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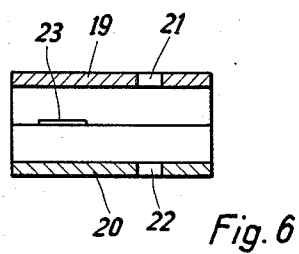
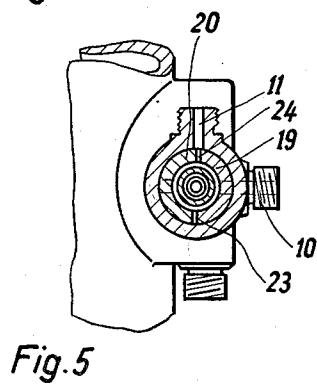
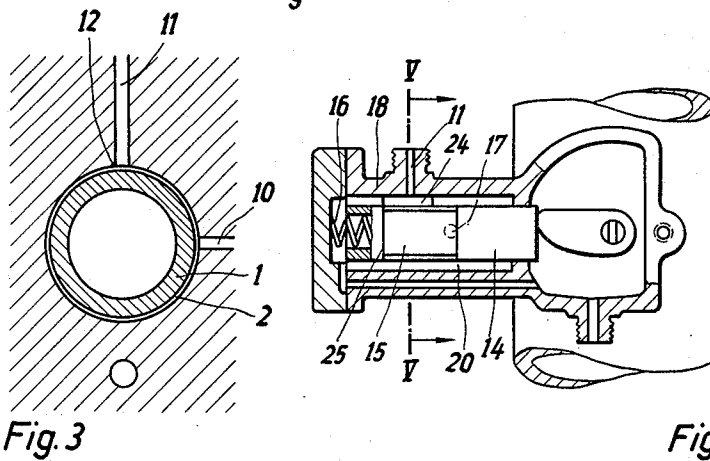
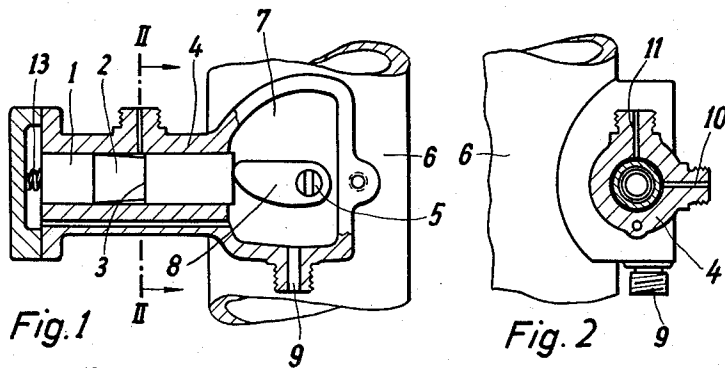
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METERING DEVICE FOR TWO-CYCLE INTERNAL COMBUSTION ENGINES

Filed Jan. 30, 1961

2 Sheets-Sheet 1



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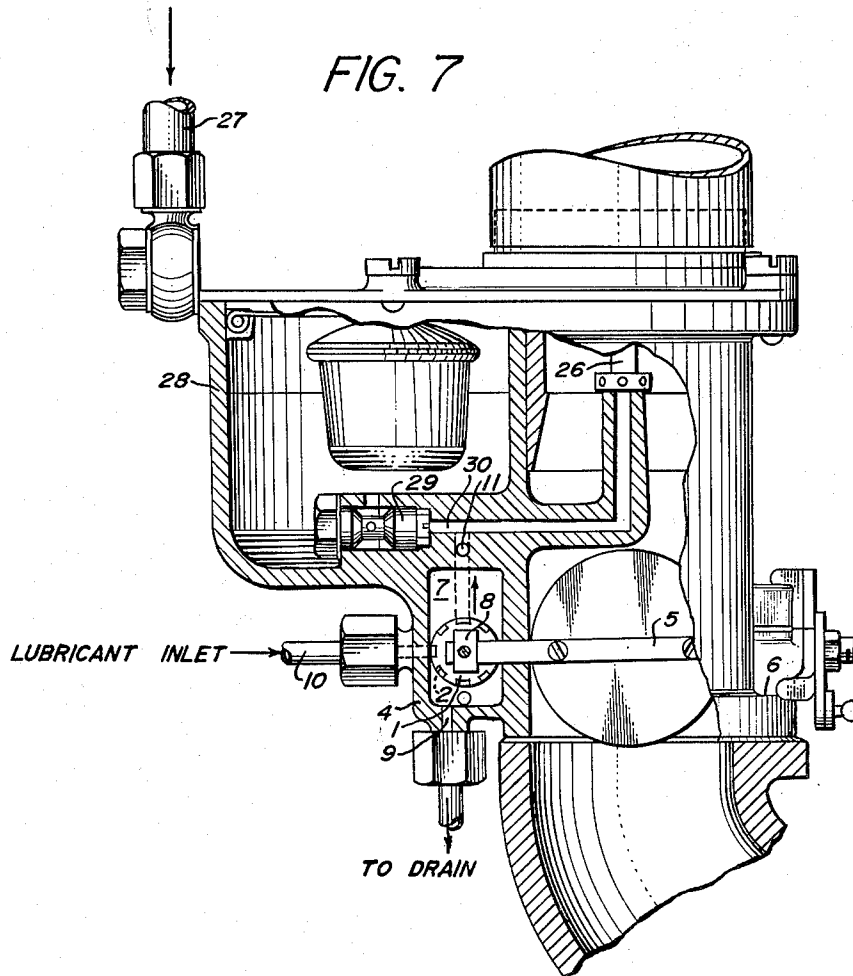
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METERING DEVICE FOR TWO-CYCLE INTERNAL COMBUSTION ENGINES

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This invention relates to a metering device for internal combustion engines and more particularly to an oil metering device for two-cycle internal combustion engines in which the mixture ratio of oil to gasoline which is fed into the suction system of the carburetor is regulated temporarily at no load in the ratio of 1-∞ to the usual ratio at full load.

An arrangement for providing a regulation of the oil to gasoline ratio at no load has been disclosed in a prior application Serial No. 23,809, Patent No. 3,114,356, assigned to the assignee of the present application. The arrangement disclosed in this prior application comprises a slide member for controlling the amount of oil fed to the engine at no load.

In the open position of the slide member a supply canal provides a connection for a plurality of oil supply lines which are disposed in opposite relationship in the cylindrical bore.

It is important that during the different load conditions and particularly at no load, only a small amount of oil is admitted to the two-cycle internal combustion engine. If more oil is introduced into the engine than is required for proper lubrication, the excess amount is carried into the exhaust system and causes a smoking or fuming. In order to prevent that an excessive amount of oil is conducted to the engine at no load or part-load conditions, the circular feeder openings of the supply lines, which are covered or uncovered by the slide member in regulating the supply of oil through these lines, are very small and the stroke of the slide member is correspondingly also very small.

In this prior control arrangement the slide member may perform its regulatory function with sufficient accuracy only if the cam member associated with the throttle valve has just the right configuration and size and is additionally mounted very precisely in relation to the slide member. Furthermore, care must be taken that no wear take place, particularly with respect to the cam member, which might adversely affect the proper regulation of the oil supply to the engine.

It is therefore an object of this invention to provide a metering device which provides a more dependable regulation of the lubricating oil supplied to the carburetor of an internal combustion engine.

It is a further object of this invention to provide a metering device which maintains an accurate control of the lubricating oil to the carburetor of an internal combustion engine even under conditions where the relatively moving control elements have been subjected to normal wear.

According to the invention the metering device comprises a slide member having an effective flow control portion of increased length extending substantially in the direction of the longitudinal axis of the slide member which permits an accurate regulation of the supply of lubricating oil conducted to the engine even under conditions where the cam member or its supporting bearing have been subjected to normal wear. In view of this modified arrangement of the slide member, it is adapted to operate over an extended control range and the effect of any wear of the cam member or its bearing

is reduced to such an extent that it does not influence adversely the accuracy of the metering control.

The invention is illustrated in the accompanying drawing in which like numerals designate similar elements of the several figures and in which:

FIGURE 1 shows a cross section of a metering device according to the invention and the adjacent carburetor portion which carries the throttle valve shaft, partly in section.

FIGURE 2 shows a cross-section of the metering device according to the invention along line II-II of FIG. 1.

FIGURE 3 shows an enlarged cross-section of the slide member according to FIG. 2.

FIGURE 4 shows a cross-section of a modified metering device according to the invention and the adjacent carburetor portion which carries the throttle valve shaft, partly in section.

FIGURE 5 shows a cross-section of a metering device according to the invention along line V of FIG. 4.

FIGURE 6 shows a cross-section of a detailed portion of the two half shells of the metering device according to FIGS. 4 and 5.

FIGURE 7 shows an elevation view, partly broken away, of the housing incorporating the metering device according to the invention.

Referring more particularly to the embodiment illustrated in FIGURES 1, 2 and 3, the control portion of the metering device may be formed by reducing the diameter of the cylindrical slide member 1 over a longitudinal area substantially parallel to the axis of the slide member. This circumferentially reduced area 2 of the slide member represents the actual control surface of the metering device. It is provided between the ends of the cylindrical slide member and is shaped substantially like a cone the top of which terminates at a wall portion 3 which is at right angle to the cylindrical surface of the slide member. At the start of the metering stroke the control portion 2 of the slide member which is disposed opposite the outlet opening 12 of the oil supply line 11 has a diameter which is almost as large as the cylindrical slide member proper. In this position of the slide member only a very small amount of lubricating oil is allowed to enter the outlet opening. However, at the end of the metering stroke the control portion of the slide member disposed opposite the outlet opening 12 has the smallest diameter of the conically reduced surface 2 so that a relatively large cross sectional area is provided between the surface of the reduced portion and the inner surface of the cylinder housing 4 in which the slide member is adapted to reciprocate. At the end of the stroke of the slide member the amount of oil permitted to enter the outlet opening 12 of the metering device is therefore much larger than at the start of the stroke. The housing of the metering device is preferably integral with an adjacent portion 6 of the carburetor in which the throttle valve shaft 5 is mounted which supports a cam member 8. The cam member extends into a chamber 7 of housing 4 and is adapted to engage the inner end of the slide member 1. Chamber 7 may be provided with a suitable cover (not shown). At the bottom of chamber 7 an opening 9 is provided through which lubricating oil which may leak past the slide member is discharged and returned to a lubricant supply container (not shown). The cam member which operates the slide member in response to the actuation of the throttle valve may have profiles of varying configuration and may be adapted to be interchangeable.

In operation, the lubricating oil is fed by a pump (not shown) through a conduit 10 into the meter housing 4. From housing 4 the oil is discharged into an outlet conduit 11 which is arranged preferably in the upper portion

of the housing and is conducted through conduit 11 into the carburator.

FIGURE 7 shows a pipe 27 for supplying the fuel or gasoline to the float housing 28 and thence through the supply nozzle 29 into the fuel line 30. This fuel line leads to the mixing tube 26. A short distance behind the fuel supply nozzle 29 the oil outlet conduit 11 is connected into the fuel line 30.

In the position shown in FIG. 1 the control portion 2 of the slide member has been moved by means of cam member 8 into the position relative to the opening 12 of conduit 11 in which the oil flow is allowed the most space, and therefore the highest volume of lubricating oil is available for feeding through conduit 11 into the carburator. The cross-sectional area of the oil supply space provided by the reduced portion of the slide member is annular in shape. The size of this annular area is determined by the distance of the borders of the opening 12 from the opposed surface 2 of the slide member 1. A compression spring 13 mounted in a housing end plate 4a biases the slide member and the cam member into the idling position. In the idling or no-load position the slide member is located at the right as viewed in the drawing and the size or height of the cross-section which determines the oil supply has been greatly reduced, as the conical surface has moved from the smallest diameter to its largest diameter relative to the outlet opening 12.

Referring now more particularly to the embodiment illustrated in FIGURES 4, 5 and 6 the slide member 14 is provided with a reduced portion 15 of cylindrical configuration. This reduced portion is provided between the ends of the slide member 14 and is confined on each side by a wall portion 25, 25a disposed at right angle to the reduced cylindrical portion. A compression spring 16 which is mounted between the housing end plate 18a and the outer face of the slide member 14 biases the slide member into the idling or no-load position.

According to a preferred arrangement of this embodiment the slide member 14 is surrounded by a cylindrical sleeve composed of two half shells 19 and 20. The half shell 19 is provided with openings 21 and 23 and the half shell 20 has openings 22 and 24. Openings 23 and 24 are preferably in the form of a recessed or cut-out portion provided in the half shells 19 and 20, respectively, and extend parallel to the longitudinal axis of the cylindrical slide member 14.

In operation, the oil is supplied by a pump (not shown) through a conduit 10 into the space provided between the reduced cylindrical portion 15 of the slide member and the inner surface of the half shells 19 and 20. The amount of oil which is allowed to pass through the metering device is regulated by means of the length of the recessed portion 24 which may be uncovered by the wall 25 of the slide member. The lubricating oil thus admitted into the meter housing is discharged through a conduit 11 into a pipe line leading to the mixing tube of the carburator.

The recessed portion 23 and the inlet opening 21 provided in the half shell 19, shown in FIG. 6, are also adapted to be covered or uncovered by the wall of housing 18. The two half shells 19 and 20 are suitably press-fitted into housing 18 and provide a guide for the cylindrical slide member 14. In moving the slide member relative to the half shells the size of the recessed portion 24 is either increased or decreased by means of the wall portion 25. The oil supply to the mixing tube of the carburator may therefore be regulated in an accurate manner depending on the configuration and size of the cam member and on the position of the throttle valve.

While in accordance with the Patent Statutes there have been described what at present are considered to be the preferred embodiments of the present invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is therefore the aim of the ap-

ended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising in combination a housing, a longitudinal bore in said housing, said housing having oil inlet and outlet means communicating with said bore, a longitudinal slide member received in said bore, said slide member having a circumferentially reduced intermediate portion of varying diameter confronting said outlet means, a chamber in said housing communicating with said bore at one end, cam means rotatably mounted in said chamber and engaging the adjacent end of said slide member, and biasing means engaging the other end of said slide member for urging said slide member against said cam means, said cam means being operable to move said slide member relative to said outlet means to vary the amount of oil discharged through said outlet means.

2. A metering device as defined in claim 1 wherein the oil outlet means is disposed in the upper portion of the housing.

3. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising in combination a housing, a longitudinal bore in said housing, oil inlet and outlet openings communicating with said bore, a chamber at one end of said housing and communicating with said bore at one end, a longitudinal slide member received in said bore and adapted to reciprocate relative to said outlet opening, said slide member having a circumferentially reduced conically shaped portion intermediate its ends, a cam member rotatably mounted in said chamber and engaging one end of said slide member, closure means connected to said housing and having a dish recess facing said bore at the other end, spring means in said dish portion and engaging the other end of said slide member to urge said last-named member toward said cam member, said cam member being operable to move said slide member to vary the amount of oil discharged through said outlet opening.

4. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising in combination a housing, a longitudinal bore in said housing, oil inlet and outlet openings communicating with said bore, a mixing tube connected to said housing adjacent one end, a chamber connected to said housing and communicating with said mixing tube and said bore, a longitudinal slide member received in said bore and adapted to reciprocate relative to said outlet opening, said slide member having a conically reduced intermediate portion, a valve shaft mounted in said mixing tube, a cam member disposed on said valve shaft and engaging said slide member at one end, biasing means for engaging said slide member at the other end and urging said last-named member against said cam member, said valve shaft operating said cam member to move said slide member and vary the amount of oil discharged through said outlet opening.

5. A metering device as defined in claim 4 wherein said circumferentially reduced conically shaped portion terminates at a shoulder of said slide member disposed substantially at right angle to the cylindrical surface of the slide member.

6. A metering device according to claim 3 wherein said carburator further includes a throttle valve having a shaft thereon and the actuating means mounted in said chamber is connected to the shaft of the carburator throttle valve.

7. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising in combination a housing, a longitudinal bore in said housing, said housing having oil inlet and outlet openings communicating with said bore, a chamber at one end of said housing and communicating with said bore at said one end, an elongate slide member received in said bore and adapted to reciprocate relative to said outlet open-

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ing, said slide member having a circumferentially reduced axially extending cylindrical portion intermediate its ends facing said outlet opening, a sleeve member surrounding said slide member, said sleeve member comprising two half shells, at least one of said half shells having an axially extending recessed portion adjacent said outlet opening, an oil inlet opening in at least one of said half shells, said slide member having wall portions adapted to cover and uncover said axially extending recessed portion, and a cam member rotatably mounted in said chamber and engaging one end of said slide member, said cam member being operable to move said slide member to regulate the amount of oil discharged from said outlet means.

8. A metering device as defined in claim 7 wherein said oil inlet opening in said one half shell is spaced axially and radially relative to said axially extending recessed portion.

9. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising in combination a housing, a longitudinal bore in said housing, said housing having oil inlet and outlet means communicating with said bore, slide means received in said bore, said slide means having a circumferentially reduced portion of varying diameter disposed opposite said oil outlet means, a chamber connected to said housing at one end and communicating with said bore, said slide means having one end extending into said chamber, slide actuating means mounted in said chamber and operatively engaging said one end of said slide means, and biasing means for urging said slide means toward said slide actuating means, said slide actuating means being operable to move said slide means relative to said outlet means to regulate the amount of oil discharged through said outlet means.

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10. A metering device for regulating the oil supply to the carburator of an internal combustion engine comprising a carburator having a throttle valve with a shaft attached thereto, a housing, a bore in said housing, said housing having oil inlet and outlet means communicating with said bore, slide means received in said bore, said slide means having a circumferentially reduced portion of varying diameter disposed opposite said oil outlet means, a chamber connected to said housing and communicating with said bore, actuating means mounted in said chamber connected to the shaft of said carburator throttle valve and operatively engaging said slide means, and biasing means for urging said slide means toward said actuating means, said actuating means being operable to move said slide means relative to said outlet means to vary the amount of oil discharged through said outlet means.

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