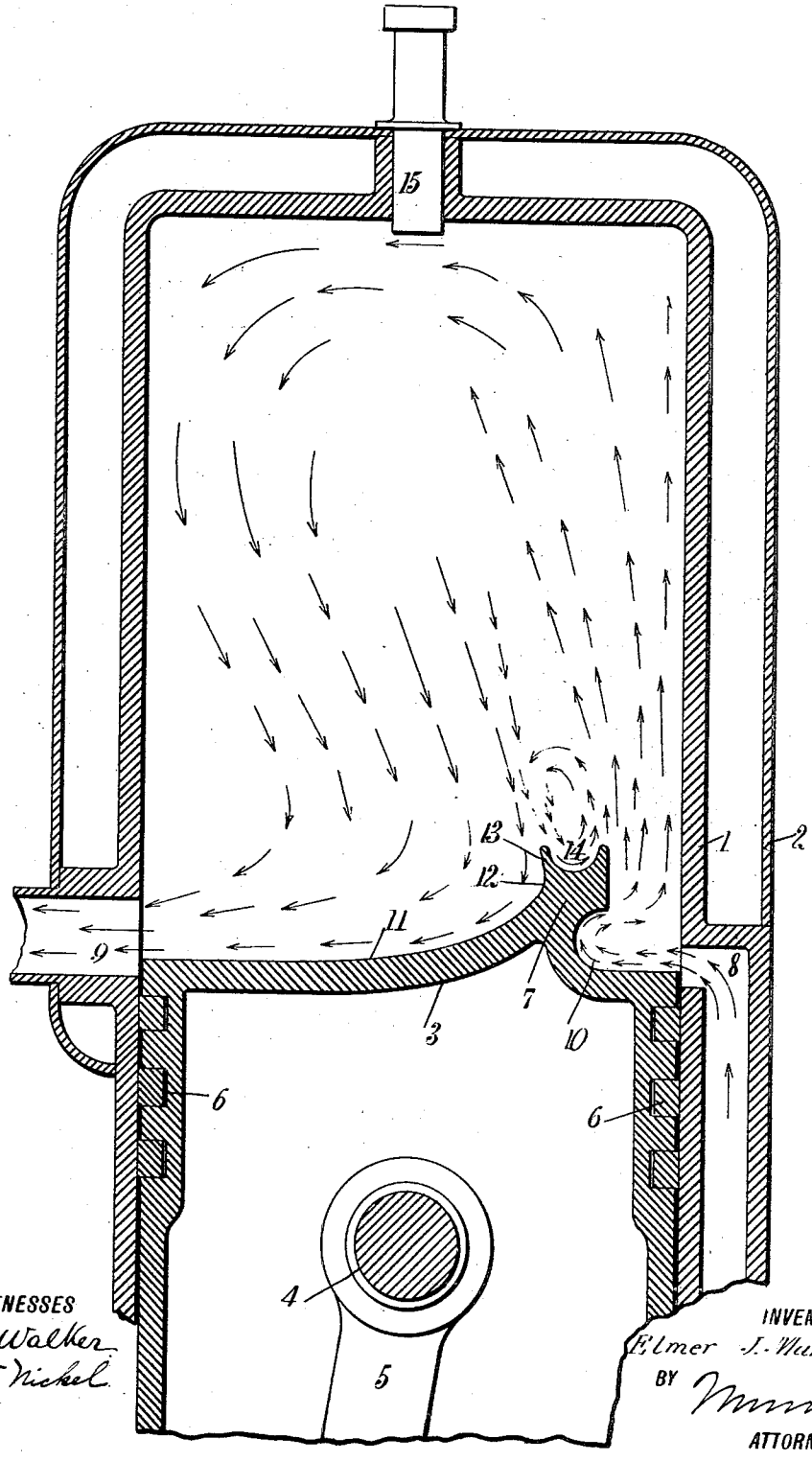
E. J. MANNING.

TWO-CYCLE ENGINE.

APPLICATION FILED MAR. 8, 1912.

1,122,965. Patented Dec. 29, 1914.



WITNESSES

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TWO-CYCLE ENGINE.

1,122,965. Specification of Letters Patent. Patented Dec. 29, 1914.

Application filed March 8, 1912. Serial No. 682,359.

To all whom it may concern:

Be it known that I, ELMER J. MANNING, a citizen of the United States, and a resident of Janesville, in the county of Rock and State of Wisconsin, have invented a new and Improved Two-Cycle Engine, of which the following is a full, clear, and exact description.

My invention relates to an improved form of two-cycle internal combustion engine in which the deflector plate carried by the piston to direct the incoming gases toward the head of the cylinder is given an especial shape, with a view to causing the incoming gases to enter in such a way as to keep them separated from the burned gases of combustion and obviate any tendency of the incoming charge to pass out through the exhaust conduit, with resultant waste of fuel and loss of power.

Reference is to be had to the accompanying drawing forming a part of this specification, in which the figure represents in longitudinal section a two-cycle engine having a piston with a deflector plate designed to give the desired results.

The numeral 1 represents a cylinder or casing inclosing a power chamber, and this power chamber is provided with the usual water jacket 2 for cooling purposes.

3 is the piston having a pin 4 which serves as a pivot for the connecting rod 5; and the piston has the usual packing rings 6, and deflector plate 7 which shields the inlet port 8 when the piston overruns the same, to deflect the incoming gases toward the far end of the cylinder as the exhaust gases pass out through the conduit 9.

In ordinary two cycle engines the inner face of the piston and the baffle plate located thereon are so shaped that the incoming gas is directed straight toward the opposite end of the cylinder and permitted to some extent to curl over the upper edge of the deflector plate, as it were, and mix with some of the burned gases in their exit from the power chamber. This is because of the natural tendency of the fuel mixture which is forced into the power chamber of the cylinder under pressure to expand, upon passing the edge of the baffle plate, toward the opposite side of the cylinder, and as a result some of the gas instead of flowing straight toward the opposite end of the cylinder flows diagonally across the power chamber to the far corner thereof, and this often results in some exhaust gases being pocketed in the cylinder in the corner adjacent the head on the same side as the deflector plate; and, further, owing to this lateral displacement of the inflowing gases there is a marked tendency of the mixture to mingle with the exhaust gases and escape from the power chamber before the piston moves inward to close the exhaust opening. The consequences of these drawbacks are, of course, waste of fuel and diminution in the output of the engine and the efficiency thereof.

In my invention these disadvantages are overcome by giving the baffle plate an especial shape, as clearly shown on the drawing, and which will now be described. In the face of the baffle plate which is turned toward the inlet opening 8 I form a semi-cylindrical recess 10, and I make this baffle plate of a certain thickness, so as to be able to form a semi-cylindrical recess in the top thereof, shown at 14. I also curve the inner face of the piston as shown at 11, this curve beginning at a point 12 below the top edge of the baffle plate and extending smoothly toward the opposite edge of the piston 3. The surface connecting the point 12 to the adjacent edge of the baffle plate 13 may be straight or plane, as shown. 15 is the usual igniter by means of which the charge is fired at the beginning of the expansion stroke.

The result of the construction described is to cause the incoming gaseous mixture to pass into the recess 10 along the bottom thereof and be deflected or doubled back upon itself, and thus be delayed in rising until such time as when there will be sufficient volume to fill completely the space between the deflector plate and the cylinder wall, instead of shooting up in a thin stream and mixing with the burned gases. If the deflector plate could be very much farther extended from the piston head it would obviously keep the incoming and burned gases much better separated. This, however, cannot be done, as the height of the deflector plate must be kept at such a point that it will not strike the cylinder head when the piston has traveled to its greatest distance within the cylinder; that is, the height of the deflector plate is limited by the height of the compression space.

It is to secure the same results as with an extended deflector plate that I place the groove in the top of the plate. Its action is

to be explained in this way. During the power stroke the expanding gases are following and flowing in the same direction as the piston is traveling. When the piston has reached a point at which it uncovers the exhaust port, the expanding gases continue to flow in the same direction and at a greatly accelerated rate of travel as they are escaping from the cylinder on the exhaust side of the deflector plate. It is at this time in the cycle that the projecting edge 13 will shave off, as it were, a small portion of the expanding and outflowing gases. The semi-cylindrical recess 14 will deflect and reverse the direction of flow of this small quantity of gas, causing it to flow in the same direction that it is desired to have the incoming gas travel. Under this action the incoming gas does not have to meet and overcome a current of gas coming directly toward it, but rather flows by the side of a current of gas traveling in the same direction. The tendency for the gases to mix is thereby greatly reduced. This is virtually the same thing as greatly increasing the height of the deflector plate.

To secure the most efficient exhaust the burned gases should be so directed as to flow out with least resistance between the same and the surface of the piston. For this reason I make the surface of the piston 11 in the form of a parabolic curve, with the apex 12 of the curve below the top edge 13 of the deflector plate, as described above. The coring out of the inside of the piston leaves but a small body of solid metal in the deflector plate. As a result, the cooling effect of the air that enters the crank case and comes in contact with the inside of the piston is enhanced. When the exhaust port first opens, the burned gases start to flow on the top surface of the piston and out through the port 9, and the passage of the burned gases from the power chamber is easy and continuous, owing to the fact that all obstacles in the form of shoulders and corners have been carefully removed.

I form a parabolic curve on the top of the piston because the parabolic curve has such mechanical properties that a particle projected through the focus of the curve so as to impinge upon the curve at any point will be deflected by the curve in a direction parallel to the axis thereof. This is what makes a parabolic curve of especial utility in the arts, for example, in parabolic mirrors which have the property of directing all the beams of light which fall upon the mirror away from the face of the same in parallel lines where such beams emanate from a source of light located at the focus of the parabola. In my engine this property makes the parabolic curve useful in directing the gases which impinge thereon straight toward the exhaust port, and is better adapted than any other form of curve to cause the gases which strike the top of the piston to be deflected therefrom in such a direction as to cause them to travel straight toward the exhaust port and out through the exhaust conduit. It will be seen that the focus of the parabola described by the top of the piston will be located in the axis of the cylinder as the piston moves. As the center of mass of the gases inside the power chamber will also be located substantially in the axis of the cylinder when it strikes the piston, it will be seen that the tendency of the top of the piston will be to cause the gases to be deflected, after striking the top of the piston, in a straight horizontal line, toward the exhaust passage 9. This greatly facilitates the escape of the products of combustion, as will be readily understood.

From the above description it will be apparent that by means of my improved form of baffle plate the exhaust gases are permitted to flow from the cylinder in an easy and unobstructed fashion, and that the incoming fresh gas which is to form the fuel for the next charge, is prevented from mixing with the exhaust gases and flowing out with them, to the utmost possible extent. The recess 10 checks the incoming gas to such an extent as to cause it to flow in sufficient volume toward the opposite end of the cylinder and completely fill the space between the cylinder wall and the plate. The curved top of the piston allows of a smooth flow of the exhaust gases from the power chamber without the formation of eddies, and the recess in the top of the plate forms an eddy which will prevent the direct flow of any of the incoming charge across the plate to the exhaust port.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

In an internal combustion engine, a piston carrying a deflector plate of considerable thickness to shield the inlet port of the engine at the end of the out stroke of the piston, said deflector plate having a recess in its top to form an eddy and thus prevent the incoming combustible gas from mixing with the outflowing gases of combustion.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELMER J. MANNING.

Witnesses:
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F. H. PALMER.