H. STEINGASSNER.

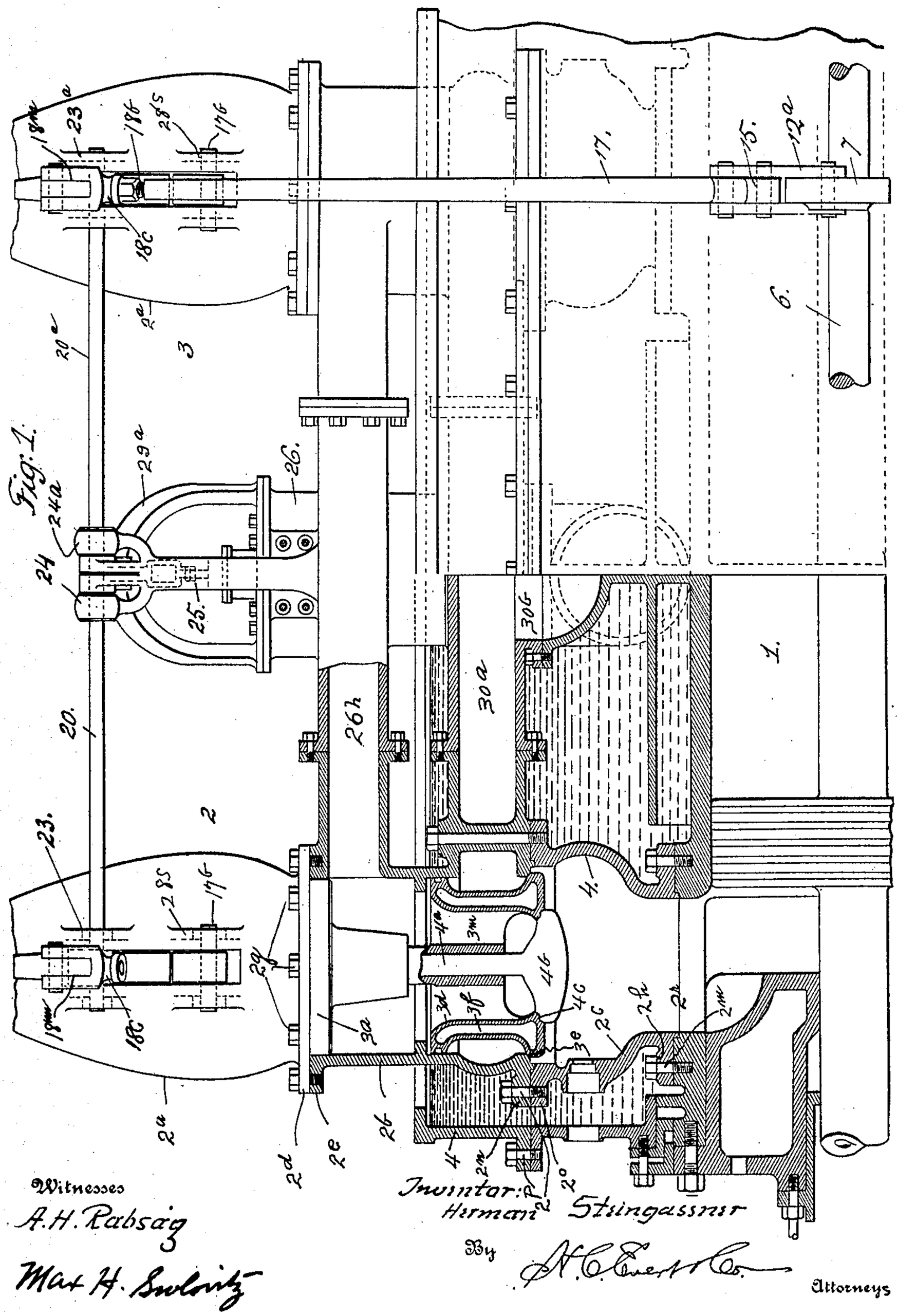
VALVE OPERATING MECHANISM FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 10, 1907.

913,578.

Patented Feb. 23, 1909.

3 SHEETS—SHEET 1.



Witnesses

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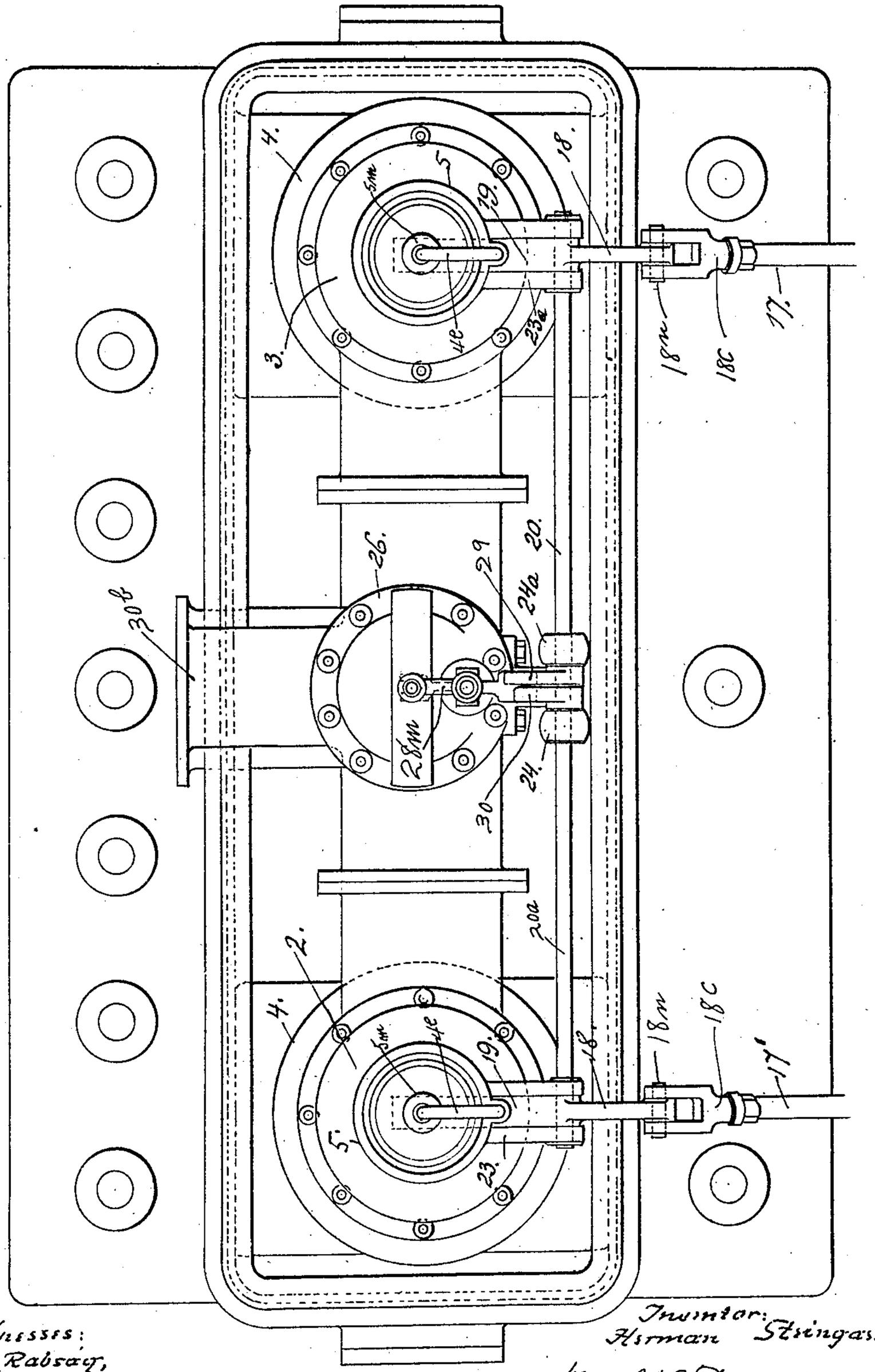
3 SHEETS—SHEET 2.

Fig. 2.



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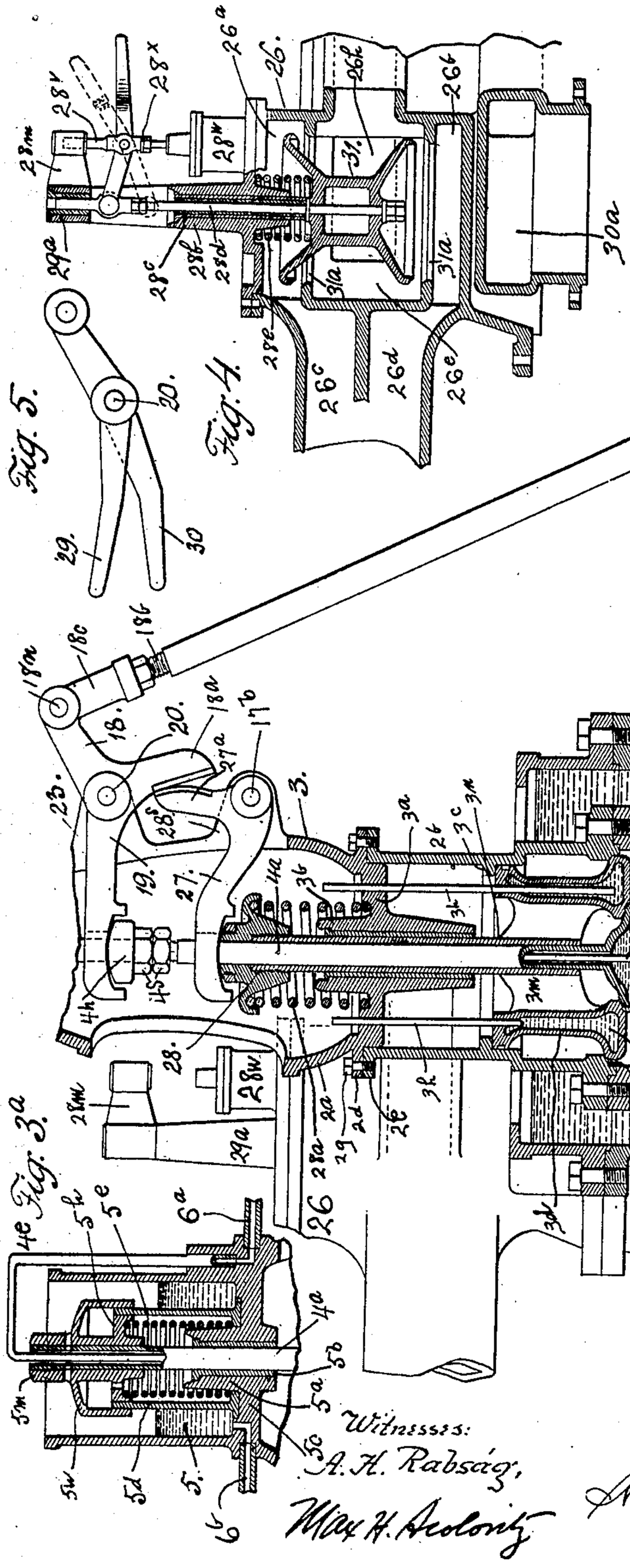

UNITED STATES PATENT OFFICE.

HERMAN STEINGASSNER, OF WILMERDING, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO ALFRED HUTTER AND JACOB DIMAND.

VALVE-OPERATING MECHANISM FOR EXPLOSIVE-ENGINES.

No. 913,578. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed August 10, 1907. Serial No. 387,956.

To all whom it may concern:

Be it known that I, HERMAN STEINGASSNER, a subject of the King of Hungary, residing at Wilmerding, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Valve-Operating Mechanism for Explosive-Engines, of which the following is a specification, reference being had thereto the accompanying drawing.

This invention relates to a valve operating mechanism for explosive engines and has for its primary object to provide means in a manner as hereinafter set forth to prevent premature ignition of the explosive charge.

A further object of the invention is to provide means in a manner as hereinafter set forth and for use in connection with an explosive engine whereby the inlet and exhaust valves as well as the mixing valve are operated from a common shaft.

A further object of the invention is to provide means in a manner as hereinafter set forth and which is adapted for use in connection with an explosive engine whereby the various valves, outlets or gearing used in connection with the engine are so disposed as to be below the center line of the cylinder of the engine, therefore allowing of all the working parts of the engine to be readily accessible and overcoming the necessity of employing a complicated foundation.

Further objects of the invention is to provide a valve operating mechanism for explosive engines which shall be simple in its construction, strong, durable, efficient in its use, conveniently set up, and inexpensive to manufacture.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawing wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawing wherein like reference characters denote corresponding parts throughout the several views; Figure 1 is a sectional side elevation of an explosive engine showing the adaptation therewith of a valve operating mechanism in accordance with this invention, Fig. 2 is a top plan. Figs. 3 and 3^a when taken together illustrate a transverse sectional view of one end of the engine. Fig. 4 is a vertical sectional view of the mixer, Fig. 5 is a detail illustrating the tappet arms.

Referring to the drawings in detail, 1 denotes the engine cylinder, 2, 3 valve chambers and 4, 5 compartments containing a cooling medium. The valve chambers 2, 3 are so disposed as to be positioned at each end of the cylinder 1. Each of the valve chambers 2, 3 house an inlet and an outlet valve as well as a shifting mechanism for the valves. As the valves and their shifting mechanism which are housed in one chamber are similar to the mechanisms housed in the other chamber, but one will be described, the description of one applying to the other.

Each valve chamber is formed of an upper section 2^a an intermediate section 2^b and a lower section 2^c. The sections 2^a and 2^b are provided with opposing flanges as at 2^d, 2^e through which extend hold-fast devices 2^g for connecting the said sections together. The section 2^c is flanged as at 2^h through which extends hold-fast devices 2^m for connecting said section 2^c to the cylinder 1 of the engine. The sections 2^b and 2^c are provided with opposing flanges 2^n, 2^o through which extends hold-fast devices 2^p for securing said sections together. The section 2^c communicates with one end of the cylinder 1 as at 2^r. The section 2^a at its lower end is provided with an inwardly-extending annular flange 3^a with which is formed integral a vertically-extending sleeve 3^b said sleeve projecting into the section 2^a and depending into the section 2^b. The latter is formed with an annular shoulder 3^c constituting a stop to limit the upward movement of the outlet valve 3^d, and the said section 2^b is furthermore provided at its lower end with an annular shoulder 3^e which constitutes a seat for the outlet valve 3^d. The outlet valve 3^d is cylindrical in form and hollowed as at 3^f to receive a cooling liquid through the medium of the supply pipes 3^h. These latter extend into the valve 3^d and project through the flange 3^a. The valve 3^d is furthermore provided with a plurality of arms 3^m formed integral with a vertically-extending hollow stem 3^n which projects through the sleeve 3^b and is connected to a head piece

28 between which and the flange 3^a is positioned an extension spring 28^a, the spring surrounding the head piece 28 and a portion of the sleeve 3^b. Extending through the stem 3^n is a hollow stem 4^a which carries on its lower end an inlet valve 4^b, its seat being formed by the inner edge of the outlet valve 3^d as at 4^c. The inlet valve 4^b is hollow and a cooling liquid is fed thereto through the medium of the pipe 4^e which is positioned within the stem 4^a and will be hereinafter referred to. The stem 4^a is of such a length as to extend through the section 2^a and carries upon a part which is positioned in the section 2^a an abutment 4^h secured in position by the nuts 4^s. A bearing for the upper portion of the stem 4^a is provided through the medium of a collar 5^a in which is positioned a bearing sleeve 5^b. The collar 5^a is formed integrally with an inwardly-extending flange 5^c which is carried by the section 2^a, the flange 5^c not only supports the collar 5^a but also constitutes the bottom of the water chamber 5, the latter being formed by the upper end of the section 2^a and a vertically-extending hollow cylindrical member 5^a which is formed with the flange 5^c. The member 5^d surrounds the upper portion of the collar 5^a and incloses a compression spring 5^e which bears against the flange 5^h projecting from a sleeve 5^m which is fixed to the upper end of the valve stem 4^a. Projecting from the collar 5^m is a cap piece 5^n which is of a diameter and of a height as to extend around the member 5^d. The valve stem 3^n as well as the valve stem 4^a is adapted to be shifted to open the valves carried thereby. The manner in which these stems are shifted will be hereinafter referred to, but it will be stated that the shifting of the valve stem 3^n is had against the action of the spring 28^a and the shifting of the valve stem 4^a is had against the action of the spring 5^e. It will furthermore be stated that when the valve 3^d is shifted to open the outlet, the valve 4^b is carried with the outlet valve, and such action is had without the opening of the inlet. The manner in which such operation of the valves is had will be hereinafter referred to. The function of the springs 28^a and 5^e is to assist in returning the inlet and outlet valves to closing position. The pipe 4^e which supplies a cooling medium to the valve 4^b extends up through the stem 4^a and then exteriorly of the section 2^a and is then bent downwardly and communicates with a cooling medium supply pipe 6^a. A cooling medium supply pipe 6^b communicates with the chamber 5.

Mounted above the cylinder 1 is a casing 26 which constitutes a valve chamber embodying two compartments 26^a and 26^b, the former communicating through the medium of a channel 26^c with a gas supply (not shown) and the latter communicating through the channel 26^d with an air supply (not shown). Within the casing 26 is positioned a valve 31 adapted to engage the seats 31^a for closing the outlets of the compartments 26^a, 26^b. The compartments 26^a and 26^b communicate through the medium of their outlets with a chamber 26^e which opens into a passage 26^h for supplying the combustible charge to the valve chambers 2 and 3. The passage 26^h opens into the section 2^b of each of the valve chambers 2 and 3. Formed integral with the casing 26 is a vertical sleeve 28^b in which is arranged a bearing 28^c for a valve stem 28^d which is connected at its lower end to the valve 31 and has its upper end projecting from the top of the sleeve 28^b. Interposed between the valve 31 and the top of the casing 26 is a compression spring 28^e, the function of which is to return the valve 31 to its normal position, that is to say, a closed position. Formed integral with the casing 26 is a vertically extending yoke 29^a provided with an opening into which extends the upper end of the valve stem 28^d, the yoke 29^a constituting an additional bearing for the valve stem 28^d. Projecting laterally from the top of the yoke 29^a is an arm 28^m, the function of which will be hereinafter referred to.

Arranged below the inlet passage 26^h is a discharge passage 30^a opening at each end into a section 2^b of the valve casings 2 and 3. Intermediate the ends of the passage 30^a is provided an outlet 30^b which opens into the atmosphere. The passage 30^a at each end is closed by the outlet valve 3^d which engages the seat 3^e.

The valves in the casing 2 alternately operate with respect to the valves in the valve casing 3, while the operation of the mixing valve 31 to supply a charge is had when either one of the inlet valves is removed from its seat.

Mechanism for operating the valves in the foregoing manner will now be referred to:— Extending longitudinally with respect to the cylinder 1 is a shaft 6, suitable bearings (not shown) being provided therefor. Upon the shaft 6 is fixed a pair of disks 7, only one of which is shown, each of these disks being provided with a plurality of cam faces. The cam faces of one disk are set 180° apart with respect to the cam faces upon the other disks. The two disks are adapted to actuate the rods 17 and 17′. The construction of each of the disks 7 is the same and but one will be described, the description of one applying to the other. The disk 7 which is illustrated is shown in connection with the rod 17. Each of the disks has its periphery formed with a plurality of cam faces 8, 9, 9^a, 10 and 10^a. Supported in operative relation with respect to the periphery of the disk 7 and adapted to travel upon the cam faces are rollers carried by

suitable supporting devices, but one of the rollers and its supporting device will be described, the description of the one applies to the other. The roller as shown is indicated by the reference character 15 and is journaled at the point formed by the junction of the two arms of a bell crank lever, one of the arms being indicated by the reference character 12 and the other arm by the reference character 12^a. The arm 12 being of greater length than the arm 12^a and having its free end pivotally connected as at 12^b to a laterally extending bracket 11 formed integral with the engine cylinder 1. The bracket 11 is provided with an upwardly extending arm 13, one portion of said arm being positioned in parallelism with respect to the arm 12 of the bell crank lever. The arm 12 is formed with a seat 12^c which receives a protuberance 12^d depending from the lower face of a cup-shaped member 12^e. The arm 13 is formed with a seat 12^h in which is mounted the upper end of a compression spring 14, while the lower end of said spring 14 engages in the cup-shaped member 12^e. Pivotally connected as at 16 to the arm 12^a of the bell crank is the rod 17, said rod extending at an inclination with respect to a valve casing, the inclination of the rod being upwardly and inwardly.

Projecting from the section 2^a of each of the valve casings are the laterally extending lugs 28^s and to each pair of lugs 28^s is pivotally connected as at 17^b a bell crank lever. The arms of each of the bell crank levers are indicated by the reference characters 27, 27^a, the arm 27 being of greater length than the arm 27^a and the said arm 27 extends into the casing 2^a and engages the head 28. The arm 27^a is arranged exteriorly of the section 2^a and is adapted to be engaged by a means hereinafter referred to so as to cause the bell crank to rock upon its pivot, shifting the arm 27 downwardly and causing thereby the unseating of the outlet valve 3^d. The inner end of the arm 27 of the bell crank is bifurcated so as to allow of the passage therethrough of the valve stem 4^a of the inlet valve 4^b.

Projecting laterally from the valve casing 2 at a point above the lugs 28^s are the bearing arms 23 and projecting from the valve casing 3 at a point above the lugs 28^s are the bearing arms 23^a. Arranged between the valve casings 2 and 3 is a vertically extending standard 25 having a yoke shaped upper end forming thereby a pair of bearing arms 24 and 24^a. Journaled in the arms 23 and the arm 24 is a rock shaft 20, said shaft having its inner end projecting past the arm 24 and journaled in the arms 23^a and the arm 24^a is a rock shaft 20^a, said shaft having its inner end projecting past the arm 24^a.

The rod 17 is connected to the shorter arm 12^a of the bell crank lever hereinbefore referred to, said connection being indicated by the reference character 16. The upper end of the rod is screw threaded as at 18^b and engages in a socket forming member 18^c, the member 18^c is bifurcated as at 18^m and is pivotally connected as at 18^n to the arm 18 of a three arm lever fixed upon the shaft 20. A similar construction of lever is fixed to the shaft 20^a. The other arms of the three arm lever are indicated by the reference characters 18^a and 19, the arm 19 extending in the section 2^a and straddling the valve stem 4^a and furthermore engaging the abutment 4^h. The arm 18^a depends downwardly and is arranged in operative relation with respect to the arm 27^a of the bell crank lever which is pivoted as at 17^b to the lugs 28^s. The manner in which the inlet and outlet valves are operated through the medium of the mechanism just set forth will be presently referred to.

Depending from the arm 28^m is a screw-threaded piston rod 28^v which is connected to a piston (not shown) arranged in a lubricating cylinder 28^w supported by the casing 26. The piston rod 28^v carries a screw-threaded collar 28^x to which is pivoted a shifting lever 28^z for the valve stem 28^d. The lever 28^z is pivoted at its inner end to the stem 28^d and has its outer end of such width as to be alternately engaged by a pair of tappet arms 29 and 30, the former carried by the inner end of the rock shaft 20 and the latter by the inner end of the rock shaft 20^a. The tappet arms 29, 30 are positioned upon their shafts in such manner with respect to each other as to alternately engage the lever 28^d and thereby close the valve 31 for cutting off the supply of gas and air to the chamber 26^h. The valve 31 normally is held in an open position through the medium of the spring 28^e and which permits of an explosive charge being supplied to that valve casing in which is positioned that inlet valve which is shifted from its seat to allow the explosive charge being supplied to one end of the cylinder 1.

Each of the disks 7 is so designed that its cam surface from 8 to 9 allows the outlet valve to close, its surface 9^a to cause the opening of the inlet valve, the latter being depressed against the action of the spring 5^e. The inlet valve remaining open until the roller 15 passes off the surface 9^a and when the roller engages the surface 10 the inlet valve is closed by the action of the spring 5^e. As the roller travels over the surface 10^a the valve operating mechanism will be dormant and remain in such position while the disk rotates 180°. While the roller 15 of the rod 17 is traveling over the cam surface 10^a the roller of the rod 17′ travels over the surfaces 8, 8^a, 9, 9^a, and 10 successively, by such an arrangement the inlet

valves operate alternately with respect to each and a like operation is had with respect to the outlet valves.

In connection with the general operation of the valve operating mechanism it will be said that the shifting of the bell cranks carrying the rollers 15 is had against the expansive force of the springs 14, the said springs constantly maintaining the roller 15 upon the disk 7. Now it will be assumed that the disk 7 is revolving in the direction of the arrow and the roller 15 traveling over the cam surface 8, this allows of the lowering of the rod 17, such action rocking the shaft 20 and imparting motion to the three arm lever so that the arm 18^a thereof will engage and shift the arm 27^a, thereby moving the arm 27 downwardly which engaging with the head 28 will also shift it downwardly against the action of the spring 28^a; the shifting of the head 28 in the manner as stated carries the valve stem 3^n therewith and opens the outlet valve 3^d. As the roller 15 leaves the surface 8 it travels over the cam surface 8^a and elevates the rod 17, moving the three arm lever in a direction so as to elevate the arm 18^a and allow of the return of the outlet valve 3^d to its seat, the return of the valve 3^d is had through the medium of the expansion of the spring 28^a, the latter being compressed when the head 28 is shifted downwardly. The roller 15 then travels over the cam surface 9^a elevating the rod 17 which will actuate the three arm lever and lower the arm 19 thereof, the latter in turn engaging the abutment 4^h will shift the valve stem 4^a downwardly thereby unseating the inlet valve 4^b. The unseating of the inlet valve 4^b is had against the expansive force of the spring 5^e. When the roller 15 travels over the cam surface 10, the rod 17 is allowed to lower, the spring 5^e will expand and consequently return the inlet valve 4^b to its seat. As the roller 15 travels over the surface 10^a the valves in the casing 2 will not be operated, that is to say, they will remain in position shown in Fig. 3. The valves are retained in such position while the disk rotates 180° and until the roller 15 engages the cam surface 8. At this point the outlet valve will be opened in a manner as hereinbefore referred to. During the foregoing operation in connection with the opening of the outlet valve the tappet arm 29 will engage the lever 28^z and shift the valve stem 28 consequently seating the valve 31 against the tension force of the spring 28^e thereby shutting in the explosive mixture supply and retaining the valve 31 upon its seat until the outlet valve again resumes its seat, by this time the shaft 20 will be actuated and move the arm 29 out of engagement with the lever 28^z.

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

1. In a valve operating mechanism for explosive engines, the combination with inlet and outlet valves, of a rotary shaft, a disk mounted thereon and formed with a plurality of cam faces, a bell crank lever provided with a roller adapted to be engaged by said disk causing thereby the shifting of the bell crank, a three-arm lever pivotally supported from the valve casing of the engine and adapted to engage with the valve stem of the inlet valve for shifting said stem causing thereby the unseating of said inlet valve and a second bell crank pivotally supported by the said valve casing and adapted to engage the valve stem of the outlet valve for shifting it and thereby unseating the said outlet valve, said last mentioned bell crank adapted to be actuated by said three-arm lever, a rod connection between the bell crank lever carrying the roller and the said three-arm lever, said rod actuating the three-arm lever when that bell crank lever which carries the roller is shifted by the disk in one direction, and means for returning the valves to closed position.

2. In a valve operating mechanism for a gas engine, the combination with the inlet and outlet valves and mixing valve mechanism, of a rotary shaft, a disk mounted thereon and formed with a plurality of cam faces, and means operated by said disk for controlling said valves, comprising a spring-pressed bell-crank lever, a roller carried thereby, a horizontal shaft mounted in bearings projecting from the valve casings of the engine, mechanism on said horizontal shaft for operating the valves of the engine and mixer, and a rod connection between said mechanism and said spring-pressed bell-crank lever.

3. In a valve operating mechanism for a gas engine, the combination with the inlet and outlet valves and mixing valve mechanism, of a rotary shaft, a disk mounted thereon and formed with a plurality of cam faces, and means operated by said disk for controlling said valves, comprising a bracket arm projecting from the engine cylinder, a bell-crank-lever pivoted to said bracket, a coil spring interposed between said arm and lever, a horizontal shaft mounted in bearings projecting from the valve casings of the engine, a three-arm lever on said horizontal shaft for operating the valves of the engine and mixer, and a rod connection between said three-arm lever and the spring-pressed bell crank lever which is operated upon by said disk.

4. In a valve operating means for a gas engine, the combination with the inlet and outlet valves and mixing valve mechanism, of a rotary shaft, a disk mounted thereon,

and formed with a plurality of cam faces, and means operated by said disk for controlling said valves, comprising a spring pressed bell-crank lever, a roller carried thereby, a horizontal shaft mounted in bearings projecting from the valve casings of the engine, bell-cranks and tappet arms on said horizontal shaft for operating the valves of the engine and its mixer, and a rod connection between said spring pressed bell crank lever, and the mechanism mounted upon said horizontal shaft.

5. In a valve operating mechanism for explosive engines, the combination with an outlet valve provided with a hollow stem, an inlet valve having its stem extending through the hollow stem of the outlet valve, said outlet valve constituting the seat for the inlet valve, of means for actuating said valves, said means comprising a rotatable disk provided with a plurality of cam faces, a spring-pressed bell crank provided with a roller traveling upon the cam faces of the disk, a double arm lever engaging with the head of the valve stem of the outlet valve for shifting the latter when said lever is actuated in one direction, causing thereby the unseating of the outlet valve, and the carrying of the inlet valve therewith, a three-arm lever adapted to engage with the valve stem of the inlet valve for shifting it when said three-arm lever is actuated causing thereby the unseating of the inlet valve independently of the shifting of the outlet valve, said three-arm lever actuating said double-arm lever to unseat the outlet valve in advance of the actuation of the valve stem of the inlet valve, and a connection between said three-arm lever and said bell crank causing the actuation of the three-arm lever during the shifting of the bell crank.

6. In a valve casing mechanism for explosive engines, the combination with an outlet valve provided with a hollow stem, an inlet valve having its stem extending through the hollow stem of the outlet valve, said outlet valve constituting the seat for the inlet valve, of means for actuating said valves, said means comprising a rotatable disk provided with a plurality of cam faces, a spring-pressed bell crank provided with a roller traveling upon the cam faces of the disk, a double-arm lever engaging with the head of the valve stem of the outlet valve for shifting the latter when said lever is actuated in one direction, causing thereby the unseating of the outlet valve, and the carrying of the inlet valve therewith, the three-arm lever adapted to engage with the valve stem of the inlet valve for shifting it when said three-arm lever is actuated causing thereby the unseating of the inlet valve independently of the shifting of the outlet valve, said three-arm lever actuating said double-arm lever to unseat the outlet valve in advance of the actuation of the valve stem of the inlet valve, a connection between said three-arm lever and said bell crank causing the actuation of the three arm-lever during the shifting of the bell crank, means for returning the outlet valve to closed position and an expansive spring for returning the inlet valve to closed position.

7. A valve actuating mechanism for explosive engines comprising the combination of an inlet and an outlet valve, of means for alternately operating said valves, said means comprising a three-arm lever engaging with the valve stem of the inlet valve for shifting it when the said lever is actuated in one direction, a bell crank lever operated by the three-arm lever when the latter is shifted in the opposite direction, said bell crank lever engaging with the valve stem of the outlet valve for unseating the valve when the bell crank is shifted by said three-arm lever, the shifting of the outlet valve from its seat being in advance from the shifting of the inlet valve from its seat, and means for actuating said three-arm lever.

8. A valve actuating mechanism for explosive engines comprising the combination of an inlet and an outlet valve, of means for alternately operating said valves, said means comprising a three-arm lever engaging with the valve stem of the inlet valve for shifting it when the said lever is actuated in one direction, a bell crank lever operated by the three-arm lever when the latter is shifted in the opposite direction, said bell crank lever engaging with the valve stem of the outlet valve for unseating the valve when the bell crank is shifted by said three-arm lever, the shifting of the outlet valve from its seat being in advance from the shifting of the inlet valve from its seat, means for actuating said three-arm lever, and a means for returning said outlet valve to its seat, and an expansible spring for returning said inlet valve to its seat.

9. In a valve actuating mechanism for explosive engines, the combination with an inlet valve, an outlet valve, a mixer valve, of a rock shaft, means carried by said rock shaft for actuating the mixer valve, a bell crank lever engaging the valve stem of the outlet valve for unseating the latter when the bell crank is shifting, a three-arm lever carried by said rock shaft and adapted when shifted in one direction to engage said bell crank thereby shifting it to unseat the outlet valve, said three-arm lever engaging with the valve stem of the inlet valve and adapted when shifted in the opposite direction to unseat said inlet valve, and means for operating said rock shaft.

10. In a valve actuating mechanism for explosive engines, the combination with an inlet valve, an outlet valve, and a mixer valve, of a rock shaft, means carried by said

shaft for actuating the mixer valve, a bell crank lever engaging the valve stem of the outlet valve for unseating the latter when the bell crank is shifted, a three-arm lever carried by said rock shaft and adapted when shifted in one direction to engage said bell crank thereby shifting it to unseat the outlet valve, said three-arm lever engaging with the valve stem of the inlet valve and adapted when shifted in the opposite direction to unseat said inlet valve, means for operating said rock shaft, and means for returning said outlet valve to its seat, and means for returning the inlet valve to its seat.

11. In a valve actuating mechanism for explosive engines, the combination with an inlet valve, an outlet valve, and a mixer valve, of a rock shaft, means carried by said rock shaft for actuating the mixer, a bell crank lever engaging the valve stem of the outlet valve for unseating the latter when the bell crank is shifted, a three-arm lever carried by said rock shaft and adapted when shifted in one direction to engage said bell crank thereby shifting it to unseat the outlet valve, said three-arm lever engaging with the valve stem of the inlet valve and adapted when shifted in the opposite direction to unseat said inlet valve, a means for operating said rock shaft comprising a spring-actuated rod, a spring pressed means for shifting the rod in one direction, and a rotatable disk provided with a plurality of cam faces for actuating the rod in the other direction.

12. In a valve actuating mechanism for explosive engines, the combination with an inlet valve, an outlet valve, and a mixer valve, of a rock shaft, means carried by said rock shaft for actuating the mixer, a bell crank lever engaging the valve stem of the outlet valve for unseating the latter when the bell crank is shifted, a three-arm lever carried by said rock shaft and adapted when shifted in one direction to engage said bell crank thereby shifting it to unseat the outlet valve, said three-arm lever engaging with the valve stem of the inlet valve and adapted when shifted in the opposite direction to unseat said inlet valve, a means for operating said rock shaft comprising a spring-actuated rod, a spring pressed means for shifting the rod in one direction, a rotatable disk provided with a plurality of cam faces for actuating the rod in the other direction, combined with a means for returning said outlet valve to its seat, and means for returning said inlet valve to its seat.

In testimony whereof I affix my signature in the presence of two witnesses.

HERMAN STEINGASSNER.

Witnesses:
A. H. Rabsàg,
Max H. Srolovitz.