

Apr. 17, 1923.

1,452,011

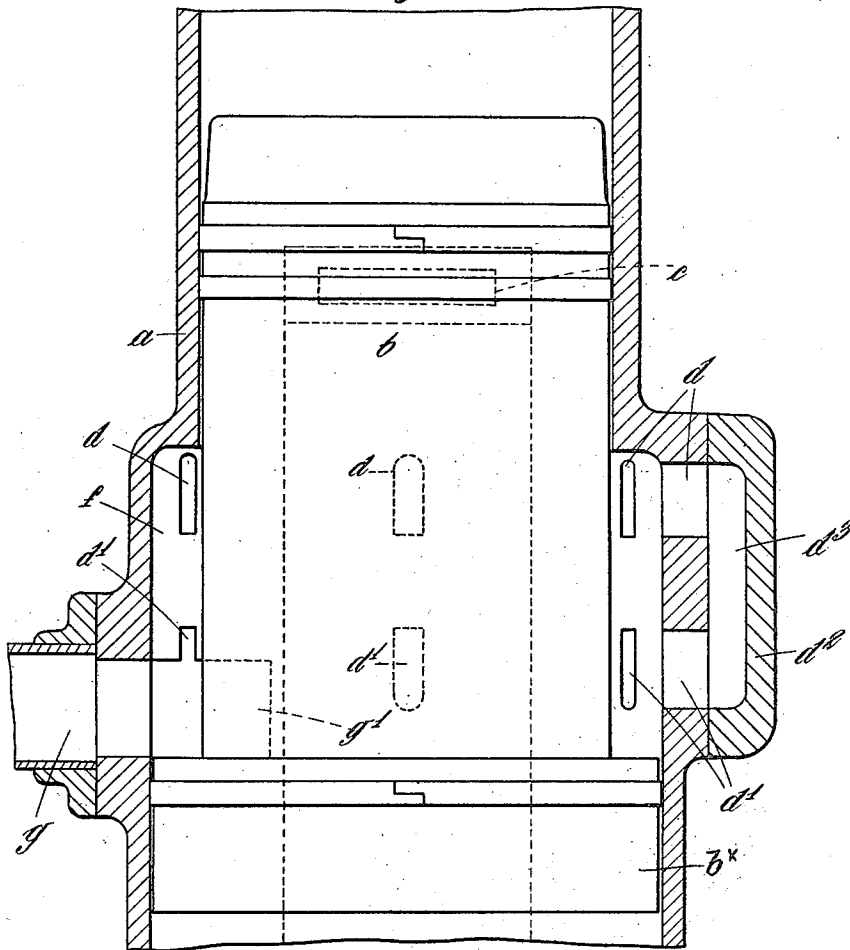
H. E. WATTON

INTERNAL COMBUSTION ENGINE

Filed Sept. 27, 1920

2 Sheets-Sheet 1

Fig. 1.



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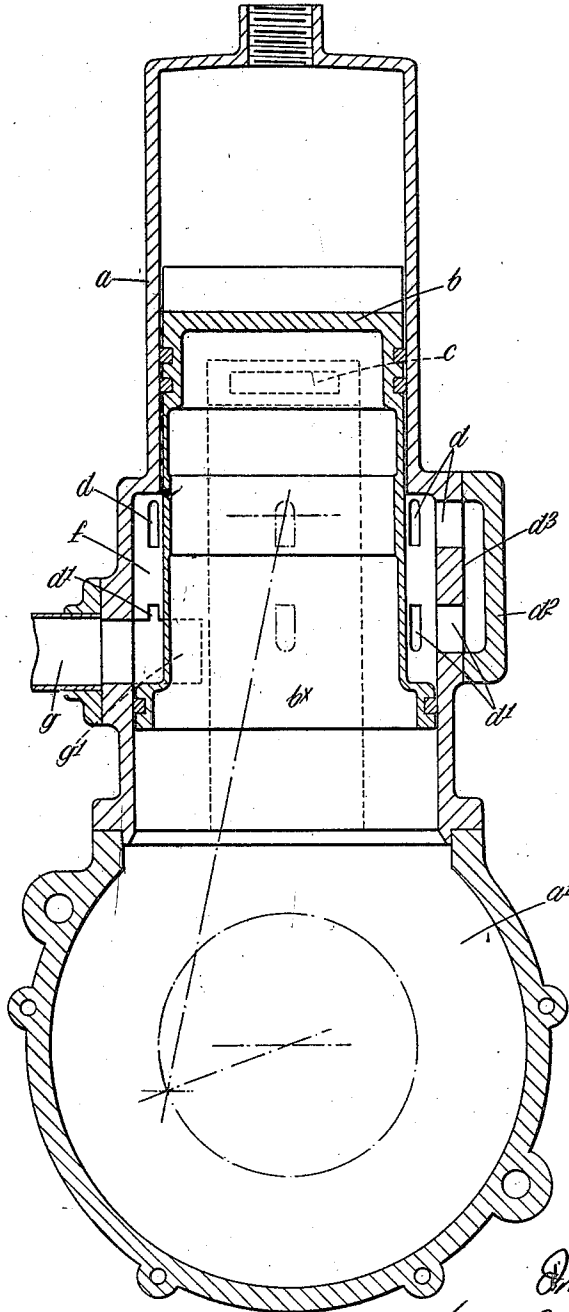
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FIG. 2



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UNITED STATES PATENT OFFICE

HAROLD EDWIN WATTON, OF BIRMINGHAM, ENGLAND, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO DUNFORD & ELLIOTT (SHEFFIELD) LIMITED, OF ATTERCLIFFE, SHEFFIELD, ENGLAND.

INTERNAL-COMBUSTION ENGINE.

Application filed September 27, 1920. Serial No. 413,193.

To all whom it may concern:

Be it known that I, HAROLD EDWIN WATTON, a subject of the King of Great Britain, residing at Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in or Relating to Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines working on the two stroke principle and of the type in which the piston is stepped or made of two diameters and the cylinder correspondingly formed to receive it, the carburetted air constituting the combustible charge being drawn into the crank case through a valveless inlet port situated in the wall of the cylinder while the piston is completing its instroke and compressed in the crank case during the outward stroke and subsequently conveyed from said crank case through a port leading to the combustion space of the cylinder; it is the chief object of the invention to provide improved means for cooling the piston of such engines.

In engines of the above stated type a volume of the combustible charge from the carburettor also enters the annular space existing between the larger portion of the cylinder and the smaller diameter of the piston when the aforesaid inlet port is uncovered by the larger diameter of the piston during the outward stroke, most of the said charge being expelled again through the aforesaid inlet port during the inward stroke of the piston. A considerable volume of the charge, however, remains trapped in said annular space after the larger diameter of the piston passes the said inlet port during the termination of the instroke and becomes compressed therein, thus leaving behind a highly heated volume of the charge which in mixing with the next ensuing volume of the charge entering said annular space during the outstroke of the piston neutralizes the cooling effect which such volume would otherwise have on the piston.

According to our invention we provide means, preferably in the form of transfer ports, slots or openings in the wall of the said annular space controlled by the larger diameter of the piston, whereby the hot volume of the charge trapped in said annular space is transferred to the crankcase

as the piston is completing its instroke and during the admission of the combustible charge into the crank case through the aforesaid valveless inlet port as the latter is uncovered during the completion of the said inward stroke of the piston. Full advantage can thus be taken of the cooling effect of the cool volume of the charge entering the said annular space during the outstroke of the piston and at the same time the charge entering the crank case through the inlet port is augmented and warmed by mingling with the hot volume of the charge expelled from the said annular space.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawing in which Figure 1 is a vertical section of the upper part of the cylinder of an internal combustion engine with our improvements applied thereto, and Figure 2 is a vertical section taken through the cylinder, piston and crank case of the engine.

a is the cylinder and b the piston which is stepped to form two diameters of which the larger is designated by the reference letter b^* . The cylinder a is correspondingly stepped to receive said piston. a' is the crank case of the engine. d d' are upper and lower transfer ports which open into the annular space f the lower ports lying level or approximately level with the inlet port g' of the engine and communicating with the upper ports by the transfer passages d^3 extending through the boxes, pipes or casings d^2 . On the outward stroke of the piston a volume of cool atmospheric air is drawn through the carburettor into the annular space f which it enters through the induction pipe g and inlet port g' and by coming into contact with the piston cools it and itself becomes heated. On the return or inward stroke of the piston the carburetted air in the annular space f will be expelled through the inlet port g' until the portion b^* of the piston in passing beyond the said inlet port uncovers the lower transfer port d' whereupon the said carburetted air remaining in the annular space f will be caused to pass through the upper transfer ports d and escape through the lower transfer ports d' beneath the piston and enter the crank case in a heated condition owing

to the heat it has absorbed from the piston and in this condition it will mix with the cool combustible charge which is being drawn into the crank case through the inlet port *g'* by the piston during the latter part of its inward stroke. On the next outward stroke of the piston the combustible mixture now contained in the crankcase *a'* is compressed until the top of the piston passes below the port *c* which forms part of the external transfer passage between the crankcase and the combustion space of the cylinder. As soon as the piston passes said port *c* the combustible mixture passes through the transfer passage into the combustion space of the cylinder wherein during the following inward stroke of the piston, it is compressed and fired. In some cases the ports *d d'* may be elongated to meet together to form slots in the wall of the annular space *f*.

What I claim and desire to secure by Letters Patent of the United States is:—

1. An internal combustion engine working on the two stroke principle, consisting in the combination of a stepped piston, a cylinder in which said piston works, an induction pipe communicating with a valveless inlet port situated in the wall of the cylinder in such position that the combustible charge is admitted to the crankcase while but not before the piston is completing its instroke, means external to the cylinder for leading the combustible charge from the crank case to the combustion space of the cylinder and

means whereby the volume of the combustible charge which becomes trapped in the upper part of the annular space existing between the larger portion of the cylinder and the smaller diameter of the piston is transferred to the crank case as the piston is completing its instroke and during the admission of the combustible charge into the crank case through said valveless inlet port.

2. An internal combustion engine working on the two stroke principle, consisting in the combination of a stepped piston, a cylinder in which said piston works, an induction pipe communicating with a valveless inlet port situated in the wall of the cylinder in such a position that the combustible charge is admitted to the crank case while but not before the piston is completing its instroke, means external to the cylinder for leading the combustible charge from the crank case to the combustion space of the cylinder and transfer ports in the cylinder so situated that as the larger diameter of the piston is completing its instroke communication between the crank case and the annular space existing beyond said larger diameter of the piston will be established so that the combustible charge trapped in the upper part of said annular space will be transferred to the crank case during the admission of the combustible charge into the crank case through said valveless inlet port.

HAROLD EDWIN WATTON.