

H. R. SETZ.
SCAVENGING PORT CONTROL.
APPLICATION FILED APR. 11, 1921.

1,407,586.

Patented Feb. 21, 1922.
3 SHEETS—SHEET 1.

Fig. 1.

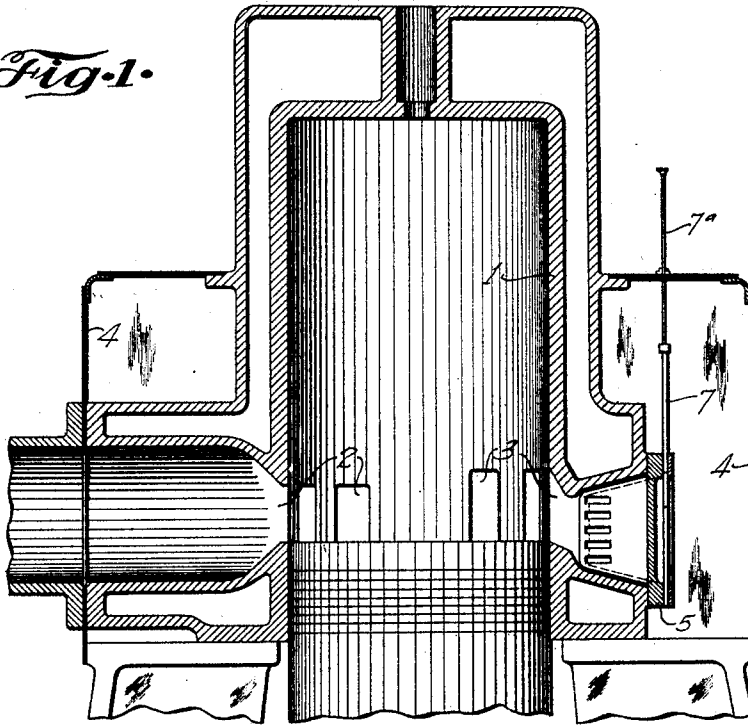
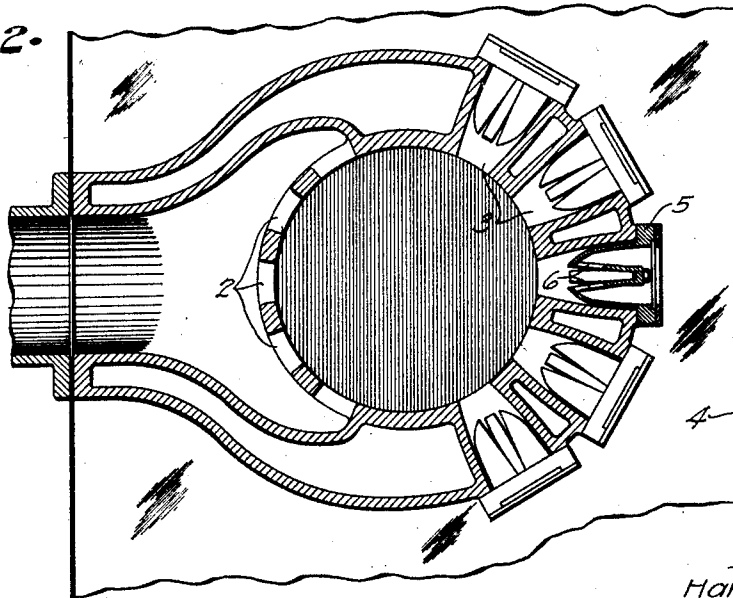


Fig. 2.



INVENTOR
Hans R. Setz

BY
Bakewell Church
ATTORNEYS

1,407,586.

Patented Feb. 21, 1922.

3 SHEETS—SHEET 2.

Fig. 3.

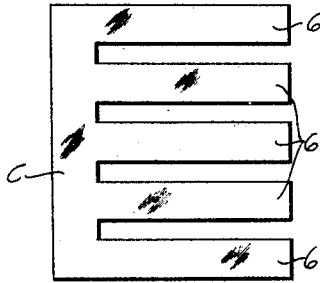


Fig. 4.

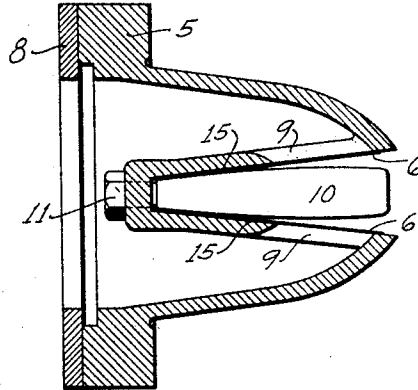


Fig. 5.

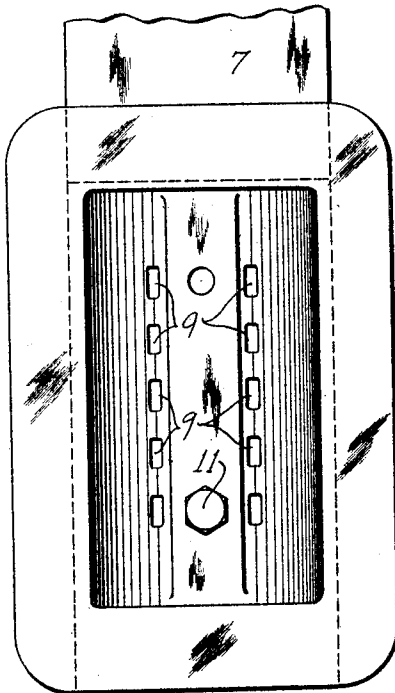
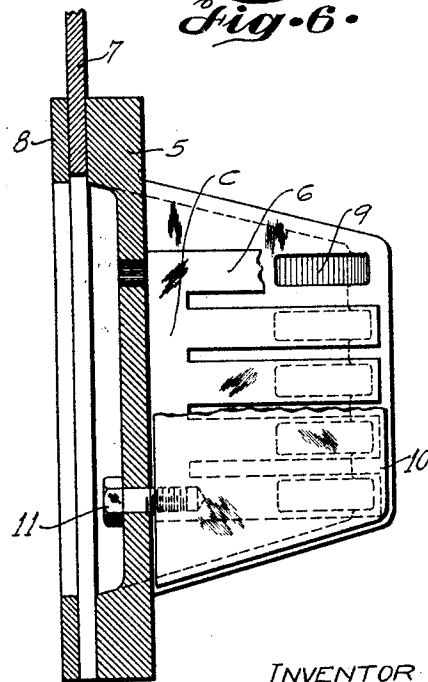


Fig. 6.



INVENTOR
Hans R. Setz

By *Baker & Church*
ATTORNEYS

1,407,586.

H. R. SETZ.
SCAVENGING PORT CONTROL.
APPLICATION FILED APR. 11, 1921.

Patented Feb. 21, 1922
3 SHEETS—SHEET 3.

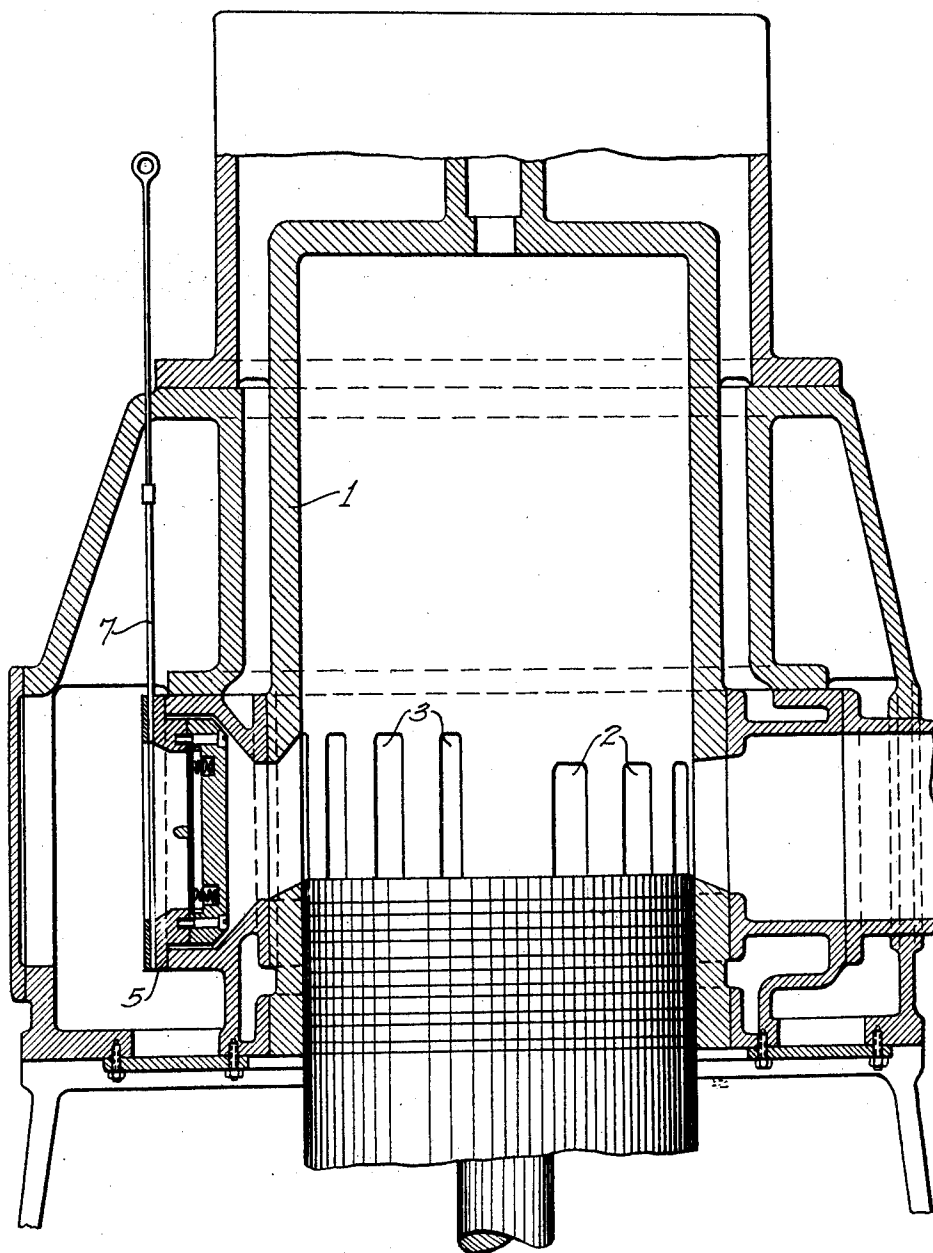


Fig. 7.

INVENTOR
Hans R. Setz.

By
Bakewell Church
ATTORNEYS

UNITED STATES PATENT OFFICE.

HANS R. SETZ, OF MANITOWOC, WISCONSIN.

SCAVENGING PORT CONTROL.

1,407,586.

Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed April 11, 1921. Serial No. 460,533.

To all whom it may concern:

Be it known that I, HANS R. SETZ, a citizen of the United States, residing at Manitowoc, Wisconsin, have invented a certain new and useful Improvement in Scavenging Port Control, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

10 This invention relates to a scavenging port control arrangement of the general type disclosed in my pending application Serial 399,042, filed July 26, 1920 for two cycle internal combustion engine.

15 One object of my present invention is to provide a somewhat modified control arrangement for the specific purpose of having each port controlled individually by its own control element.

20 Another object is to provide means whereby each control element may be rendered inoperative, thereby cutting out any individual port without affecting the supply of scavenging air to adjacent ports.

25 Figure 1 of the drawings is a vertical sectional view, illustrating a port control arrangement embodying my invention.

Figure 2 is a horizontal sectional view through the scavenging and exhaust ports of the cylinder shown in Figure 1.

30 Figure 3 is a side elevational view of one of the valve strips.

Figure 4 is a horizontal sectional view of one of the valve cages.

35 Figure 5 is an end elevational view of said valve cage.

Figure 6 is a vertical sectional view of said cage; and

40 Figure 7 is a vertical sectional view, illustrating a modification of my invention.

Referring to the drawings, 1 designates a cylinder provided with exhaust ports 2 and scavenging ports 3 arranged diametrically opposite the exhaust ports. The scavenging ports are of equal or slightly greater length than the exhaust ports and are preferably in the form of radially-disposed passages in the side wall of the cylinder, extending from the interior to the exterior of the cylinder. The cylinder section containing these passageways is surrounded by an air receiver 4 which may be of any suitable construction, so long as it is of such design that it will supply pre-compressed scaveng-

ing air to the circumferentially-disposed scavenging air passageways whose outer ends terminate in the outer contour of the cylinder, or merely serves as a guard or silencer if scavenging air of atmospheric pressure is used.

60 An automatic controlling element is associated with each of the scavenging ports, and in the form of my invention shown in Figures 1 to 6, inclusive, each of said controlling elements consists of a cage 5 on which one or more valves are mounted. If the cage is provided with a plurality of valves, as herein shown, each of said valves is preferably formed from a light strip of steel or other suitable material rigidly held at one end so as to be guided without friction, and normally held by its own elasticity against a flat seat on the valve cage 5.

As shown in the drawings, each of the valve cages 5 consists of a hollow member 75 arranged in the outer end of the scavenging air passageway with which it co-operates and bifurcated vertically so as to form two flat valve seats 15 that face each other and which are arranged at an approximately 80 acute angle to each other, as shown in Figure 4, each of said valve seats 15 being preferably provided with a vertical row of holes or openings 9 through which the scavenging air passes in entering the scavenging air 85 port or passageway 3 in which said cage is arranged. Two flat strips of metal C that constitute the valves are mounted upon the angularly-disposed surfaces 15 and are retained in position by a wedge-shaped member 10 that is secured to the valve cage by bolts 11 or other suitable fastening devices, each of the valves or valve strips C being slotted or bifurcated horizontally, as shown in Figure 3, so as to form a plurality of 95 fingers 6 that lap over the holes 9 in the valve cage. The contour of the wedge-shaped member 10 is such as to result in easy and uniform deflection of the fingers 6 of the valves when the scavenging air rushing 100 through the openings 9 in the valve cage into the scavenging air passageways 3 causes said fingers 6 to lay against the side faces of the wedge-shaped member 10, it being, of course, understood that the valves open automatically when the pressure in the reservoir 4 exceeds the pressure in the cylinder. In a scavenging valve structure of the char-

acter above described the valves automatically uncover a large passage area at the slightest pressure difference. Furthermore, the valves and the openings in the valve cages through which the scavenging air is admitted are so disposed that there will be no eddy currents or turbulency in the flowing streams of scavenging air, thus tending to insure precise valve action and introduction of the scavenging air into the cylinder in clearly defined paths.

In order that the supply of scavenging air to the cylinder may be diminished, and in order that the particular point or points at which the scavenging air is introduced into the cylinder may be accurately controlled, I have provided means whereby any one of the automatic controlling elements that is associated with the respective scavenging ports 3 can be cut out of service without affecting the operation of the remaining controlling elements. In the form of my invention illustrated in Figures 1 to 6, said means consists of slides 7 arranged to slide vertically in guideways formed by plates 8 and vertical grooves in the outer ends of the valve cages 5 and equipped with actuating devices 7^a that project upwardly through the top wall of the scavenging air receiver 4, as shown in Figure 1, each of the valve cages being equipped with such a slide. Consequently, any scavenging port 3 of the cylinder can be cut out of service while the engine is in operation without affecting the admission of scavenging air through the other ports, by simply depressing the slide valve 7 associated with the scavenging port which it is desired to cut out of operation, the movement of the slide valve into its closed position causing the scavenging air receiver to be cut off from the cage 5 in which said slide valve is mounted.

It is to be understood that the bifurcated surfaces 15 on cage 5 might be placed at a right angle to the position shown in Figures 1 to 6 without detracting from the spirit of this invention; in this case the strips forming the automatic valves would be held in a substantially horizontal position.

Figure 7 shows identically the same valve construction as is contained in my pending application previously referred to; to this has been added the slide 7 on the outer face of cage 5 in a similar manner and for the same purpose as described above.

A valve structure of the kind above described embodies all of the good features and characteristics of the valve structure described in my pending application previously referred to, but it differs slightly from the particular species of my invention therein claimed.

1st. In the form and arrangement of the

cages and valves of the automatic controlling elements for the scavenging air; and

2nd. In that a means separate and distinct from the valve cages is provided for enabling a particular scavenging port to be cut out of service without affecting the admission of scavenging air through the other ports.

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

1. A two-cycle internal combustion engine, comprising a cylinder having a plurality of scavenging air ports that terminate in the inner face of the side wall of the cylinder, and automatic controlling elements corresponding in number to the number of said ports and each associated with a particular port whereby the admission of the scavenging air to the cylinder through said ports can be accurately governed by said controlling elements.

2. A two-cycle internal combustion engine, comprising a cylinder having exhaust ports and scavenging ports, an individual passageway leading from the outer cylinder wall to each of said scavenging ports, and an automatic controlling element associated with each of said ports.

3. A two-cycle internal combustion engine, comprising a cylinder having a plurality of radially-disposed scavenging air passageways whose inner ends terminate in the inner face of the side wall of the cylinder and whose outer ends communicate with a scavenging air receiver, and automatic controlling elements corresponding in number to the number of said passageways and each associated with a particular passageway so as to accurately govern the admission of scavenging air to the cylinder from said receiver.

4. A two-cycle internal combustion engine, comprising a cylinder having exhaust ports and scavenging ports, radially-disposed passageways leading from the outer cylinder wall to each of said scavenging ports, a scavenging air receiver surrounding the portion of the cylinder in which said passageways terminate, and an automatic controlling element associated with each of said ports for governing the admission of scavenging air to same from said receiver.

5. A two-cycle internal combustion engine, comprising a cylinder having a plurality of radially-disposed scavenging air passageways formed in the side wall of same and terminating in the inner face of said side wall, a scavenging air receiver surrounding the portion of the cylinder in which said passageways are formed, and an automatic controlling element arranged at the outer end of each of said passageways for governing the admission of scavenging air to that particular passageway from said receiver.

6. A two-cycle internal combustion engine, comprising a cylinder having a plurality of scavenging ports which extend as individual passageways to the outer cylinder wall, and an automatic controlling element arranged within each of said passageways.

7. A two-cycle internal combustion engine, comprising a cylinder having a plurality of radially-disposed scavenging air passageways formed in the side wall of same and terminating in the inner face of said side wall, automatic controlling elements corresponding in number to the number of said passageways and each associated with one of said passageways for governing the admission of scavenging air to that particular passageway from a source of supply, and means whereby any one of said controlling elements can be rendered inoperative without affecting the operation of the remaining controlling elements.

8. A two-cycle internal combustion engine, comprising a cylinder having a plurality of scavenging ports which extend as individual passageways to the outer cylinder wall, an automatic controlling element arranged within each of said passageways, and means whereby any one of said controlling elements can be rendered inoperative.

9. A two-cycle internal combustion engine, comprising a cylinder having a plurality of scavenging ports which extend as individual passageways to the outer cylinder wall, a scavenging air receiver surrounding the cylinder portion which contains the intake openings to said passageways, an automatic controlling element arranged within each of said passageways, and means whereby any of said controlling elements can be rendered inoperative without affecting the operation of the remaining controlling elements.

10. A two-cycle internal combustion engine provided with a cylinder equipped with scavenging ports, and a control unit associated with each of said ports for governing the admission of scavenging air to the cylinder through that particular port and consisting of a cage, an automatic valve in said cage, and a means independent of said cage for enabling said valve to be rendered inoperative without affecting the operation of the valves of the remaining control units.

11. A two-cycle internal combustion engine provided with a cylinder equipped with scavenging ports, controlling elements for governing the supply of scavenging air to said ports comprising cages and automatic valves in said cages, and cut-off devices separate and distinct from said cages which permit one or more of the controlling elements to be rendered inoperative without affecting the operation of the remaining controlling elements.

12. A two-cycle internal combustion engine provided with a cylinder equipped with

scavenging ports, a scavenging air reservoir, controlling devices for governing the admission of scavenging air from said reservoir to the said ports comprising cages and automatic valves combined with said cages, and cut-off devices arranged between said cages and reservoir, for the purpose described.

13. A two-cycle internal combustion engine, comprising a cylinder provided in its side wall with radially-disposed scavenging ports, a controlling element associated with each of said ports consisting of a stationary cage and an automatic valve in said cage, and a manually-operable device associated with each cage that is adapted to be moved into a position to cut off communication between the valve in the cage and a supply of scavenging air.

14. A two-cycle internal combustion engine, comprising a cylinder provided in its side wall with a plurality of radially-disposed scavenging ports or passageways that lead from the interior to the exterior of the cylinder, a scavenging air reservoir surrounding the portion of the cylinder in which said passageways are formed, stationary cages in the outer ends of said passageways, automatic valves in said cages, and manually-operable cut-off devices on said cages, for the purpose described.

15. A two-cycle internal combustion engine comprising a cylinder provided in its side wall with radially-disposed scavenging ports or passageways, an automatic controlling element associated with each of said ports and consisting of a cage and a valve on said cage formed from a thin strip of metal having one of its ends secured, and means to limit the deflection of the free end of said strip along a predetermined contour.

16. A two-cycle internal combustion engine, comprising a cylinder provided in its side wall with radially-disposed scavenging ports or passageways, an automatic controlling element associated with each of said ports and consisting of a cage and a valve on said cage formed from a thin strip of metal having one of its ends secured and adapted to be retained by its own resiliency in engagement with a flat seat on said cage, and a device on said cage for rendering said valve inoperative.

17. A two-cycle internal combustion engine, comprising a cylinder provided with radially-disposed scavenging air ports or passageways, a scavenging air reservoir surrounding the portion of the cylinder in which said ports are formed, a hollow valve cage arranged in the outer end of each of said passageways and provided with a flat valve seat having holes therein through which the scavenging air can enter from said reservoir, an automatic controlling valve provided with resilient fingers that nor-

mally cover the holes in said valve seat, and a cut-off device in said cage, for the purpose described.

5 18. A two-cycle internal combustion engine, comprising a cylinder provided with scavenging ports, and an automatic controlling element associated with each of said ports and comprising a hollow valve cage

provided with a bifurcated portion having two angularly-disposed valve seats therein, 10 a pair of resilient valves mounted on said valve seats, and a wedge-shaped device interposed between said valves and secured to said cage to retain the valves in position.

HANS R. SETZ.