(No Model.)

A. L. IDE.

ENGINE.

No. 569,832. Patented Oct. 20, 1896.

Fig. 1

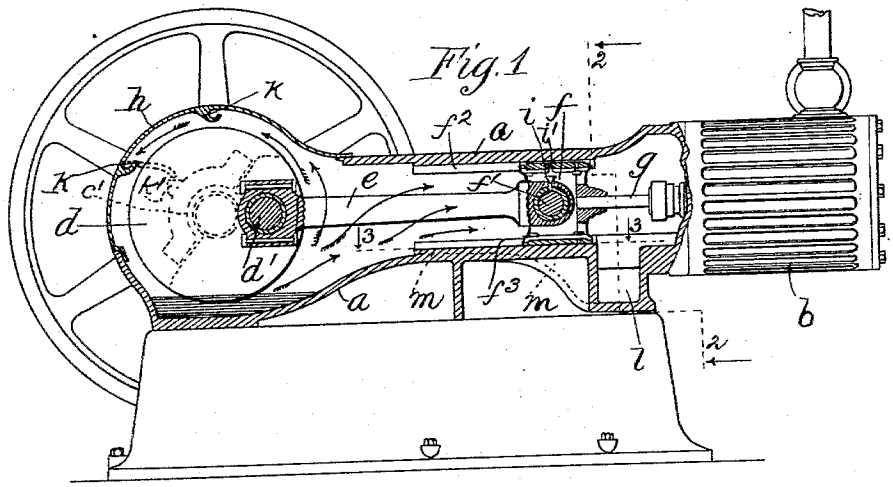


Fig. 2.

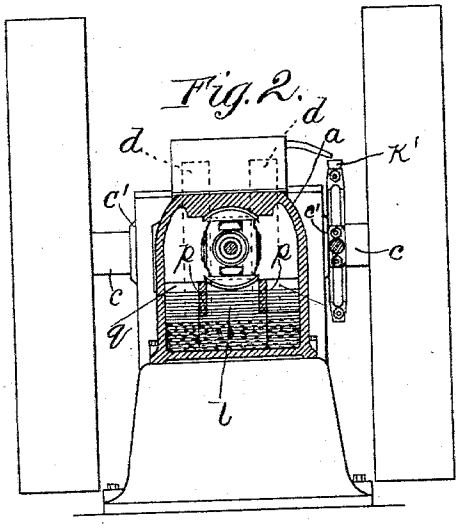
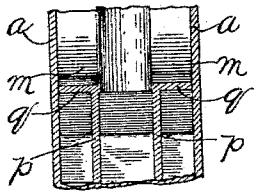


Fig. 3.



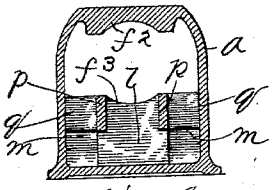
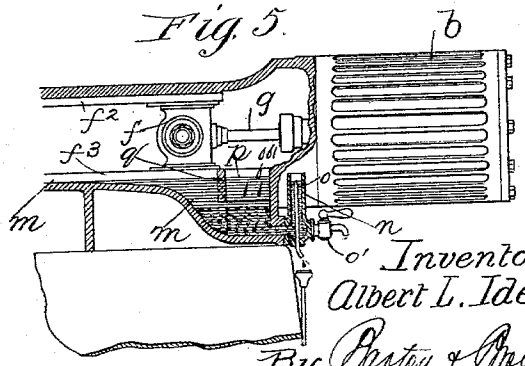


Fig. 4

Fig. 5.



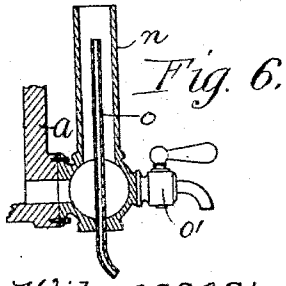


Fig. 6.

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UNITED STATES PATENT OFFICE.

ALBERT L. IDE, OF SPRINGFIELD, ILLINOIS.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 569,832, dated October 20, 1896.

Application filed April 25, 1896. Serial No. 589,089. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. IDE, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a certain new and useful Improvement in Engines, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to steam, gas, or other engines, and more particularly to that class of engines wherein the parts having frictional contact are automatically supplied with lubricating-oil from a common source or reservoir by some moving or rotating portion of the engine. Such an engine is illustrated and described in United States Letters Patent No. 400,682, issued to me April 2, 1889, in which a horizontal stationary engine having two crank-disks is shown, said crank-disks, connecting-rod, cross-head, and the various other parts associated therewith being contained and completely inclosed within a continuous horizontal casing supporting the bearings of the crank-shaft at one end and the cylinder at its opposite end. A pocket or reservoir is provided in the casing below the crank-disks, in which the lubricating-oil is confined, the crank-disks dipping for a slight distance into the oil. The rotating crank-disks deliver the oil from said pocket to the various points of application by centrifugal force. A difficulty which is met with in the system of lubrication set forth in my said patent lies in the fact that the water which is condensed in the casing of the engine from the steam escaping from the cylinder through the stuffing-box becomes mechanically united with the oil by being churned, agitated, and mixed therewith by the crank-disks and reciprocating parts of the engine, whereby the oil is caused to thicken, its function as a lubricant being thereby impaired. The oil when thus mechanically united with water sometimes becomes too thick to flow freely to all of the bearings, especially when oil having a vegetable or animal constituent is employed.

It is the object of my present invention to provide means whereby the water may be separated from the oil before it becomes thoroughly mingled therewith and to remove the same from the engine-casing without wasting any portion of the oil.

My invention may be generally described as consisting of a pocket or receptacle placed beneath the stuffing-box of the cylinder in a position to receive the water which escapes from the stuffing-box and the oil cast forward by the crank-disks, the water, having greater specific gravity, sinking beneath the oil. When the water reaches a certain height in this pocket, it is drawn off through a siphon-vent, while the oil is caused to flow back to the reservoir beneath the crank-disks through channel-ways placed alongside the cross-head guides. To separate the water and oil more perfectly, I provide partitions in the pocket adapted to prevent the too rapid return passage of the oil, which is thrown forward by the crank-disks in large quantities, whereby sufficient time is given for the complete separation of the oil and water.

My invention further consists in matters hereinafter described, and pointed out in the claims, and will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is an elevation, partially in section, of a self-lubricating engine built in accordance with my present invention. Fig. 2 is a sectional view thereof on line 2 2 of Fig. 1. Fig. 3 is a plan view of a portion thereof on line 3 3 of Fig. 1. Fig. 4 is a view similar to Fig. 2 with some of the parts omitted, the oil and water being removed to show the disposition of the partitions. Fig. 5 is an elevation, partly in section, of a portion of the engine. Fig. 6 is a detail view showing the siphon-vent.

Like letters indicate like parts throughout the different views.

The casing *a* supports the cylinder *b* and the bearings *c' c'* of the crank-shaft *c* at its ends. Upon the crank-shaft and between its bearings are provided two crank-disks *d d*, which are adapted to rotate within an enlarged portion of the engine-casing. Upon the crank-pin *d'*, secured to the crank-disks, is journaled one end of the connecting-rod *e*, the other end whereof is journaled upon a wrist-pin *f'*, secured to the cross-head *f*, to which is also secured the piston-rod *g*.

The cross-head is adapted to be reciprocated in longitudinal guides f^2 f^3, which are curved to conform in contour to the bearing-surfaces of the cross-head. That portion of the casing which supports the cross-head guides is preferably of cylindrical form. The lower portion of the wall of the tubular part of the frame is extended beneath the crank-disks to form a pocket or reservoir adapted to contain the lubricating-oil or other lubricant, in which the peripheries of the crank-disks are immersed. A removable hood or cover h forms a part of the casing of the engine and is provided to permit of the assembling and inspection of a portion of the parts of the engine.

In the normal operation of the engine the crank-disks are turned in a direction to cast the oil forward by centrifugal force toward the cylinder-head and other parts of the engine, as indicated by arrows in Fig. 1, the oil being deposited upon the various points of application and lubrication to be hereinafter specified. The parts of the engine contained within the casing are thus constantly and copiously supplied with lubricating-oil during the operation of the engine.

The cross-head shown herein is constructed as shown and described in my said patent, the head of the connecting-rod being journaled thereto and provided with an oil-receptacle i, communicating with the bearing-surface of the wrist-pin and adapted to receive a portion of the oil supplied to the upper guide of the cross-head by the rotating crank-disks through a passage-way i', provided in said cross-head, as fully set forth in said patent.

The cover h is provided with transverse trough-like receptacles k k, adapted to receive a portion of the oil cast from the rotating crank-disks and to supply oil to oil-receptacles k' k', from which the oil passes to bearings. I do not deem it necessary to further describe the method of lubrication set forth in the above-mentioned patent.

Preferably near the cylinder-head and beneath the piston-rod stuffing-box I provide a receptacle l, which extends a considerable distance below the lower cross-head guide. This receptacle communicates with the reservoir beneath the crank-disks, preferably by channel-ways m m, located upon the sides of the lower cross-head guide and slightly below the bearing-surface thereof, the oil that is cast forward by the crank-disks being readily returned to the reservoir by said channel-ways. The water that forms at the stuffing-box drips into the receptacle and, being heavier than the oil, sinks to the bottom thereof.

To prevent the accumulation of water from becoming too great, I provide means whereby when the height of water in the receptacle l extends above a predetermined limit the water is automatically drawn off, the oil being constantly returned through the channel-ways to the oil-reservoir. The preferred device for accomplishing this function is illustrated in Figs. 5 and 6, wherein I have shown a vertically-disposed chamber n, extending above the normal level or overflow-line of the oil in the receptacle l and communicating with said receptacle at the bottom thereof. Within the chamber n I provide a duct o, the top whereof is placed a distance below the bottoms of the channel-ways m m, with which the oil in receptacle l is normally level. In practice it has been found that a column of water five inches high approximately balances a column of lubricating-oil six inches high, and this relative specific gravity of the oil and water is taken into consideration in constructing the apparatus of my invention. If the depth of the receptacle l is, for instance, six inches, I preferably dispose the upper end of duct o one-half of an inch below the overflow-level of the oil, whereby three inches of water and three inches of oil may be accumulated in the receptacle before either the oil or water is caused to overflow. When three inches of water and three inches of oil are thus contained within the receptacle l, a column of water two and one-half inches above the water-level in said receptacle will be contained in the chamber n, the upper surface of said column of water being level with the top of duct o. This two-and-one-half-inch column of water serves to balance the three inches of oil contained in the receptacle l. The oil being constantly thrown forward by the crank-disks in copious quantities, there is a continuous return flow thereof to the reservoir, the oil in receptacle l being thus constantly above its overflow-line. As the quantity of water within the receptacle l is increased by the dripping from the stuffing-box the supporting-column of water within the chamber n is diminished. The oil supported by said column, being now heavier in proportion and overbalancing the same, presses the water from the receptacle l through the overflow-duct o until the head of said column is again increased to a point where it balances the oil. The water that is added to the receptacle l above the predetermined limit is thus constantly passed off through the overflow-duct o. I provide a cock o' for the purpose of withdrawing all or a portion of the water from the receptacle l when desirable for any purpose.

Before starting the engine water to the depth of two inches is placed in the bottom of receptacle l, which, if confined solely within the chamber n, would produce a column of water five inches high, after which sufficient oil is poured into the receptacle to fill the same and to supply enough oil to the reservoir beneath the crank-disks to immerse said crank-disks for about one inch. The oil poured into the receptacle forces the water into the chamber n to a height of five inches, which is sufficient to balance the six inches of oil within said receptacle. This five-inch

column of water reaches a point within one-half of an inch of the top of the overflow-duct *o*. The water in the receptacle is gradually accumulated and displaces the oil above it until the height of the water inside of the receptacle is sufficient, with the weight of the oil above it, to elevate the water in the chamber *n* up to the top of the overflow-duct *o*, whereupon the water will be passed off as it is added to the fixed limit of water contained within the receptacle *l*, as above set forth.

In order that the oil may be more perfectly separated from the water, I provide longitudinal partitions *p p* and transverse partitions *q q* in the path of the oil as it returns to its reservoir, preferably located as shown, each of which extends above the top of the oil and about half-way toward the bottom of the receptacle, the bottoms of said partitions extending a sufficient distance above the water-line to permit of the ready flow of oil beneath the same to the channel-ways. These partitions prevent the oil from being returned too rapidly to the reservoir beneath the crank-disks. If the oil were permitted to return immediately upon entering the receptacle *l*, it might carry a portion of the water from the stuffing-box upon its surface to the reservoir, where it would become mechanically united with the oil. The oil, before reaching the reservoir, must pass beneath the several partitions, during which passage sufficient time is given to permit the water to separate from and settle through the oil to the bottom of the receptacle.

Referring to Fig. 2, two longitudinal partitions *p p* are provided, which divide the receptacle *l* into three parts. The middle portion holds the water and oil, that have just become temporarily united. The water in this division of the receptacle sinks to the bottom, while the oil passes beneath the partitions *p p*. Before passing to the channel-ways *m m* the oil must pass beneath the transverse partitions *q q*, any water that may still be united with the oil separating and settling through the same during the time that the oil is contained in the portions of the receptacle between the partitions *p p* and *q q*.

While I have described my invention as being applied to engines, and to engines of a particular type, I do not desire to be limited in its application.

Changes may readily be made without departing from the spirit of my invention, and I do not therefore desire to be limited to the precise construction shown; but,

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

1. The combination with an engine, of a reservoir adapted to contain lubricating-oil, a moving portion of the engine being adapted to transfer said oil to bearing-surfaces of the engine, a receptacle adapted to receive the oil after having been transferred, a channel-way or passage through which the oil is adapted to be passed from said receptacle to the oil-reservoir, said receptacle being also adapted to receive the water that condenses from the engine, and means for withdrawing the water from said receptacle, substantially as described.

2. The combination with an engine, of a casing inclosing the working parts thereof, a reservoir adapted to contain lubricating-oil located in said casing, a moving portion of the engine being adapted to transfer said oil to bearing-surfaces of the engine, a receptacle adapted to receive the oil after having been transferred, a channel-way or passage through which the oil is adapted to be returned from said receptacle to said reservoir, said receptacle being also adapted to receive the water that drops from the working parts of the engine, and means for withdrawing said water, substantially as described.

3. The combination with an engine, of a casing inclosing the working parts thereof, a reservoir adapted to contain lubricating-oil located within said casing, a moving portion of the engine being adapted to transfer said oil to the bearing-surfaces of the engine, a receptacle adapted to receive the oil thus transferred, a channel-way or passage through which the oil from said receptacle is adapted to be returned to the reservoir, means for retarding the oil in its return from the receptacle to the reservoir, said receptacle being also adapted to receive the water that condenses from the engine, and means for withdrawing said water, substantially as described.

4. The combination with an engine, of a casing inclosing the working parts thereof, a reservoir located within said casing adapted to contain lubricating-oil, means for transferring said oil to portions of the engine having frictional contact, a receptacle adapted to receive the oil after having been thus transferred, a passage-way through which the oil is adapted to be returned from said receptacle to said reservoir, a partition or partitions located in the path of the returning oil to retard its passage, said receptacle being also adapted to receive water that condenses from the engine, and means for withdrawing said water, substantially as described.

5. The combination with an engine, of a casing inclosing the working parts thereof, a reservoir adapted to contain lubricating-oil, means for transferring said oil to parts having frictional contact, a receptacle adapted to receive the oil after having been thus transferred, means for returning the oil in said receptacle to said reservoir, partitions *p p* located in said receptacle adapted to retard the oil in its return passage to the reservoir, said receptacle being also adapted to receive the water that condenses within the casing of the engine, a chamber *n* communicating with said receptacle, and an overflow-duct *o*

located within said chamber, substantially as described.

6. The combination with an engine, of a reservoir adapted to contain lubricating-oil, means for casting said oil toward and upon portions of the engine having frictional contact, a receptacle located in the path of the oil as it is being cast from said reservoir adapted to receive the water as it drips from the engine and also the oil, after being thus cast, said oil and water being adapted to be separated in said receptacle, means for returning the oil from said receptacle to said reservoir and means for withdrawing the water from said receptacle; substantially as described.

7. The combination with an engine, of a reservoir adapted to contain lubricating-oil, means for casting said oil toward and upon portions of the engine having frictional contact, a receptacle located in the path of the oil as it is being cast from said reservoir adapted to receive the water as it drips from the engine, and also the oil after being thus cast, means for returning the oil from said receptacle to said reservoir, a chamber *n* communicating with said receptacle and an overflow-duct *o*; substantially as and for the purpose described.

8. The combination with an engine, of a reservoir adapted to contain lubricating-oil, means for casting said oil toward and upon portions of the engine having frictional contact, a receptacle located in the path of the oil as it is being cast from said reservoir adapted to receive the water as it drips from the engine and also the oil after being thus cast, means for returning the oil from said receptacle to said reservoir, means for retarding the oil in its return from the receptacle to the reservoir and means for withdrawing the water from the receptacle; substantially as and for the purpose described.

9. The combination with an engine, of a casing inclosing working parts thereof, a crank disk or disks, forming a part of said engine, a reservoir located beneath said crank disk or disks, adapted to contain lubricating-oil, said crank disk or disks being adapted to cast the oil from said reservoir upon parts of the engine having frictional contact, a receptacle located in the path of the oil as it is being thus cast from said reservoir adapted to receive the water as it drips from the engine and also the oil after being thus cast, said oil and water being adapted to be separated in said receptacle, means for returning the oil from the receptacle to the reservoir and means for withdrawing the water from the receptacle; substantially as described.

10. The combination with an engine, of a casing inclosing working parts thereof, a crank disk or disks forming a part of said engine, a reservoir located beneath said crank disk or disks adapted to contain lubricating-oil, said disk or disks being adapted to cast the oil from said reservoir upon parts of the engine having frictional contact, a receptacle located in the path of the oil as it is being thus cast from said reservoir adapted to receive the water as it drips from the engine and also the oil after being thus cast, means for returning the oil from said receptacle to said reservoir, means for retarding the oil in its return from the receptacle to the reservoir, and means for withdrawing the water from the receptacle; substantially as described.

11. The combination with an engine, of a casing inclosing working parts thereof, a crank disk or disks forming a part of said engine, a reservoir located beneath said crank disk or disks adapted to contain lubricating-oil, said crank disk or disks being adapted to cast the oil from said reservoir upon parts of the engine having frictional contact, a receptacle located in the path of the oil as it is being thus cast from said reservoir adapted to receive the water as it drips from the engine and the oil after being thus cast, a passage-way between said receptacle and reservoir through which the oil is adapted to be returned to the reservoir, a partition or partitions placed within the path of the returning oil and means for withdrawing the water from said receptacle; substantially as described.

12. The combination with an engine, of a casing inclosing working parts thereof, a crank disk or disks forming a part of said engine, a reservoir located beneath said crank disk or disks adapted to contain lubricating-oil, said crank disk or disks being adapted to cast the oil from said reservoir upon parts of the engine having frictional contact, a receptacle located in the path of the oil as it is being thus cast from said reservoir, adapted to receive the water as it drips from the engine and the oil after being thus cast, a passage through which the oil from the receptacle may be returned to the reservoir, a partition or partitions located in the path of the returning oil, a chamber *n* communicating with said receptacle and a vent-duct *o* communicating with said chamber; substantially as and for the purpose described.

In witness whereof I hereunto subscribe my name this 21st day of April, A. D. 1896.

ALBERT L. IDE.

Witnesses:
CHARLES A. BROWN,
GEORGE L. CRAGG.