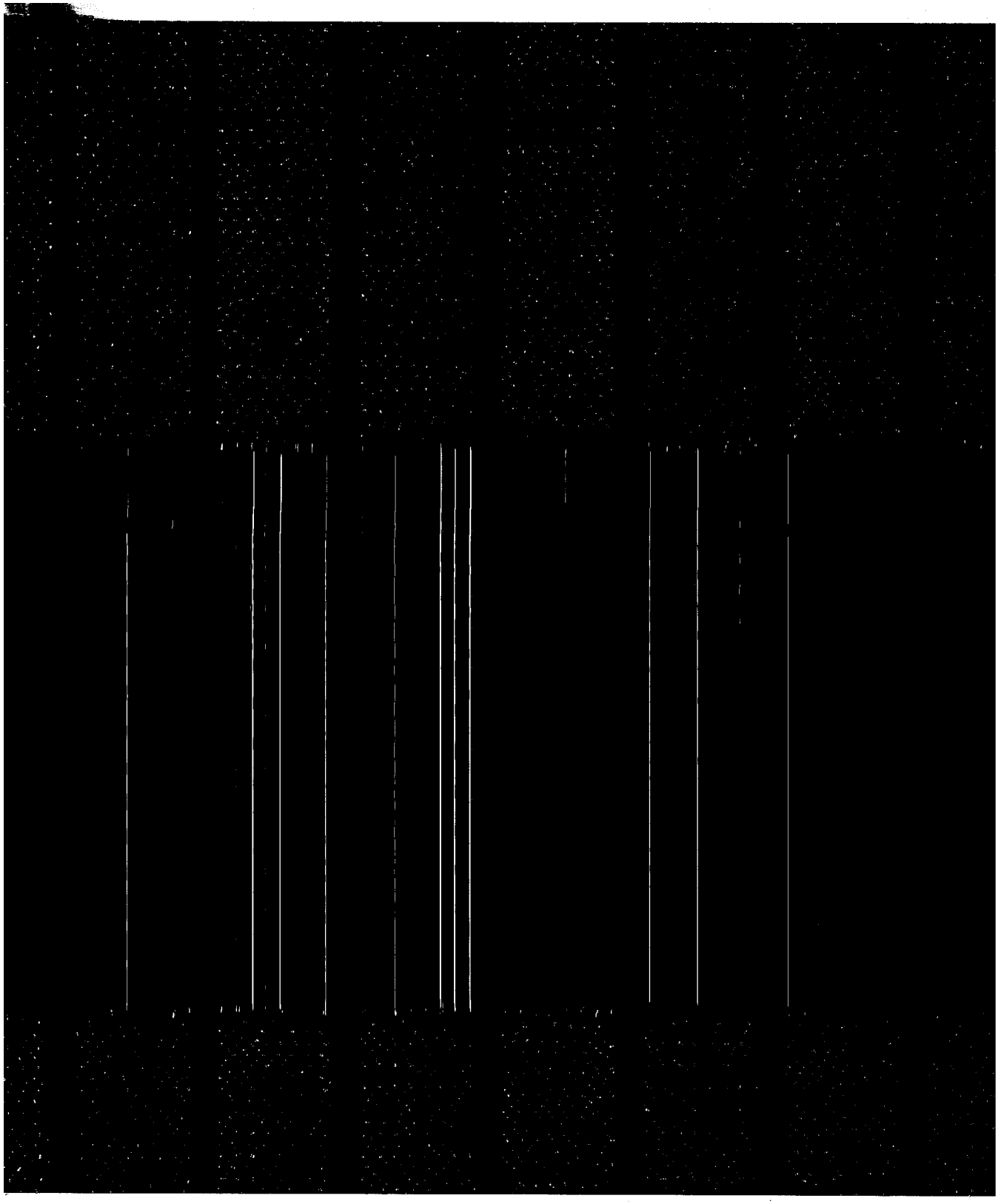
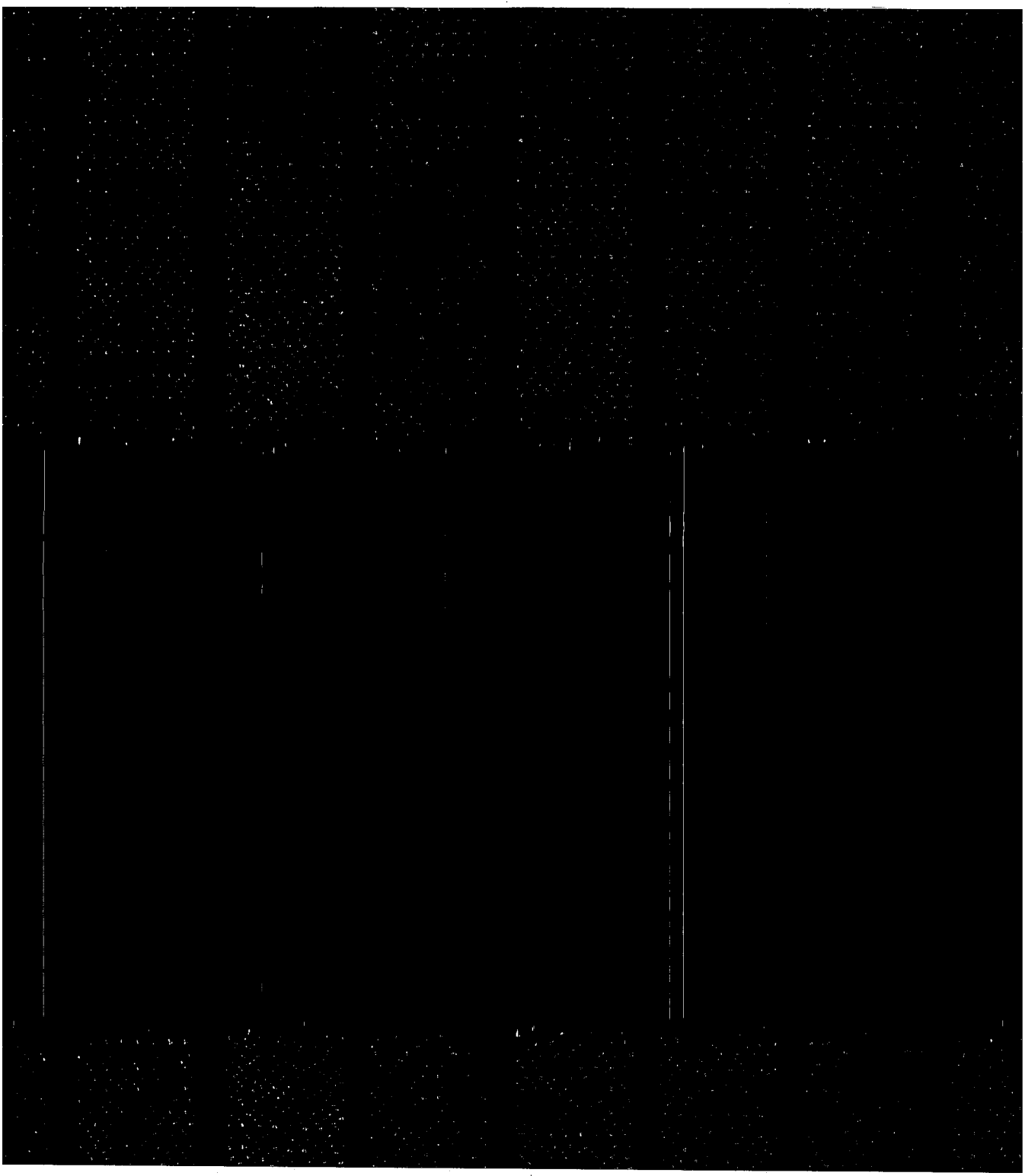


A. A. RUEGG.

TWO-CYCLE GAS ENGINE.

APPLICATION FILED NOV. 6, 1917.

1,330,496. Patented Feb. 10, 1920.



UNITED STATES PATENT OFFICE.

ANTON A. RUEGG, OF SAN FRANCISCO, CALIFORNIA.

TWO-CYCLE GAS-ENGINE.

a higher plane than the upper end of the inlet port 11a. This is of great importance, when the efficiency of the engine is taken into consideration, as it permits opening of the exhaust port 25° ahead of the opening of the inlet port and also permits both the exhaust and inlet ports to reach their maximum opening when the working piston 5 comes to the lower end of its stroke, and it, furthermore, permits a simultaneous closing of both the exhaust and the inlet ports when the working piston has moved 35° on the return or compression stroke. In other words, opening of the exhaust port takes place after the working piston has traveled 120° on the explosion stroke or 60° before it reaches the lower end of the explosion or working stroke, while the inlet port does not open before 35° of the lower end of the stroke is reached or 25° after the exhaust port has been opened. The two ports may, therefore, close in unison when the working piston has traveled 35° on the compression stroke, thus permitting a compression movement of 145°.

This is accomplished for the simple reason that the main ports 11 and 12 are mechanically opened and closed by movement of the sleeve 4 and it cannot be accomplished in an ordinary two-cycle engine as the exhaust port will always be the first to open and the last to close, while the present structure permits the exhaust first to open and both ports to close simultaneously. Any waste of escaping gas is, therefore, reduced to a minimum and a greater volumetric capacity is permitted than would otherwise be the case, as the actual length of the compression stroke is increased 25°. Both the working and compression strokes in all standard types of two-cycle engines are limited to 120°, while the present structure permits a working stroke of 120° and a compression stroke of 145°.

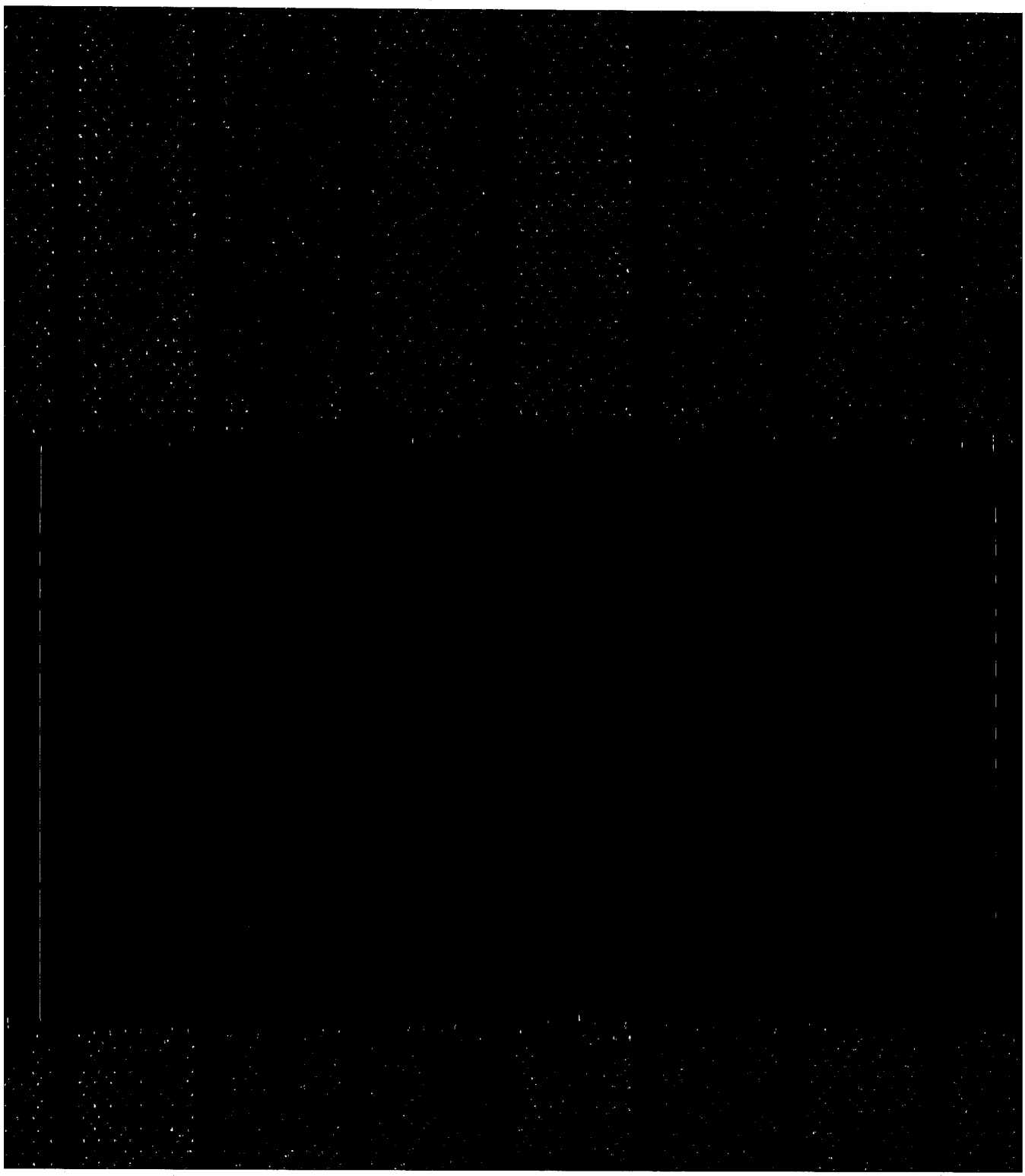
Another feature of the present invention is the provision of the by-passing valve 21 previously described. This valve may be opened in unison with the opening of the inlet port 11 or it may be opened during the upward or compression movement of the working piston, the actual timing or opening of the valve being controlled by a hand lever 30, which may be locked in any position desired by means of a spring-actuated pawl and ratchet 31. The inner end of this lever is fork-shaped to straddle a grooved collar 32 formed on cam 14, and as this cam is splined to the cam shaft 13, as shown at 33, it can readily be seen that longitudinal movement of the cam upon the shaft will retard or advance the time of opening of valve 21 with relation to the movement of piston 5; the cam 14 being sufficiently long to engage the rocker arm 19 regardless of whether it has been moved to one extreme position or the other lengthwise of the shaft.

In actual operation, it is possible to employ any suitable form of carbureter. This may be connected with the check valve, shown at 34, and all gas admitted during the downward stroke of the charging piston 3 will fill the lower cylinder 2 and also a pipe 35 and the annular chamber 36 formed between the head 9 and the main cylinder. Upward or return movement of the charging piston compresses the charge in the tube 35 and also in a chamber 37 formed behind the valve 21. The whole compressed charge is admitted to the main working cylinder A when the inlet port is uncovered and if the maximum power of the engine is required, it is obvious that the cam 24 will be so set that valve 21 will open and close in unison with port 11. A maximum charge is thus admitted to the cylinder, a maximum compression is secured and maximum power is obtained.

If it is desired to reduce the power or to throttle the engine to any extent, it is only necessary to change the position of cam 14 so that the valve 21 will open a little later, that is, during the beginning of the upward stroke of the piston 5. Part of the charge admitted through port 11 will thus be forced outwardly through the valve 21 and pipe 35 back to the charging cylinder 2, or, in other words, merely return or circulate the volume or amount of gas thus released, depending entirely upon the length of time that the valve 21 is permitted to remain open. The actual charge retained in the cylinder may thus be varied to suit working conditions as practically any quantity may be released during the compression stroke. The amount released, of course, determines the compression secured and the power developed.

The engine thus arranged and constructed may employ a set carbureter, that is, a uniform or ideal mixture may be obtained at all times as throttling of the engine is permitted by merely circulating or releasing part of the charge admitted. An ideal means has been provided for throttling a two-cycle engine and practically any speed and power desired may be developed. The ordinary two-cycle engines in general use can only throttle by varying the richness of the mixture or by throttling the carbureter proper. This is, of course, very inefficient, hence the great difficulty of throttling ordinary two-cycle engines.

While a specific form of mechanism is here shown for the purpose of operating the by-passing valve 21, I wish it understood that any other form of mechanism may be employed which is capable of opening the valve when desired. Also I wish it under-



stood that the materials and finish of the several parts of the device may be such as the experience and judgment of the manufacturer may dictate.

I also wish it understood that various changes in form, proportions, and minor details of construction may be resorted to within the scope of the appended claims and that I do not wish to limit myself to

valve, means for regulating the time period of opening of said valve with relation to the movements of the working piston, said last named means comprising a cam shaft, means for driving said shaft in unison with the crank shaft, a cam turnably mounted on the cam shaft, means for changing the position of the cam circumferentially on the shaft, means for securing the cam against rotation

der and coacting ports in the sleeve, a compression space connecting the inlet port with the charging cylinder below and a valve at the upper end of the working cylinder with which said space connects, a shaft, and a cam by which the opening of said valve may be varied.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ANTON A. RUEGG.

Witnesses:
JOHN H. HERRING,
W. W. HEALEY.