(No Model.)

2 Sheets—Sheet 1.

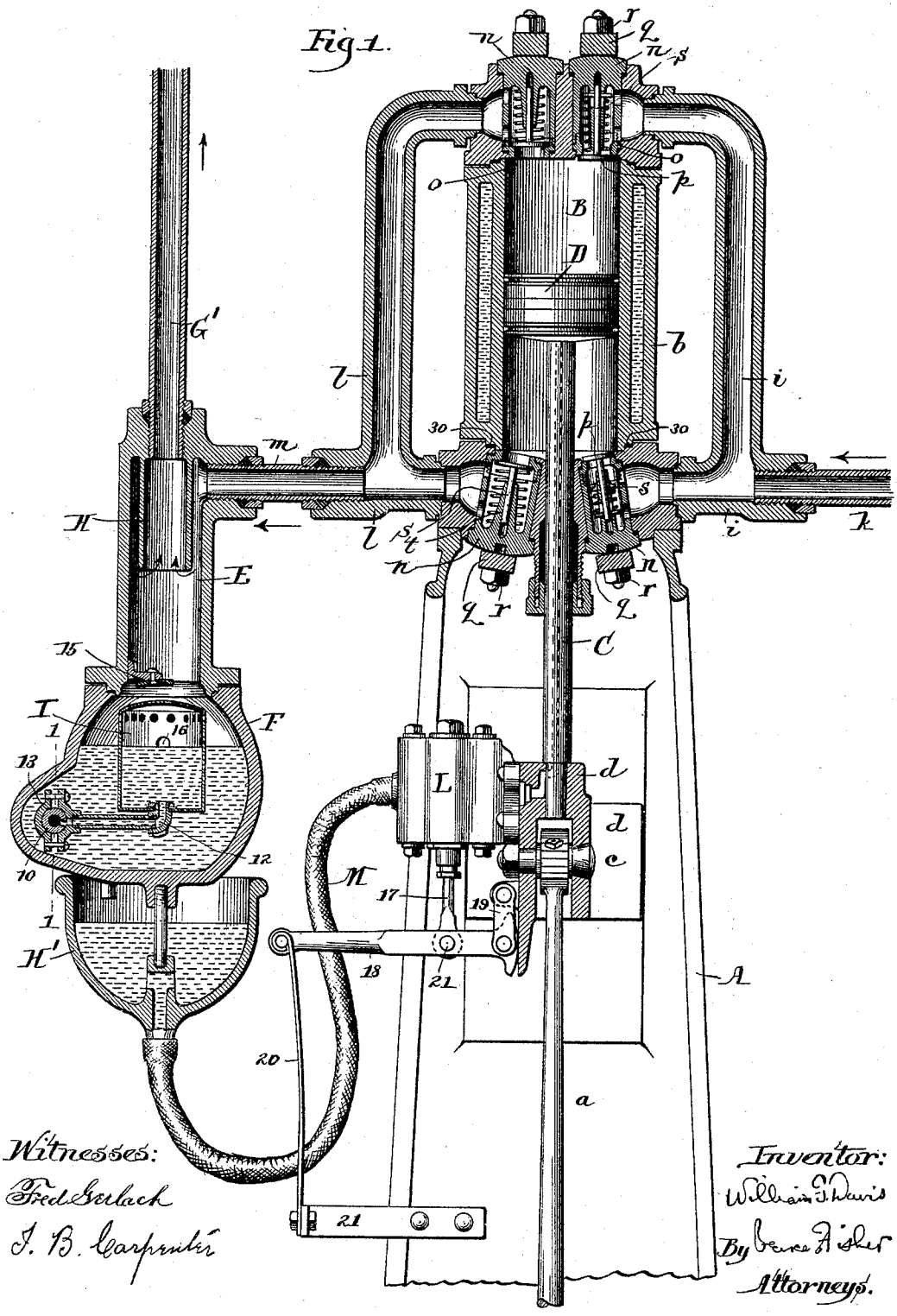
W. F. DAVIS.

COMPRESSION PUMP.

No. 497,092

Patented May 9, 1893.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

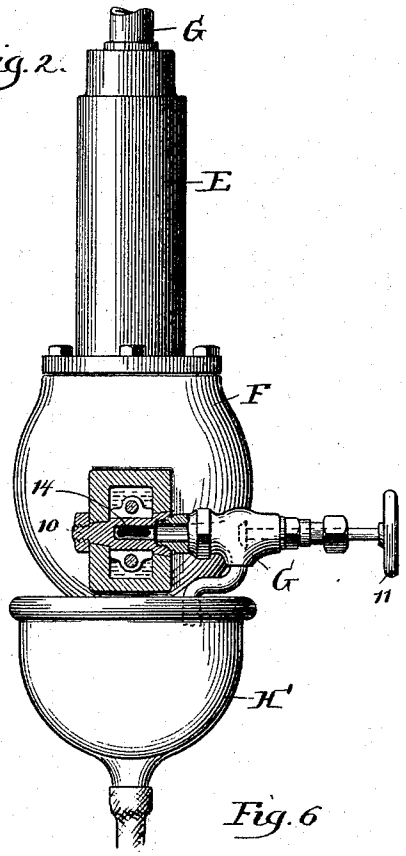


Fig. 3.

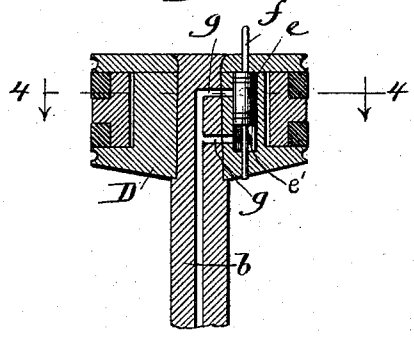


Fig. 4.

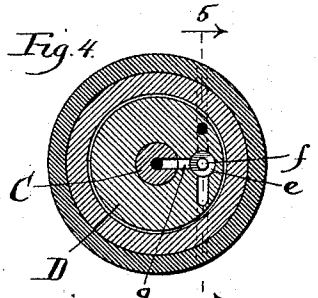


Fig. 5

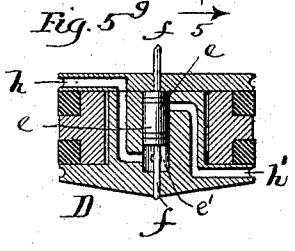
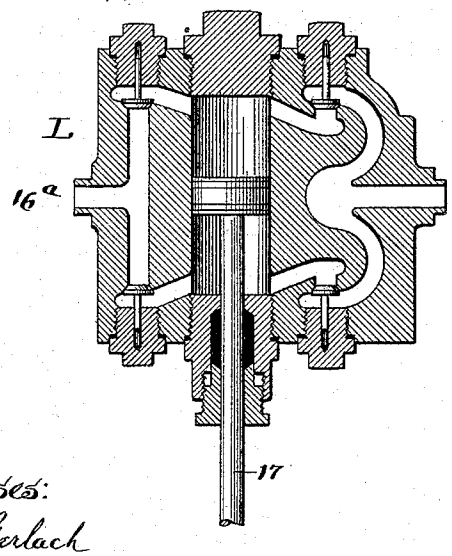


Fig. 6



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UNITED STATES PATENT OFFICE.

WILLIAM F. DAVIS, OF KANSAS CITY, KANSAS, ASSIGNOR OF ONE-FOURTH TO ROBERT H. DAVIS, OF RAYMOND, NEBRASKA.

COMPRESSION-PUMP.

SPECIFICATION forming part of Letters Patent No. 497,092, dated May 9, 1893.

Application filed November 16, 1891. Serial No. 412,013. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. DAVIS, residing at Kansas City, in the county of Wyandotte, State of Kansas, have invented certain new and useful Improvements in Compression-Pumps, of which the following is hereby declared to be a full, clear, and exact description, sufficient to enable others skilled in the art to which such invention appertains to make and use the same.

The invention relates to compression pumps, such, for example, as are used to condense the volatile refrigerant employed in ice-making plants, and in breweries, packing-houses, &c., and the object is to improve the structure of the pump and to provide efficient means for oiling the cylinder, and for saving the surplus lubricant.

The nature of the improvements will appear from the description following and be thereafter more distinctly pointed out by claims at the conclusion thereof.

In the accompanying drawings, which form part of this specification, like features of structure are designated by like reference symbols throughout.

Figure 1 is a view of the improved pump and surplus oil trap in longitudinal section; the oil supply pump for the main cylinder being shown in elevation. Fig. 2 is a side elevation view of the oil trap, its outlet cock being shown in longitudinal section on line 1—1 Fig. 1. Fig. 3 is a detail view of the main piston and its rod, in central longitudinal section. Fig. 4 is a view of the piston head in transverse section, on line 4—4 of Fig. 3. Fig. 5 is a section view of the piston showing the oil feed ports and control valve, on line 5—5 of Fig. 4. Fig. 6 is a view of the oil supply pump in central longitudinal section.

Mounted upon the upright frame or standards A is the compression pump B having water-jacket *b* surrounding its cylinder, as well understood, to aid in reducing temperature. The pump B is operated in the usual manner by means of the connecting rod *a* driven from the steam-engine or other ordinary source of power. The connecting rod *a* is united by wrist pin *c*, to the cross head *d*, which latter moves and is guided as usual in the opposite ways or channels of the frame A. The piston-rod C is connected at its outer end as usual, to the cross-head *d*, and at its inner end carries the piston D. Instead of being solid, the rod C is furnished with a tubular bore or channel which extends centrally therein, from the cross-head *d* to the interior of the piston D. The piston D is furnished internally with a longitudinal chamber which snugly receives and seats the valve *e* having stems *f* at opposite ends thereof which project for a slight distance beyond the the faces of the piston. Leading out from the valve-chamber *e'* are the ducts *g* which open into the tubular piston-rod C, said ducts being located apart at a distance sufficient to allow free ventage from the tubular piston rod to the valve chamber through one of the ducts, while the other is closed by the valve *e*. From the valve chamber *e'*, on opposite sides, lead the reverse feed-ducts *h h'* which discharge at the upper and lower rims of the piston respectively. In Figs. 3 and 5 of the drawings, the control valve *e* is shown in the position it maintains during the upward stroke of the piston. As the piston nears the end of such stroke, the projecting pintle of the valve *e* will contact with the end of the pump cylinder, thus reversing the valve, and establishing the lower ducts *h'* in communication with the valve chamber and the hollow piston-rod. By this provision the supply of oil is discharged at the rim of the piston directly in the lead of its advance, and whether upon the forward stroke or in reverse. An abundant supply of lubricant is thus provided at the piston, so that the rapid drying and heating of the cylinder due to the compression of the circulating agent, will not impair the efficiency of the piston which is kept constantly lubricated by means of the fresh flow of oil which it receives during each stroke.

The compression pump B is furnished with the companion inducts *i* and educts *l* which are united respectively to the feed-pipe *k*, and discharge pipe *m*, in closed connection with the other parts of the refrigerating system. The pump B has the usual heads secured in convenient manner to the pump cylinder, and carrying the induct and educt valves. The cylinder heads are bored to receive the cages *n* of the several valves, each cage being furnished with a hardened steel seat *o* screwed thereto,

and serving to receive the head *p* of the valves. The ledges or insets of the cylinder heads are made at nearly the same distance apart as the ledges of the cage *n* so that a gasket of lead or other material can be slipped over the cages, and serve to close the joint between the cages and head when the former are set in place, by means of the cross bar *q* and set-screws *r*. The valves are of ordinary pattern, having the heads *p* carried by stems *s*, sustained within guides *t* of the cages, and held in place by means of the reaction springs.

The excess oil which escapes from the main cylinder passes in company with the condensed refrigerant or other circulating agent by the common educt *m*, to the dome E of the trap or receiver F. A pipe G′ is tapped through the dome E, and communicates with the curtain H which serves as a screen for the mixed oil and agent, and permits the latter to proceed to its reservoir by pipe G′, while the oil is separated and drops from the dome E into the closed trap F. Through an off-set at one side of the trap F extends an outlet cock 10 tightly secured as shown, in the wall of the trap F, and furnished externally with an elbow coupling G fitted thereto, and discharging at its outer end into the open cup H′. The coupling G is furnished with a stem valve 11 which closes against its proper seat to obstruct the longitudinal vent of the cock 10. Within the trap F is a hollow float I perforated or open about its top, as shown, and having an outlet tube 12 at the bottom thereof which is coupled, as at 13, about the body of the cock 10, and is free to swivel for a limited distance thereon. A cross vent 14 in the cock 10, coincides at times with the mouth of the tube 12, and thus establishes free communication between the interior of the trap F, and the cup H′.

When the compression pump is first operated, the stem valve 11 of the coupling G is closed against its seat and so remains until the excess oil in trap F accumulates in sufficient volume to lift the float I against the stop 15, and thereafter until the oil passes by hole 16 into the float can and weights the same sufficiently to further submerge it in the oil of the trap F. The stem-valve 11 is thereupon opened and the oil which has accumulated in the can I flows at once through the cock 10 and coupling G to the cup H′, which being open to the air permits the oil to cool rapidly. The pressure of the main pump B expedites the flow of oil, but as the overflow-can I is gradually emptied, the surrounding volume of oil in the trap F, floats it higher so that when it rests against the stop 15, the cock 10 is closed, and the ventage of the condensed gas or like circulating agent is prevented.

In the form shown by the drawings, the force feeder for the oil-supply of the main cylinder, consists of a pump L of approved pattern, and which is attached at one side to the cross head *d* of the main pump. A flexible hose M unites the inducts 16^a (Fig. 6) of the oil pump with the surplus cup H′. The piston rod 17 of the feed pump carries at its outer end a cross-lever 18 which, by link 19, is suspended from the cross-head *d* and at its opposite end is pivoted to a yielding spring actuator 20 secured to a bracket 21 of the main frame. The inner end of the lever 18 has an arc-like terminal described from the fulcrum 21, as a center, by which expedient and its link suspender 19, the lever 18 bears snugly against the cross-head *d* and is at the same time free to turn in limited play about its fulcrum 21. The outer end of the cross-lever 18 being held in practically constant position by the actuator 20, operates to effect the reciprocation of the piston rod 17 in keeping with the movements of the cross-head *d*; the right-line throw of the rod 17 being assured by reason of the link connection 19 and the yielding actuator 20 of the operating lever 18. The oil supply pump L injects the oil into the main pump cylinder in unison with the movement of the main piston and its rod C, so that for each stroke of the latter, the oil is discharged portion-wise into the body of the main cylinder.

Obviously, the details of structure can be varied according to the skill of the mechanic without departing from the spirit of the invention, which is not limited to the precise devices herein set forth.

Gaskets 30 of lead, or the like, are seated between the companion ledges of the cylinder and its heads, and are snugly retained thereby so that they cannot be displaced whatever pressure is exerted in bringing the heads to gas tight position against the cylinder ends.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the main-pump having a hollow piston-rod, of the lubricant pump opening into, mounted upon and traveling with, said piston-rod, and a stationary actuator to shift the rod and piston of said lubricant pump during its reciprocating play, substantially as described.

2. The combination with the main-pump having a hollow piston-rod, dual piston ducts opening therefrom and a control valve to close said ducts alternately, of the supplemental or lubricant pump mounted upon and communicating with said hollow piston-rod and a stationary actuator to shift the piston rod of said supplemental pump, substantially as described.

3. In compression pumps, the combination with the hollow piston-rod, of a lubricant pump mounted and reciprocating therewith, said pump having a flexible supply tube, and a stationary spring actuator to determine the throw of the feed-piston and its rod, substantially as described.

4. The combination with the hollow piston-rod, of the lubricant pump mounted and trav-

eling therewith, its reciprocating piston-rod, the cross-lever secured thereto, and the fixed spring arm pivoted to said lever, substantially as described.

5. The combination with the main pump having a hollow piston-rod, of the piston-head having dual ducts opening at one side from said rod, and on the other side discharging at opposite rims of the piston respectively, and a control valve mounted within said piston, alternately closing the ducts therein, and having stem terminals projecting beyond the faces of said piston to reciprocate said valve, substantially as described.

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JAMES W. HILL.