E. M WHITE.

INTERCEPTER FOR SPLASH LUBRICATION CRANK CASES.

APPLICATION FILED DEC. 26, 1916.

1,241,589.

Patented Oct. 2, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

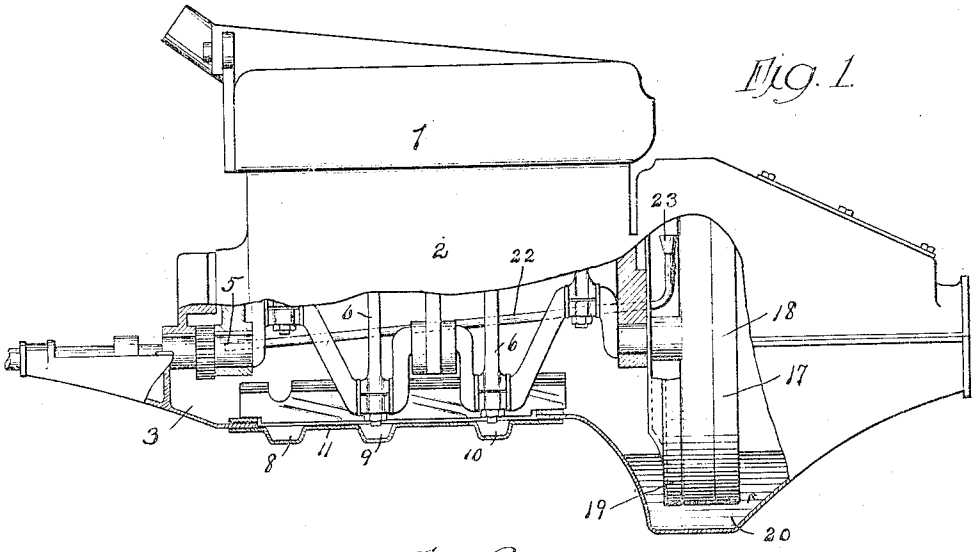


Fig. 2.

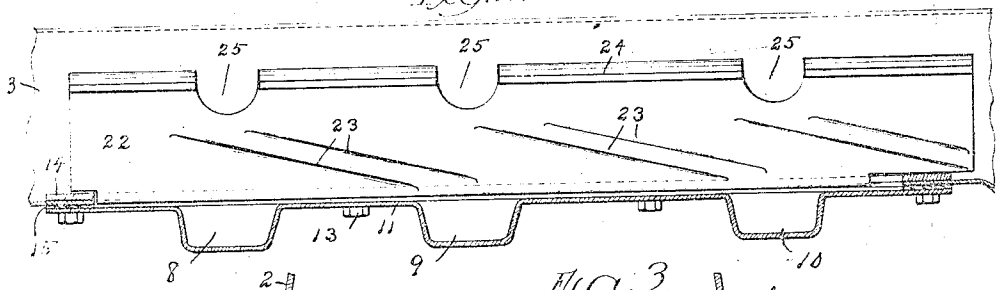


Fig. 3.

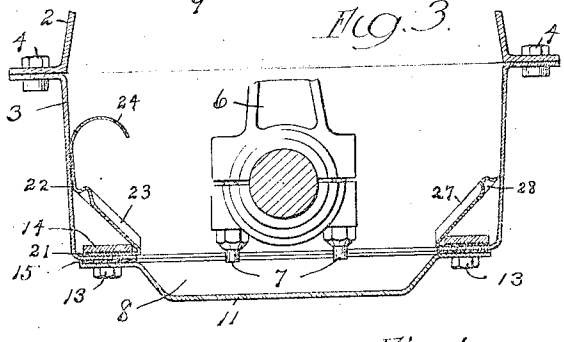
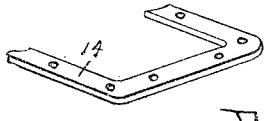


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5

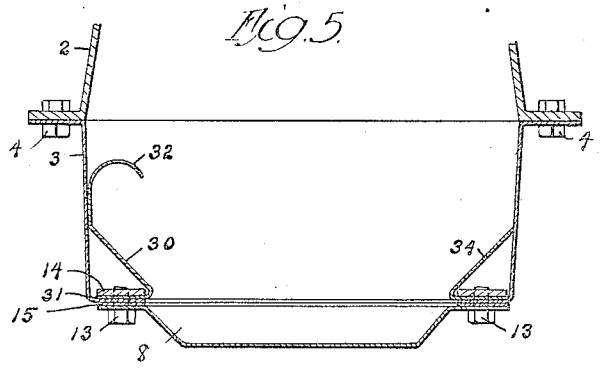


Fig. 6

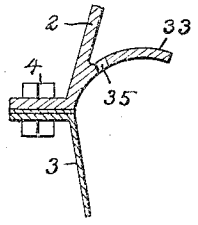


Fig. 7

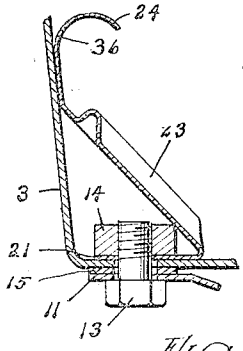


Fig. 8

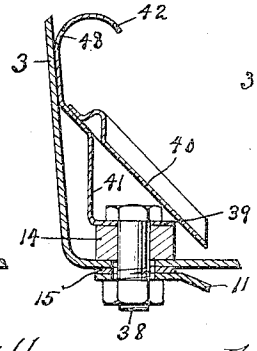


Fig. 9

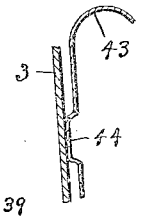


Fig. 10

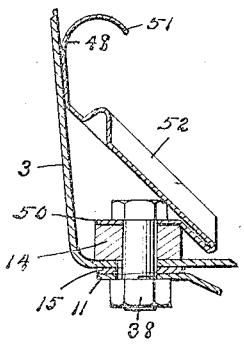
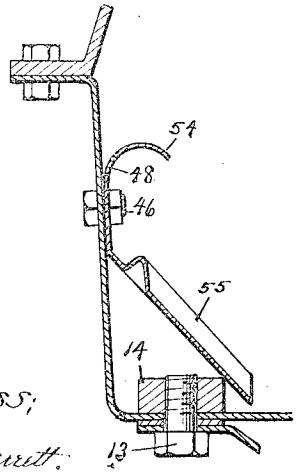
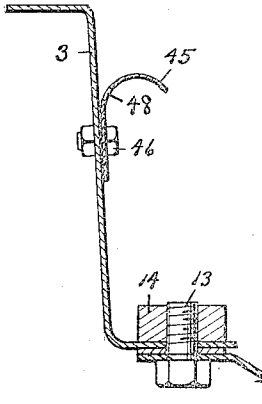


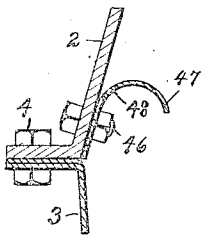
Fig. 11

Fig. 12

Fig. 13







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UNITED STATES PATENT OFFICE.

ERNEST M. WHITE, OF DETROIT, MICHIGAN.

INTERCEPTER FOR SPLASH-LUBRICATION CRANK-CASES.

1,241,589. Specification of Letters Patent. Patented Oct. 2, 1917.

Application filed December 26, 1916. Serial No. 138,952.

To all whom it may concern:

Be it known that I, ERNEST M. WHITE, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Intercepter for Splash-Lubrication Crank-Cases, of which the following is a specification.

This invention relates to means for controlling the amount of lubricating oil splashed up by the ends of the connecting rods of internal combustion engines from oil receptacles below the crank shaft and thrown up into the cylinders, and its object is to provide a projecting plate or intercepter whereby over-lubrication of the cylinders may be prevented by blocking a portion of the oil that is being carried around in the form of spray and heavy mist by the crank shaft, which mist is thrown out by centrifugal force into the cylinders of the engine.

This invention consists, in combination with an internal combustion engine provided with oil receptacles below the crank shaft from which lubricating oil may be splashed up by the connecting rods, of a plate or intercepter extending from one wall of the crank case into the space between said side and the crank shaft, and so positioned that the diameter of the drum of the mist of lubricating oil which is carried around by the crank shaft may be varied and thereby the amount of oil which is thrown out from the crank shaft into the cylinders of the engine may be controlled. It further consists in forming the metal of the intercepting device with inclined grooves or troughs by means of which a portion of the intercepted oil will be conveyed longitudinally of the crank case so as not to return to the receptacle from which it was splashed up by the connecting rods. It also consists in the details of construction illustrated in the accompanying drawings and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central longitudinal section of the lower portion of an internal combustion engine embodying this present invention. Fig. 2 is an inside elevation of a combined oil intercepter and conveyer. Fig. 3 is a cross section of the lower part of a crank case. Fig. 4 is a perspective view of a stiffening member for the lower portion of the crank case. Fig. 5 is a vertical cross section of the lower part of a crank case showing a modified form of intercepter. Figs. 6 to 13 inclusive are vertical cross sections of intercepters and those portions of the crank cases to which they are attached.

Similar reference characters refer to like parts throughout the several views.

The engine shown in Fig. 1 is of well known construction and is taken merely as an example of present engine practice, it being understood that the present invention may be made use of in any other type of engine in which splash lubrication is employed. Its cylinders 1 connect to the upper part 2 of the crank case, while the lower part 3 of the crank case may be of pressed sheet metal and secured to the upper part 2 by means of screws or bolts 4. The crankshaft 5 has any desired number of cranks to receive the thrusts from the connecting rods 6, which have extensions 7 to dip into the lubricating oil in the small receptacles 8, 9 and 10 in the cover 11 of the lower part 3 of the crank case, which cover is held in position by means of screws 13 that extend through holes in the cover and the part 3 into threaded holes in the reinforcing bar 14. A gasket 15 may be placed between the cover 11 and the crank case. It will be understood that the reinforcing bar may be omitted and the cover made integral with the part 3.

The rear end of the crank case, when mounted on a vehicle, that is, the right hand end in Fig. 1, is shown expanded to make room for the fly-wheel 17, magnet carrier 18 and the stationary magneto support 19, shown conventionally in Fig. 1, and also to constitute the main oil reservoir 20. The oil pipe 22 extends into the stationary magneto support and is provided with a funnel 23 to receive the oil that is carried up by the fly-wheel 17 and the magnet carrier, and this oil flows to the oil receptacles in the bottom of the crank case, whence it is splashed up by the lower ends of the connecting rods, and beaten into a fine mist which fills the entire crank case but is heaviest at the crank shaft where it constitutes a drum or cylinder of very heavy mist or fine spray, and from which it constantly moves outward under centrifugal force. The main heavy body of the mist seems to retain a cylindrical shape and to inclose the cranks. Any other desired means may be provided to supply the oil to the re-

ceptacles in the bottom of the crank case from any other type of reservoir at any other location.

When the vehicle carrying the engine runs down hill, the oil in the receptacles at the front end of the crank case becomes quite deep and an excessive quantity is splashed up. Not only does the mist become very heavy but heavy drops of the lubricant are thrown directly up into the front cylinders. This excessive amount of oil is smeared on the cylinder wall and much of it is drawn past the piston rings at the charging stroke of the piston. The engine is said to "pump oil." This results in loss of oil and in a deposit of carbon and gumming substance in the cylinders which is particularly objectionable at the spark plugs. When the vehicle is running down hill, the accumulation of oil at the front end often results in a lack of oil at the rear end, although this is usually compensated for by the fact that the movement of the vehicle causes the drum of mist to become densest at the rear end of the crank case.

This present invention is particularly designed to permit a free flow of lubricating oil to the oil receptacles at the bottom of the crank case, and at the same time provide means to intercept the excess of oil splashed up by the connecting rods and thrown out by centrifugal force from the drum of mist that surrounds the crank shaft. The intercepting device may be used in connection with the inclined oil conveyers shown in my Patent Number 1,194,800, dated August 15, 1916, or independently.

Referring to Figs. 1, 2 and 3, the intercepter is shown to consist of a sheet of metal having a foot 21 secured to the bottom of the crank case in any desired manner, the method employed being to place this foot between the bottom 11 and the in-turned bottom flange of the lower portion 3 of the crank case, where the foot is held by the bolts 13. The intermediate portion 22 of this intercepter is formed with inclined troughs 23 which convey the oil received thereby toward the rear end of the crank case. The upper part 24 of the intercepter is curved toward the crank case, and may be formed with notches 25 to avoid engagement with the lower ends of the connecting rods. These notches also permit any oil which may be thrown against the side wall of the part 2 to flow directly down to the inclined troughs 23, rather than have such oil gather on the top of the part 24 and flow inward toward its edge whence it would be whipped up again into the mist drum that surrounds the crank shaft.

The intercepters 24 are preferably curved in cross section, as shown, in order that any spray or mist intercepted by them may be crowded back by the swirl of air set in motion by the crank shaft. The amount of spray or mist which will pass to the cylinders will depend upon the distance between the outer edge of the intercepter and the cranks as well as on the width of the notches 25. It will be readily seen that this quantity of lubricant can be increased or decreased by bending the intercepter back toward the wall of the crank case or out toward the crank shaft.

The oil that flows down the sides of the crank case is carried back step by step by the oil troughs 23 in the plate 22 and by the troughs 27 in the plate 28, as described in Patent Number 1,194,800, and reaches the reservoir 20. This prevents an excessive amount of oil accumulating at the front end of the crank case and also insures an equal distribution of oil.

When the inclined troughs are not considered necessary, a flat inclined surface 30 connected to the foot 31 may be employed, as shown in Fig. 5, to support the intercepter 32. On the opposite side of the crank case the flat inclined conveyer 34 is shown.

In Fig. 6, the intercepter 33 is shown formed on the lower portion of the upper part 2 of the crank case. The holes 35 may be formed in this intercepter to permit oil to drain down when no notches are formed in the intercepter to permit the passage of the lower ends of the connecting rods. These holes may be located and made of sufficient size to permit lubricant to pass through to such working parts as require special service.

Various other modifications of this invention may be suggested. In Fig. 7 the conveyer-intercepter is similar to that shown in Fig. 3 but is formed with holes 36 instead of notches. In Fig. 8 the screws 13 are replaced with bolts 38 that secure the parts together. The foot 39 of the plate 41 is on top of the bar 14, and the grooved plate 40 is connected to the plate 41 below the intercepter 42. In Fig. 9, the intercepter 43 is shown formed with a rib 44 that may be electrically welded to the wall of the crank case 3. In Fig. 12 the intercepter 45 is shown secured to the wall of the lower part of the crank case by means of bolts 46 while in Fig. 13 the bolts 46 secure the intercepter 47 to the upper portion of the crank case. Both intercepters have drain holes 48.

In Fig. 10, the bolts 38 secure the foot 50 of the sheet metal structure in position and as in the intercepters shown in Figs. 3, 5, 7 and 8, the foot is preferably at a slightly smaller angle to the main portion of the sheet metal structure before being secured in position. This results in the upper or intercepter part 51 being pressed against the adjacent side of the crank case. The troughs 52 are similar to those described above. In Fig. 11, the bolts 46 pass through the sheet

metal structure between the intercepter 54 and the troughs 55. No foot is necessary in this case. Any other desired method may be employed to secure these lubricant-regulators in position.

Nearly every one of these intercepters comprises at least two parts which are usually at a distinct angle to each other. While the drawings show the outer edge of one part of each intercepter to be curved, this is not absolutely necessary, and the other part may have various forms, but in each case, the parts are generally at an oblique angle to each other In Figs. 3, 5, 7, 8 and 10, one of the parts is formed with holes to receive the bolts which secure the lower part of the crank case in position. In each case, one of the parts extends generally toward the crank case and may be perforated to permit the oil falling thereon to drain through. In practice, the notches 25 shown in Fig. 2 will often be found necessary to permit the intercepter to be almost in contact with the cranks.

It will be understood that the angle and width of these intercepters may be varied for each cylinder of an engine and to permit proper lubrication of auxiliary mechanism. The cross sectional form may also be varied to meet the requirements of each type of engine, and in some cases, to meet the requirements of the different cylinders of each engine.

While this entire specification has been directed to internal combustion engines, the invention is not limited thereto but may be employed in connection with any other mechanism which embodies a crank case, crank shaft, connecting rods, pistons and cylinders, thus including air and gas compressors and pumps.

I claim:—

1. The combination of a crank case, an oil reservoir in constant communication therewith, a crank shaft in said crank case and connecting rods attached thereto, a plate below the shaft formed with depressions constituting oil receptacles from which connecting rods may splash up oil, and an intercepter positioned apart from the plate on that side of the crank case toward which the connecting rods move as they splash up said oil and having a concave lower face to intercept a portion of the oil thus splashed up.

2. The combination of a crank case, a crank shaft and connecting rods, said crank case being provided with a series of oil receptacles from which the connecting rods may splash up lubricating oil, and an intercepter mounted in the crank case and projecting from the side of the crank case toward the crank shaft to partially obstruct one side of the crank case and intercept a portion of the splashed up oil, the other side of the crank case being unobstructed by said intercepter, the lower side of the intercepter being concave.

3. In a multi-cylinder mechanism, a crank case provided with an oil receptacle, a sheet metal plate comprising a plurality of parts at an angle to each other, one of said parts having openings to receive bolts normally used to secure together parts of the crank case, another part extending toward the crank shaft of the engine to intercept a portion of the lubricant splashed up from said receptacle and carried around by said crank shaft.

4. The combination of cylinders and connecting rods, a crank case and a crank shaft therein, said crank case constituting a main oil reservoir, an oil pan mounted in the crank case below the crank shaft and formed with auxiliary oil receptacles into which the lower ends of the connecting rods may dip to splash oil up into the cylinders, means to convey longitudinally of the crank shaft into the main reservoir a portion of the oil splashed out of said auxiliary receptacles, and an intercepter to block a portion of the oil splashed out of said auxiliary receptacles and divert it back into said auxiliary receptacles, and means to convey the lubricating oil from the main reservoir to said auxiliary receptacles.

5. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter spaced from said receptacles to intercept a portion of the splashed up oil and formed with a series of holes to permit the passage of such oil as may fall on the intercepter.

6. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter spaced from said receptacles to intercept a portion of the splashed up oil and formed with a series of holes to permit the passage of such oil as may fall on the intercepter, the lower surface of said intercepter being concave.

7. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter spaced from said receptacles to intercept a portion of the splashed up oil and formed with passages to permit the passage of such oil as may fall on the intercepter, and with oil conveyers to receive the intercepted oil and conduct it longitudinally of the crank case.

8. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter secured to the side of the

crank case toward which the oil is thrown from said receptacles by the connecting rods and extending therefrom toward the crank shaft to limit the amount of oil-mist carried around by the crank shaft.

9. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter secured to the side of the crank case and extending toward the crank shaft to block a portion of the splashed up oil, the edge of the intercepter nearest the crank shaft being formed with notches to permit the passage of the lower ends of the connecting rods.

10. The combination of a crank case, a crank shaft therein, connecting rods on the shaft, a series of oil receptacles from which the connecting rods may splash up oil, and an intercepter secured to the side of the crank case and extending toward the crank shaft to block a portion of the splashed up oil, the lower side of the intercepter being concave, the material constituting the intercepter extending down and inclined and formed with diagonal troughs to convey oil intercepted longitudinally of the crank case.

11. A new article of manufacture consisting of a sheet metal plate comprising two wings at an oblique angle to each other, one of said wings being formed with a trough and having an upper edge bent toward said trough.

12. A new article of manufacture consisting of a sheet metal plate bent to form two wings at an oblique angle to each other, one of said wings having its free edge curved and overhanging the other wing.

13. A new article of manufacture consisting of two wings at an oblique angle to each other, one of said wings being formed with holes properly spaced to admit bolts employed to secure parts of a crank case together, the second wing being formed with inclined troughs and with its free edge curved toward said troughs.

14. In a multi-cylinder mechanism, a crank case provided with main and auxiliary oil receptacles, a removable structure mounted within the crank case in engagement with one side wall and embodying a plate extending toward the crank shaft and substantially parallel thereto to intercept a portion of the oil carried around by the crank shaft.

15. In a multi-cylinder mechanism, a crank case provided with main and auxiliary oil receptacles, a removable structure mounted within the crank case along one side wall and embodying a plate extending toward the crank shaft to intercept and deflect downwardly a portion of the oil carried around by the crank shaft, said structure also embodying a trough positioned below the intercepter to receive and conduct the downwardly deflected oil longitudinally of the crank shaft.

16. A new article of manufacture consisting of a metal plate comprising a plurality of parts at an angle to each other, one of said parts having openings to receive bolts normally used to secure together parts of the crank case of an internal combustion engine, the edge of the other part being notched to permit the passage of the ends of the connecting rods of the engine.

17. In a multi-cylinder mechanism, a crank shaft, a crank case surrounding the crank shaft and embodying a main oil reservoir and auxiliary oil receptacles, means to convey oil from the main reservoir to the auxiliary receptacles, means to splash up said oil from the auxiliary receptacles, means secured to a side wall of the crank case and obstructing a portion of the space between said wall and crank shaft to intercept a portion of the splashed up oil, and means for conveying intercepted oil toward the main reservoir.

18. In an internal combustion engine, a crank case provided with an oil receptacle from which oil may be splashed up by the connecting rod, a sheet metal plate adapted to be secured within the crank case and comprising a plurality of parts, one of said parts having openings to receive bolts normally used to secure together parts of the crank case, the other part being adapted to intercept a portion of the splashed up oil and formed with holes to permit the direct passage of oil which falls thereon.

ERNEST M. WHITE.