reciprocating in said working chambers; inlet and discharge valves controlling the passage of water to and from said working chambers; a detachable discharge manifold surmounting said water box, housing said discharge valves, and providing a passage therefrom to said discharge chamber; and a separate detachable inlet manifold also surmounting said water box, housing said inlet valves and providing a passage from said inlet chamber thereto.

5. In a pump of the class described, an upright frame; a water box surrounding said

frame, provided with an inlet chamber, a discharge chamber, a plurality of working chambers, and ports leading to each of said chambers; plungers reciprocating in each of said working chambers; discharge valves mounted in and controlling certain of the ports leading to said working chambers; a detachable discharge manifold surmounting said water box, housing said discharge valves, having a port registering with the port in said water box which communicates with said discharge chamber; a separate detachable inlet manifold surmounting said water box having a port registering with the port in said water box which communicates with said inlet chamber; and inlet valves carried by said inlet manifold for controlling certain other of the ports leading to said working chambers.

6. In a pump of the class described, a water box provided with working chambers having ports; a water manifold carried by said box; valves carried by said manifold for controlling said ports; and means for preventing said valves from dropping into said working chambers, should they become detached from said manifold.

7. In a pump of the class described, a water box provided with working chambers having ports; a water manifold carried by said box; valves carried by said manifold for controlling said ports; and means comprising projections in said working chambers beneath said valves for preventing said valves from dropping into said working chambers, should they become detached from said manifold.

CHARLES I. LONGENECKER.

CERTIFICATE OF CORRECTION.

Patent No. 1,751,413. Granted March 18, 1930, to

CHARLES I. LONGENECKER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 130, claim 5, for the word "surrounding" read "surmounting"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of April, A. D. 1930.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.