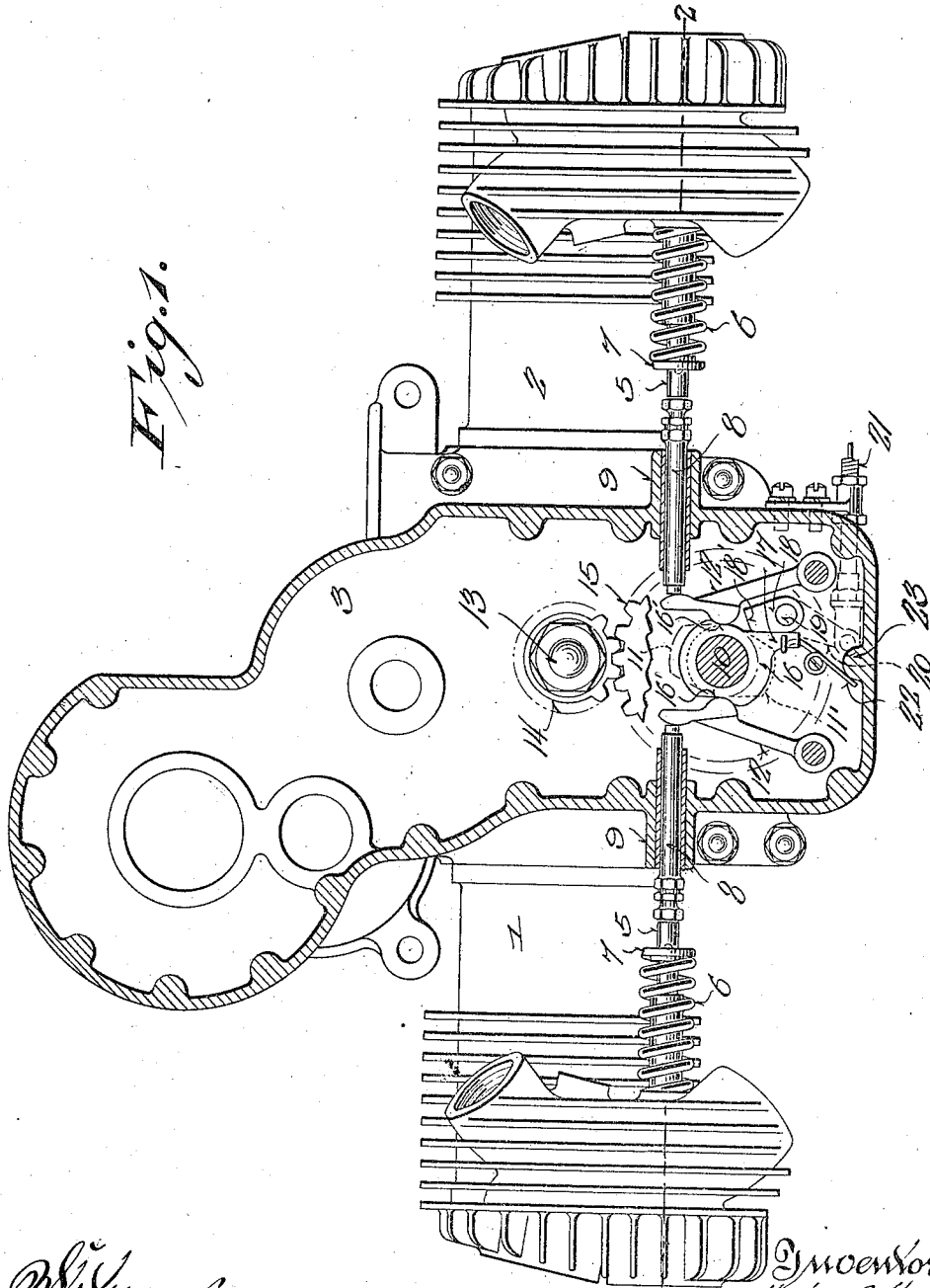


W. S. HARLEY.
COMPRESSION RELIEVING MECHANISM.
APPLICATION FILED SEPT. 19, 1917.

1,301,256.

Patented Apr. 22, 1919.
2 SHEETS—SHEET 1.



Witness:
J. P. Brett

For

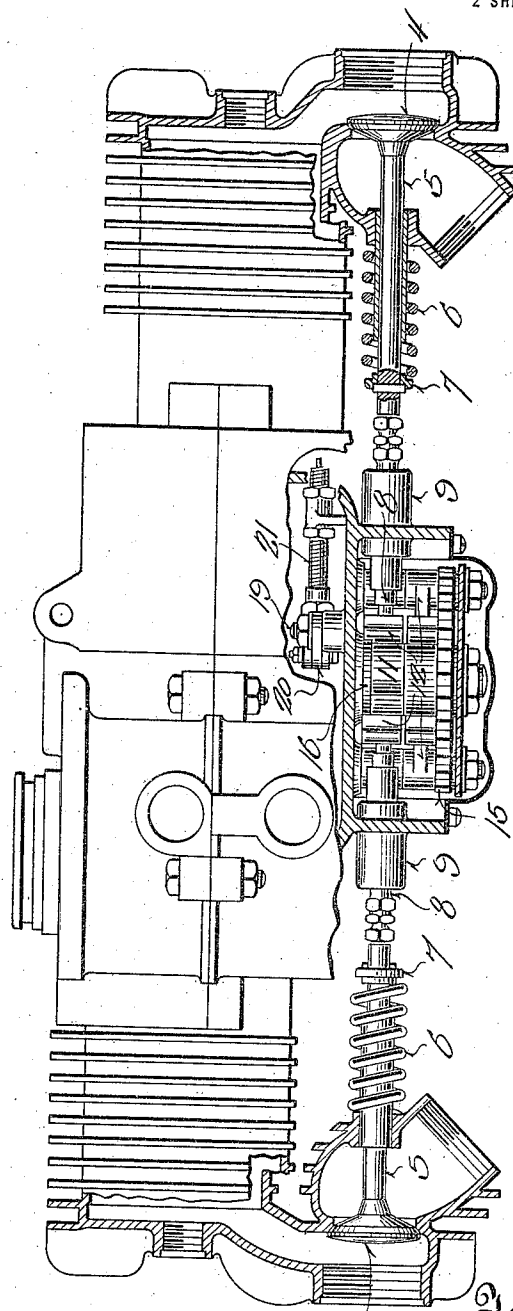
Inventor
William S. Harley
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Attorney

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Fig. 2.



Witness:
T. P. Britt

For

Inventor:
William S. Harley
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UNITED STATES PATENT OFFICE.

WILLIAM S. HARLEY, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HARLEY-DAVIDSON MOTOR CO., OF MILWAUKEE, WISCONSIN.

COMPRESSION-RELIEVING MECHANISM.

1,301,256.

Specification of Letters Patent.

Patented Apr. 22, 1919.

Application filed September 19, 1917. Serial No. 192,116.

To all whom it may concern:

Be it known that I, WILLIAM S. HARLEY, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Compression-Relieving Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to improvements in internal combustion engines for use on motorcycles, more particularly to the valve operating means thereof.

In the use of engines of this type it is frequently necessary to open the exhaust valves and retain them in this position in order to relieve compression in the cylinders. The primary object of this invention is to provide an arrangement whereby the exhaust valves may be quickly and easily opened and positively held in this position.

A less important object of the invention is to provide means for automatically returning certain parts of the valve opening mechanism to inactive position when the other parts of said mechanism are rendered inoperative.

With these general objects in view the invention resides in the novel features of construction which will be hereafter more particularly described and claimed, and shown in the drawings wherein:

Figure 1 represents a vertical sectional view through an internal combustion engine in which my improved valve opening mechanism is disposed.

Fig. 2 is a horizontal section taken on the plane of the line 2—2 of Fig. 1.

Although this invention may readily be used on any type of internal combustion engine, it is designed particularly for motorcycle engines having opposed cylinders, such cylinders in the drawings being designated by the numerals 1 and 2. It will be seen from the drawings that these cylinders extend from opposite sides of a vertically positioned elongated crank case 3, these parts being constructed and arranged as shown in one of my co-pending applications for improvements in engine construction. Inasmuch as only the exhaust valves 4 are utilized in carrying out the objects of this invention, the intake valves and their operating parts have been omitted for convenience in illustration.

When the cylinders 1 and 2 are opposed the stems 5 of the exhaust valves are also preferably extended in opposite directions, they preferably being movable in the same horizontal plane. As in similar engines the valves are adapted to be held normally closed by means of expansile springs 6 disposed around the stems 5, said springs being adapted to exert their tension against a portion of the engine cylinders and stops 7 carried by the stems. The stems themselves are directly actuated by push rods 8, which are slidably mounted in bearings 9 formed in the walls of the crank case 3.

Means for moving the push rods outwardly is substantially similar to that illustrated and described in the above mentioned co-pending application and consists of a cam shaft 10, cams 11 and 11' fixed thereon, levers 12, and means for rotating the cam shaft. Levers 12 are pivoted at one end, their free ends being extended upwardly and disposed on opposite sides of the cam shaft in such position that their intermediate portions will be alternately engaged by the cams 11 and 11'. The free ends of the levers engage the inner ends of the push rods, and thus when the cams engage said levers, said rods will be forced outwardly away from each other against the tension of the springs 6. When the cams are arranged as shown in Fig. 1, said springs 6 will have forced the push rods and levers inwardly toward each other.

The cam shaft 10 is operated from the crank shaft 13 by means of intermeshed gears 14 and 15. This operation will be seen to be substantially similar to that described in said co-pending application.

It is obvious that when the levers 12 are moved apart, the valves 4 will be opened to a greater or lesser extent, and when in this position the compression in the cylinders 1 and 2 will be relieved. Therefore means for holding the free end portions of the levers in spaced apart relation forms the principal feature of my invention. Specifically this consists of a cam plate 16 which is free to rotate on the cam shaft 10, said cam plate having recessed portions 16' in which the intermediate parts of the levers 12 rest when the invention is in inoperative position.

A finger 17 extends from the cam plate and is adapted to cooperate with a pawl 18 fixed upon a rock shaft 19, the latter extend-

ing parallel to the shaft 10 and through one wall of the crank case where it is provided with a flat face 18' for coöperation with a similar face on the finger 17, whereby the cam 16 will be retained in active position when said faces engage. The pawl is moved to cause this face 18' to engage the finger 17 by moving the arm 20 through the medium of a flexible connection 21, which is connected therewith, as illustrated.

As soon, however, as the arm 20 is shifted to dispose the pawl as shown in Fig. 1, a spring 22 will force the cam plate into its inactive position. This spring is preferably in the form of a spring wire held intermediate its ends, one end engaging the finger 17 and the other a projection 23 formed on the inner wall of the crank case 3. Thus it will be obvious that the cam plate 16 cannot be retained in active position except when the flat faces of the pawl and finger coöperate and engage each other. Accidental retention of the exhaust valves in open position is thereby obviated.

From the foregoing description of the arrangement, it will be seen that an extremely simple mechanism has been produced whereby the exhaust or other valves of a motor-cycle engine may be moved to an open position at the will of the operator and retained in this position until the opening means is rendered inactive. Such mechanism will be an important addition to a motor-cycle and will add to the enjoyment and ease of operation thereof with only a slight additional cost.

I claim:

1. The combination with an engine cylinder, an exhaust valve therefor, and a lever for operating said valve, of means for actuating said lever including a shaft, a cam plate rotatable on said shaft and having a cam face for engaging said lever, a finger extending from the plate, a rock shaft, a pawl connected with said rock shaft for coöperation with said finger, said pawl having a pair of operating faces, means con-

nected with said rock shaft for rocking the same to selectively engage either of the faces of the pawl with the finger, an intermediately pivoted spring having one end engaging said finger to hold the latter normally in engagement with one of the faces of said pawl, the finger being moved against the tension of said spring to engage the other pawl face therewith, and a stop adjacent the other end of the spring for engagement therewith, whereby to properly tension said spring.

2. The combination with an engine cylinder, an exhaust valve therefor, and a lever for operating said valve, means for actuating said lever including a shaft, a cam plate rotatable on said shaft and having a cam face for engaging said lever, a finger extending from said plate, said finger having a flat face, a rock shaft, a pawl connected with said rock shaft and having one flat face for coöperation with the similar face of said finger when in one position, and a second flat face disposed at substantially right angles to the first face for engagement with said flat face of the finger when said pawl is in a second position, the cam face of said cam plate being out of engagement with said lever and held against movement when the first mentioned flat face of the pawl and the similar face of the finger engage, the coöperative engagement of the second named flat face of the pawl with the flat face of the finger causing movement of the cam plate to actuate the lever by means of said cam face, a spring engaging said finger and urging the same toward the pawl whereby to hold the former in contact with either face of the latter, and means connected with said rock shaft for rocking the same to selectively engage either of the faces of the pawl with the flat face of the finger.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin.

WILLIAM S. HARLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."