This invention relates to improvements in a means and method for readily and efficiently mixing a motor fuel and a lubricating liquid in the one operation of removing the two liquids from their respective storage tanks.

Great quantities of mixtures of gasoline and lubricating oil are consumed annually as fuel for the usual two-cycle gasoline engine, in which the gasoline and oil are mixed in suitable proportions before being fed to the engine. More particularly, the greatest use in the above category is in so-called outboard motors. With the vast increase in the use of outboard motors, which use various proportions of lubricating oil mixed with gasoline, there is a real need for a pump which will thoroughly mix the lubricating oil with the gasoline in the correct proportions.

Some users require a mixture such as, for example, a third of a pint of oil to a gallon of gasoline, using a heavy grade of oil, whereas for racing, as high as two pints of very heavy oil is required to be mixed with the gasoline. There are some five or six blends of motor oil and some three grades of gasoline available for this mixture, making some fifteen or twenty combinations of mixtures suitable for outboard motors. It is generally conceded that, unless the oil is mixed fresh with the gasoline, trouble will result. Various refining companies have placed on the market suitable mixtures of oil and gasoline, but up in containers. This practice is expensive, and at best has not proved to be generally satisfactory. The procedure usually followed by outboard motor users is to purchase a quantity of gasoline and pump it into their gasoline tank; then place what they consider a suitable proportion of oil into the same tank, assuming that, inasmuch as the two substances are miscible, that all requirements for proper operation have been met. To one skilled in the art this haphazard method is obviously objectionable to the proper operation of the engine and is a procedure not contemplated by the engine designer as desirable for efficient operation, since the oil in the tank immediately settling to the bottom and the desired intimate mixture is not obtained.

Accordingly, one of the important objects of the present invention is to provide a novel method and means for intimately mixing varying proportions of oil and gasoline as desired at the same time these liquids are being dispensed at a service or filling station.

Another important object of the invention is to provide a convenient means for readily changing the proportions of the mixture. More particularly, a plurality of pumps are provided, the stroke of one of the pumps being preferably maintained constant, whereas the stroke of the other pump may be varied by a suitable gear change mechanism, or if desired, the stroke of each pump may be varied.

Other and further important objects of the invention will be apparent from the drawings and following description.

In the drawings, Fig. 1 is a vertical elevation of the device of the present invention, parts being broken away for clearness and other parts being shown in section. Fig. 2 is a profile view of the stroke changing mechanism.

Fig. 3 is a vertical elevation showing a slight modification of the device.

Referring now in detail to the drawings, 1 indicates generally a tank, housing or the like, which may take any convenient shape. Mounted within tank 1 are two cylinders 2 and 3, respectively, said cylinders being disposed parallel to each other and also parallel to the longitudinal axis of the tank 1. The two cylinders 2 and 3 are shown vertically disposed within the tank and positioned parallel to each other, but the present invention in its broadest aspect does not contemplate any specific disposition of the said cylinders. Preferably the cross-sectional areas of the two cylinders 2 and 3 should bear some convenient ratio to each other, such as, for example, 4 to 1, 5 to 1, 6 to 1, or the like.

A head 4 comprises a closure for the bottom of the cylinder 2. Similarly, a head 5 forms a closure for the bottom of the cylinder 3. A nipple 6 is threadedly engaged in
the head 4 at one end, and at the other is connected to an intake pipe 7 for gasoline or the like by means of a union 8. A nipple 9, oil intake pipe 10 and union 11 bear the same relation to the cylinder 3 as do the corresponding members 6, 7 and 8 bear to the cylinder 2. In either case the threaded connection of the two nipples to the respective heads is not shown inasmuch as this means of connection is conventional and will be apparent to those skilled in the art.

Slidably positioned within the cylinders 2 and 3 are pistons 12 and 13, respectively. Rigidly connected to the pistons 12 and 13 are piston rods 14 and 15, respectively. Each of the piston rods 14 and 15 extends through a head or top 16 of the tank 1 and terminates respectively in racks 17 and 18.

Mounted upon the upper portion of the tank 1 are two standards or brackets 19 and 20. The bracket 19 contains two bearings, a lower bearing 21 and an upper bearing 22. The bracket 20 contains three bearings, a lowest bearing 23 which is in alignment with the bearing 21, a middle bearing 24 which is in alignment with the bearing 22, and an uppermost bearing 25. Rotatably mounted in the bearings 22 and 24 is a shaft 26, upon one end of which is positioned a crank handle 27. A sprocket wheel 28 is mounted upon the other end of the shaft 26, and is adapted to turn therewith.

A pinion 29 is rigidly mounted upon the shaft 26 intermediate the standards 19 and 20 and adjacent the standard 19. This gear is adapted to mesh with a spur gear 30 which in turn is loosely mounted upon a shaft 31. A pinion 32 is also mounted loosely upon the shaft 31 and is connected to the gear 30 to turn therewith. This last mentioned pinion meshes with the rack 17, and, as is obvious, moves the rack when the handle 27 is turned. It can be readily seen that the movement of the handle 27, the rack 17 and hence the pinion 12, are constant, but in the broadest aspect of this invention, by conventional transmission gearing (not show) the relation of the movements of the above mentioned members may be varied at will. This gearing if desired may take a form similar to the change speed gearing associated with the rack 18, to be hereinafter fully described.

Cooperating with the sprocket wheel 28 on the shaft 26 is a sprocket chain 33, which also meshes with a sprocket wheel 34 rigidly mounted upon a shaft 35 journalled in the bearings 21 and 23. Thus, upon turning the crank 27 the shaft 35 is rotated. Two sprocket wheels 36 and 37 are rigidly mounted upon the shaft 35 intermediate the standards 19 and 20. Chains 38 and 39 cooperate respectively with the two sprocket wheels 36 and 37 and operatively connect the wheels 36 and 37 to a pair of sprocket wheels 40 and 41, respectively. The wheels 40 and 41 are loosely mounted upon the shaft 31 and both turn when the crank 27 is turned.

Keyed to shaft 31 is a clutch collar 42, said clutch collar being adapted for restricted slidable movement dependent upon the length of a slot 43 provided in the shaft 31 intermediate the two wheels 40 and 41. Each of the ends 44 and 45 is formed so as to register with corresponding notches 46 and 47 provided in the wheels 40 and 41, respectively.

The sprocket wheels 36 and 37 are preferably of the same diameter, whereas the wheels 40 and 41 are of different diameters. Hence, by an obvious manipulation of the clutch collar 42 the shaft 31 may be made to rotate at various speeds relative to the crank handle 27. Rigidly mounted upon the shaft 31 and adapted to mesh with the rack 18 is a pinion 48. Therefore, for a given stroke of the sprocket wheel 35 in the gasoline cylinder 2, the pinion 13 in the oil cylinder 3 may be moved various fractions of a stroke.

In operation the intakes 7 and 10 are connected to storage tanks of gasoline and oil, respectively. Assume for the sake of illustration that both cylinders 2 and 3 are filled with gasoline and oil, respectively, and further, that a certain percent mixture is desired. The gear ratio can readily be set and the crank turned. The pins rise in the cylinders at a rate proportional to the respective percentages of gasoline and oil desired. The tops of the cylinders 2 and 3 are open, as shown at 49 and 50, respectively, and, adjacent the said openings, there are compartments 51 and 52, respectively. From the two compartments the gasoline and oil enter an outlet pipe 53 and thence through a hose or the like (not shown) to the tank supplying the motor. The swirling motion of the liquid entering and passing through the outlet pipe 53 and the hose is sufficient to thoroughly mix the two fluids to produce a mixture satisfactory for the purpose.

In Fig. 3 a slight modification of the invention is illustrated, wherein the reference numeral 54 indicates generally the usual gasoline pump, having a conventional crank handle 55. A pipe 56 extends upwardly from the pump proper and serves the double purpose of being an outlet for gasoline from the pump and a support for a platform 57. Mounted upon the platform 56' is a cylindrical container 57. A piston (not shown) is operatively positioned in the cylinder and the piston rod thereof is provided with rack teeth, as shown at 58 in Fig. 3. Positioned adjacent the rack 58 is a pinion gear (not shown) which meshes therewith and rigidly connected to the said pinion is a sprocket wheel 59. A chain 60 connects the wheel 59 to a sprocket wheel 61 mounted on the handle 56 and, as is obvious, turns the wheel 59 and hence moves the rack 58 when the crank 59 is turned.
is turned. An outlet pipe 62 connects the top of the cylinder 57 to a hose 63. The pipe 56 also discharges into the said hose.

In operation, the pump 54 is calibrated to deliver a given quantity of gasoline for a predetermined number of rotations of the crank 56, and at the same time a certain quantity of oil is delivered from the cylinder 57. In this construction, the quantity of oil to be mixed is predetermined and poured into the cylinder 57 and, as the gasoline is pumped, the oil contained in the oil cylinder is delivered to and intimately mixed with the gasoline. This latter device is adapted for small installations and is readily detachable from the pump 54 proper.

It is apparent that I have provided a novel means and method for readily and efficiently mixing various quantities of oil with a given quantity of gasoline at the same time and by the operation which removes the liquids from storage. The device itself is comparatively economical to construct and will fill a long-felt want. Incidentally, the quantity of gasoline and oil consumed by engines of the type requiring mixed fuels comprises approximately 15,000,000 gallons of gasoline and 3,100,000 gallons of motor oil annually.

I am aware that many modifications may be made and many details of construction altered without departing from the spirit of the invention, and hence I do not wish to limit myself to the specific structure shown.

By this dual pumping combination, it is possible to give to outboard motor engine users a device which will give them the correct proportion for grade of gasoline desired with the proper proportion and grade of motor oil thoroughly mixed, so that when they get an outboard motor fuel from such a pump combination, a great deal of the trouble now being experienced will be eliminated. At the same time, it will avoid the prohibitive expense of containers when such a mixture is put up by the oil company shipped to the point of use and in addition thereto, will give a fresh mixture to the user, which is more desirable.

In conclusion, it appears that through experiments and cooperation with certain of the manufacturing companies, a fuel compound of gasoline and oil has been worked out which has completely cured some of the most pernicious and harmful ills of the outboard type of motor or any other two cycle type lubricated by placing oil in the fuel. The troubles that have been eliminated are, roughly: uneven power development, difficult starting, poor fuel economy. With these features corrected, more revolutions per minute and more power is naturally obtained.

I claim as my invention:

1. A combination pump for simultaneously dispensing and mixing fluids, comprising a plurality of cylinders having a common dis-