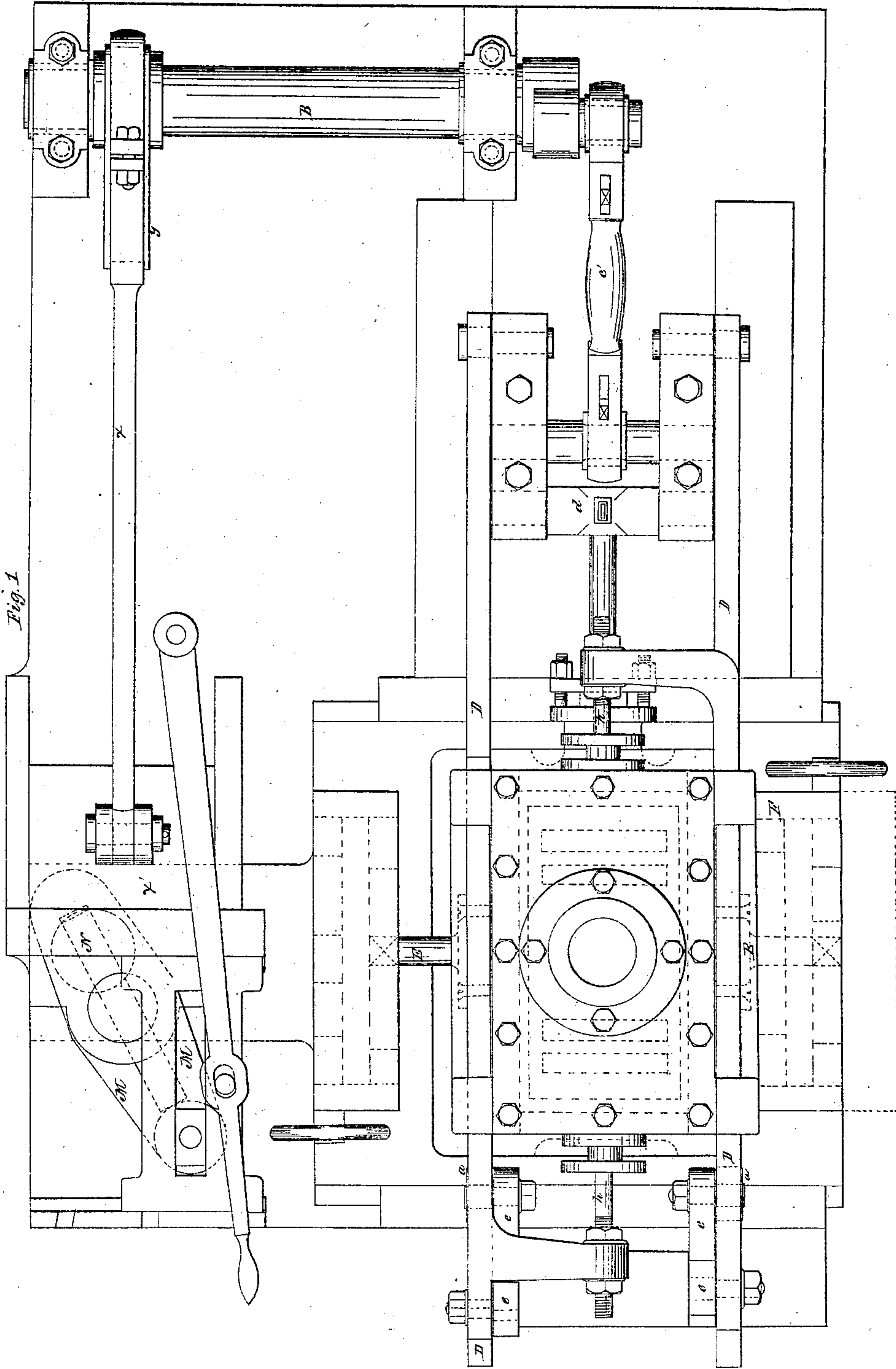


E. Moran,

Steam-Engine Valve-Gear.

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Patented Nov. 30, 1858.

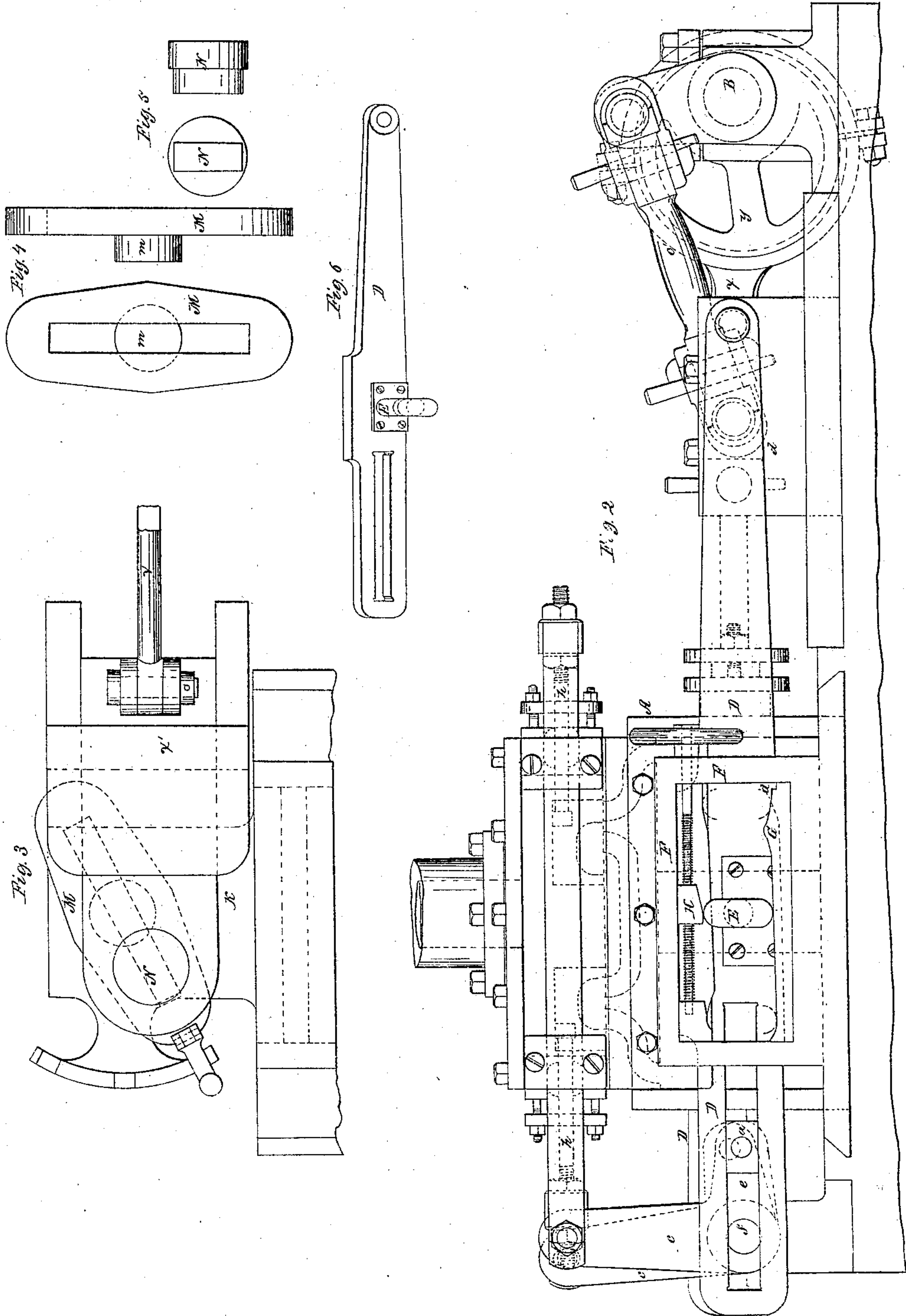


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UNITED STATES PATENT OFFICE

EDWARD MORAN, OF NEW YORK, N. Y.

VALVE-GEAR OF STEAM-ENGINES.

Specification of Letters Patent No. 22,191, dated November 30, 1858.

To all whom it may concern:

Be it known that I, EDWARD MORAN, of the city, county, and State of New York, have invented certain new and Improved
5 Devices for Moving the Valves of Steam and other Engines; and I do hereby declare and ascertain my said invention, referring to the accompanying drawing, in which—

Figure 1, is a plan of the apparatus. Fig.
10 2, is a side elevation of the same. Fig. 3, is the reversing apparatus detached. Fig. 4, the plate M, by which the reversing of the engine is effected detached to show its form. Fig. 5, is a stud or box N, that slides in the
15 groove of plate M. Fig. 6, is a sliding bar which I call a "valve-guide" and letter D by which the proper motion is given to the valves.

The purpose of my invention is to open
20 the valves of engines in the most efficient manner and in the shortest available time, with any desired motion and close them in like manner, retaining the mechanical advantage of starting gradually from a state
25 of rest at whatever may be the velocity of the engine's motion, without a shock in opening or closing the valves.

My devices properly modified are equally
30 adaped to slide, vibrating or puppet valves, the slide valve being employed throughout the description and drawing to illustrate their operation.

I will here remark that the specific form and arrangement of parts shown are susceptible of variation in a great number of
35 different ways, to suit the requirements of the constructing engineer, in adapting the invention to the style of engine and the position and space it is required to be placed in,
40 all of which modifications are the special business of the educated engineer—and the invention being susceptible of variation in a great number of different ways necessary to produce any proper valve movement.

45 In the illustrations the several parts are so disposed as to render their purpose and operation as distinct as possible without regard to beauty of arrangement, or relative position; their places in the several figures
50 where they are shown are designated by the same letter of reference.

A in the drawing is a steam cylinder.

B is the main driving shaft, that receives its motion from the piston through the connecting rod *c* and the crosshead *d*. These
55 parts may be made in the usual way.

D, D, are the "valve guides" they may be in form two flat bars as seen in the drawing—and are moved in unison with the piston by being attached thereto or otherwise—
60 they receive from the connection with the piston a right line motion of any extent desired. In addition to the above motion these "valve-guides" move in a given plane to either side of said line by means hereafter
65 explained, and by this latter movement alone they impart motion to the valves by means of certain levers, in the drawing shown as bent levers *e* on the horizontal arm of this lever at its extreme end there is a wrist or
70 stud that enters a slide block *a* upon which valve guide D slides longitudinally without imparting motion to the lever *e* whose fulcrum is at *f*. The end of the upright arm of the lever *e* is connected with the valves to
75 be moved (as these valves, the steam ports &c. are not new, I shall omit a particular description of them) by the stem *h*. To give motion to the valves by this arrangement of parts it will be seen that it is neces-
80 sary to move the valve guide laterally from the right line movement in the plane before indicated. To effect the lateral motion of the valve guide during its longitudinal motion, there is a wrist or arm E projecting
85 from its face on the side opposite to the lever *e* (clearly seen in Fig. 6,) this bears on its outer end an enlargement as seen in that figure or in place thereof a roller which moves over certain cams brought into its
90 track on its rectilinear plane of motion. For the purpose of properly presenting the cams aforementioned an oblong frame F is made to surround the track of the reciprocating wrist E. This frame F has a motion in one
95 direction only and that is perpendicular to the plane of motion of the valve guide, this motion of the frame F should be a little more than thrice the thickness of the roller or enlargement on the end of the wrist E,
100 and its breadth should exceed its length of motion. This breadth of frame F, is divided into three parts and its movement is such that the roller on wrist E in moving in one direction traverses along the outer di-
105 vision on one side, and in returning traverses the other, or inner division, leaving the center division unoccupied while the engine is moved automatically. This frame F, which I call the "cam-frame" contains upon its
110 two outer divisions certain projecting pieces or cams G over the face of which the

roller or friction piece on E runs and by means of which the valve guide is made to deviate from a rectilinear movement and impart motion to the valves, as before named.

The cams G G are shown in the drawing on the lower side of the frame, they raise the valve guide D and open the ports. The shape and position of these are such as to do this in the most efficient manner such as a parabolic curve or any other that will effect the purpose. On the opposite side of the frame there is another projection or cam H, which may be called the "cut-off-cam" its purpose being to close the steam port quickly and at the proper time; this cam can be made to slide along the frame lengthwise by any convenient mechanical device such as a screw &c. to adjust it to any length of cut-off.

The frame F is moved laterally by the following devices or any equivalent thereof that will give the necessary motion—Figs. 3, 4, and 5 represent the detached parts of this movement as devised by me. Fig. 1, shows them in place. x is a connecting rod uniting an eccentric y or crank on the main shaft with the reciprocating slide x' . This bears on its end a large pin or stud N which turns to allow its oblong projection which fits into a groove in the groove of plate M, that is placed below the slide x' . The plate M is pivoted at its center in plate K, by means of a round projection m which fits into a recess in said plate. The bar M being thus united with plate K and the latter having a sliding motion at right angles to slide x' , it follows that when the plate M is set at an angle to the right line motion of the slide x' the plate K will receive a motion therefrom perpendicular to that of slide x' , and that said movement of k can be reversed relatively to that of slide x' by reversing the angle of M but if plate M is set so as to bring its groove parallel with the line of motion of slide x' the projection N thereon will slide along the groove and the plate K will remain stationary. To the plate K the frames F are affixed and thus receive their lateral motion the effect of which has been before described, and it will be noticed that when plate M is so set as to give no motion

to the plate K the bearing on the wrist E affixed to the valve-guide D is at the center of the breadth of the frame and is freed from the cams placed on the outer or inner sections; the engine is then free to be worked by hand. The direction in which the engine is to run is determined by the direction of the angle of plate M, it being set as in Fig. 1, to revolve the main shaft one way and at the opposite angle to reverse the revolution. The bar M instead of being grooved may be ribbed with the pivot N made to fit it or the plate M may be affixed to the slide x' and N to plate K and produce the same resultant motion.

It will be noticed that the valve-guide D has an extended longitudinal motion with a comparatively short lateral motion produced by the cams and that as the longitudinal motion has no effect upon the movement of the valves its extent may be indefinitely lengthened determined only by convenience and practicability. By this extended longitudinal movement combined with the comparatively short lateral motion of the valve-guide, just sufficient to shift the valves I am enabled to open and close the ports of the engine in the shortest available time, and with gradual mechanical precision from a state of rest to the highest velocity the parts are required to attain.

Having thus fully described my new devices for giving motion to the valves of engines what I claim therein as my invention and desire to secure by Letters Patent is,

1. Operating the valves by means of a valve-guide D substantially as herein described, the movements of which are regulated by projecting cams arranged as described.

2. I also claim the reversing apparatus as, and for the purposes set forth.

3. I also claim presenting and withdrawing the cams that give motion to the valve-guide so as to bring the cams into action at the proper time to produce the desired valve motion as specified.

EDWARD MORAN.

Witnesses:

SMITH GARDNER,
WM. T. LATIMER.