

A. P. BRUSH.
SYSTEM OF SPLASH LUBRICATION.
APPLICATION FILED FEB. 15, 1911.

1,041,735.

Patented Oct. 22, 1912.

Fig. 1.

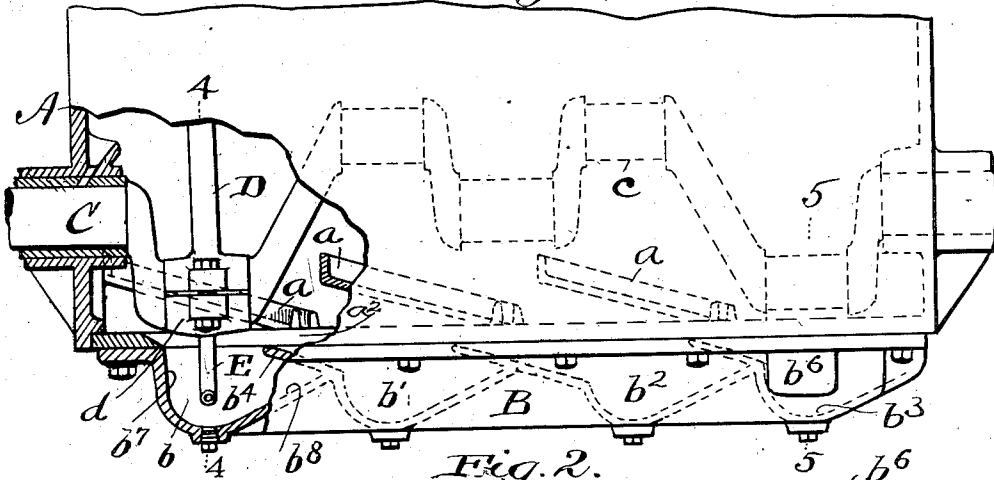


Fig. 2.

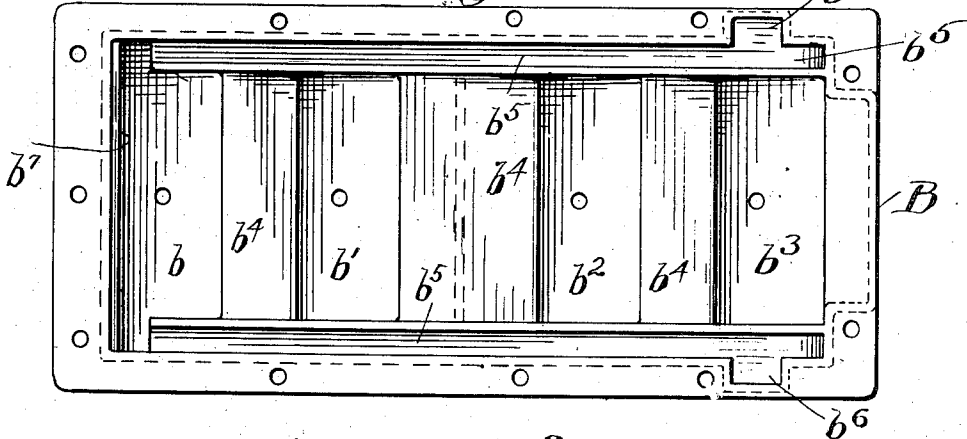


Fig. 3.

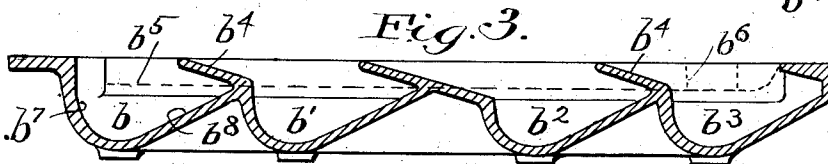


Fig. 4.

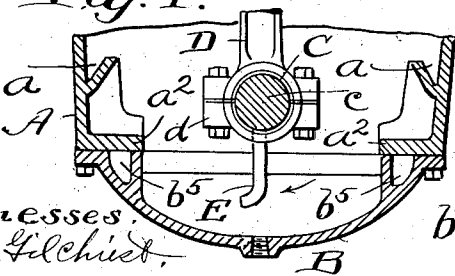
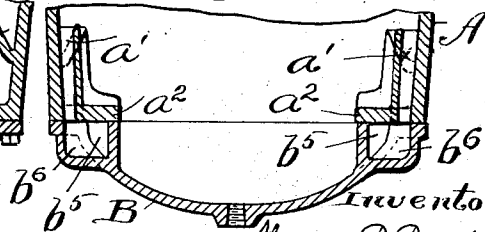


Fig. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

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SYSTEM OF SPLASH LUBRICATION.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALANSON P. BRUSH, a citizen of the United States, residing at Flint, in the county of Genesee and State of Michigan, have invented a certain new and useful Improvement in Systems of Splash Lubrication, of which the following is a full, clear, and exact description.

In my prior Reissue Patent No. 12,524 there is shown and described means for satisfactorily producing splash lubrication of the cylinders of a multi-cylinder internal combustion engine. This construction has been put on many motor cars and has proved itself to be satisfactory and efficient; but prior to the origination of the invention which forms the subject matter of this patent, the said prior invention has been applied only to engines whose crank cases have a removable lower part which is separable from the upper part in a plane which intersects the bearings of the crank shaft.

The present invention is an improvement on that which is shown in said prior patent. It was particularly contrived to adapt the said splash lubrication system to use in connection with engines whose crank cases do not separate in a plane which intersects the crank shaft bearings; although the invention may also be used with such crank cases as do so separate in a plane which intersects the crank bearings.

The invention consists of a crank case having a removable lower part which is separable from the upper part in a plane below the crank shaft bearing, and an upper part, (which may be made of one or more than one piece) in which the crank shaft is journaled, said upper part having along one (and preferably both) of its sides a plurality of forwardly and downwardly inclined troughs,—and the removable lower part having a plurality of oil pits into which said troughs respectively discharge.

The invention in its more specific form includes also the peculiar shape of the oil pits, as shown in the drawing, and hereinafter described; in the inclined transversely extended shelves which overhang the oil pits, and the open topped downwardly and rearwardly inclined return channel for returning the oil from the front part of the crank case to the oil pit at the rear end of said crank shaft; and in various other specific features of construction; all of which will

be hereinafter described and defined by the appended claims.

In the drawing Figure 1 is a side elevation of the crank case of a four cylinder internal combustion engine in which the present invention is embodied, a part of the wall of said crank case being broken away. Fig. 2 is a plan view of the removable bottom section of the crank case. Fig. 3 is a longitudinal sectional side view of said bottom section. Fig. 4 is a transverse sectional view of the crank case across one of the rear pits thereof,—for example, in the plane of line 4—4 on Fig. 1. Fig. 5 is a transverse sectional view across the front oil pit and in the plane of line 5—5 on Fig. 1.

Referring to the parts by letters, A represents the upper section of the crank case, and B the removable bottom section thereof.

C represents the crank shaft which has four cranks *c*, and which is journaled in bearings in the ends of the upper section wholly above the removable bottom section.

D represents a connecting rod which is in engagement with one of the cranks; and E represents a curved oiling tube which is screwed into the lower cap *d* of said connecting rod in communication with a hole through said cap leading to the crank bearing. This oiling tube is not new at the present time, and is not an absolute essential to the invention, although it does help in causing the circulation of the oil in the crank case, as will be described.

The crank case shown is such as is adapted for a four-cylinder engine. The bottom casing section B has four oil pits *b, b', b'', b'''*. On the side walls of the upper crank case section A above the removable bottom section are inclined troughs *a*. These troughs may be, and preferably are on both sides, but are of most service when on that side toward which the crank pin swings in moving through the lower half of its path. There are three troughs *a* on each side, one arranged over and adjacent to each of the three rear oil pits, so as to be capable of catching the oil splashed from each of the three rear cranks and the parts associated therewith, onto the side walls of the casing member A; and each of these troughs delivers the oil which it catches into the oil pit next ahead. In order that this oil may certainly enter this next forward pit, and for other reasons, there are associated with the pits the inclined shelves

b^4 formed within the lower casing section and extending across the same from side to side, each shelf being rigid with and extended rearwardly and upwardly from the juncture of the dividing walls between two adjacent pits and overhanging the rear pocket of the two. The oil which runs downward out of the troughs will drop onto these several shelves and will thereby be caused to flow into the next pit ahead. The front oil pit does not have associated with it one of the inclined troughs referred to. Instead there is a pocket a' along one and preferably both side walls of the casing section A, each pocket being open at top and bottom, and in communication at its lower end with a channel b^5 , one of which is formed in the top edge of each side member of the lower casing member B. At the rear end of this casing these two channels discharge the oil into the rear oil pit.

On the bottom of the casing member A and along the sides thereof there is an inwardly turned flange a^2 , which flanges, when the lower casing member is secured in place, serve to cover and close the top of said longitudinally extended channels b^5 . Near its front end each channel b^5 is provided with a lateral off set b^6 which is directly beneath the pocket a' .

In automobile construction the engine is set so that the crank shaft inclines from its front end to its rear end downward a little. This is shown in Fig. 1 in which the front end is at the right side of the figure. Now, in the operation of the engine the oil tubes E will dip into the oil in the several oil pits and thereby oil will be splashed around in the crank case and some will be thrown against the side walls of the casing. Additionally the oil tubes E will, as they plunge into the oil become filled with the same; and as they rise and leave the oil pools in the pits the oil will for most part run out and be delivered against that side wall of the section A toward which said tubes move in so rising. The oil so thrown against the walls of the section A will run down into the associated troughs a and will be delivered therefrom onto the shelves b^4 and thence into the next pits ahead; and thereby this oil will be gradually carried forward. When it reaches the front pit and is splashed therefrom, it will run into the pocket, thence into the offset part b^6 of the longitudinally extended channel b^5 in which it will flow by gravity rearward into the rear pocket. It will be noted that the rear walls b^7 of these oil pits are pretty nearly vertical and that the front walls b^8 are inclined considerably forward and upward; and that the shelves b^4 overhang these inclined walls b^8 of the pits. This particular construction is of advantage because, if the automobile is going up hill, the rear end of the crank case be-

comes more than usually depressed relative to the front end. This will change the level of the oil in the pits; but, in fact, it raises the oil level in the pockets relative to the planes in which the lower ends of the tube E swing, and thereby these tubes will dip deeper into the oil and will throw more oil into the casing walls. This is as it should be because in going up hill more oil should be splashed because the engine requires more. In going down hill, it is the front end of the crank casing which is depressed, and the oil will run forward and its depth will be decreased relative to the oil tube E, and this is as it should be because thereby less oil will be splashed, and less oil is required under these conditions. The overhanging shelves b^4 , however, prevent the oil from running from one pocket to the other, however much the crank case may be tipped, as stated, under any conditions in practical use.

Having described my invention, I claim:

1. In a multiple cylinder engine provided with a plurality of cranks, the combination of a crank case, and a crank shaft mounted therein,—said crank case having a bottom section which is removable in a plane below the crank shaft bearing, and is formed with oil pits located one below each crank, and an oil return channel which is located in its upper edge in the plane of separation of the two casing members and has an open front end adjacent to the front pit and extends therefrom to a point where it may be discharged into the rear pit, and the upper part of said crank case having on the side wall, toward which the cranks move when in their lowest positions, inclined troughs which are located one over each of the oil pits except the front one and are arranged to discharge into the pits next ahead of those over which they are located.
2. In a multiple cylinder engine provided with a plurality of cranks, the combination of a crank case having a removable bottom section which is separable from the part above it in a plane below the crank shaft bearings, and has oil pits located one below each crank, there being in said lower section transversely extended shelves which extend rearwardly and upwardly from the places where the walls of the adjacent pits are joined and partly overhang the oil pits behind them.
3. In a multiple cylinder engine, provided with a plurality of cranks, a crank case having a removable bottom section which is separable from the part above it in a plane below the crank shaft bearings, and has a plurality of oil pits located one below each crank, and has along one edge a longitudinally extended open topped trough provided with a lateral offset near the front end, the upper part of said crank case having along one lower side edge an inwardly extended

flange which, when the parts are connected together, covers said oil channel, excepting the offset part thereof, said upper member having on its sides above all of the oil pits except the front one downwardly and forwardly inclined troughs which severally discharge into the pits next ahead of those above which they are located, and said side also having above the front pit an open topped pocket whose lower end is in open communication with the offset part of said oil channel.

4. In a multiple cylinder engine provided with a plurality of cranks, a crank case in which the crank shaft is mounted, which crank case has a removable bottom section which is separable from the part above it in a plane below the crank shaft bearings, said bottom section having a plurality of oil pits located respectively below the several cranks, the rear wall of each oil pit being approximately vertical and the front wall of said oil pit being inclined more nearly toward a horizontal position.

5. In a multiple cylinder engine provided

with a plurality of cranks, a crank case in which the crank shaft is mounted, which crank case has a removable bottom section which is separable from the part above it in a plane below the crank shaft bearings, said bottom section having a plurality of oil pits located respectively below the several cranks, the rear wall of each oil pit being approximately vertical and the front wall of said oil pit being inclined more nearly toward a horizontal position, and downwardly and forwardly inclined shelves extending from one side of the lower crank case section to the other side and connected at their front ends with the junctures of the front and rear walls of adjoining pits and extending rearward and upward from these points of connection so as to overhang the pits behind them.

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

ALANSON P. BRUSH.

Witnesses:

O. V. H. NACKER,
E. L. THURSTON.