No. 890,682. PATENTED JUNE 16, 1908.

G. W. MORRIS.

THROTTLE VALVE,

APPLICATION FILED JUNE 17, 1907.

2 SHEETS—SHEET 1.

FIG. 2.

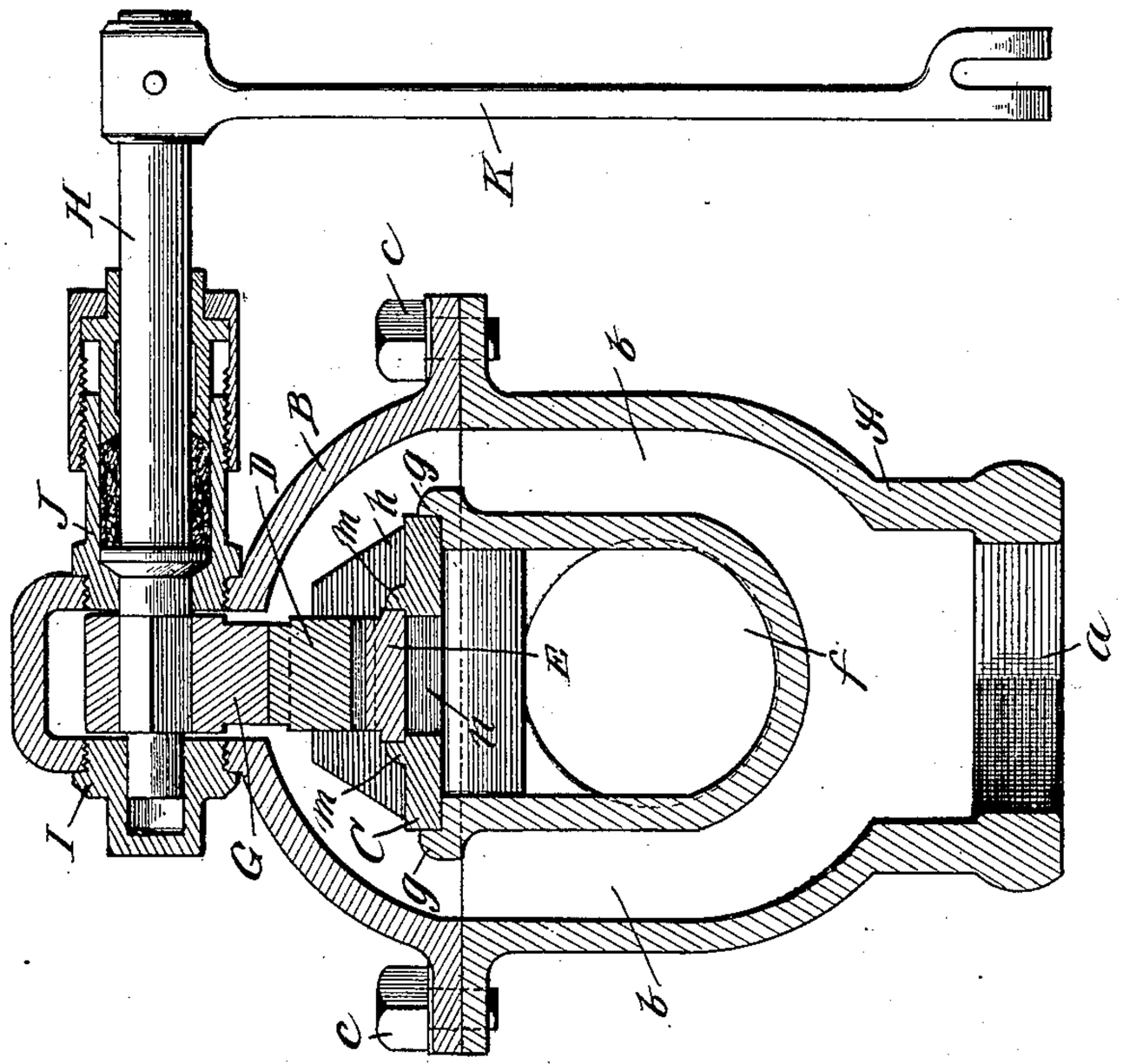
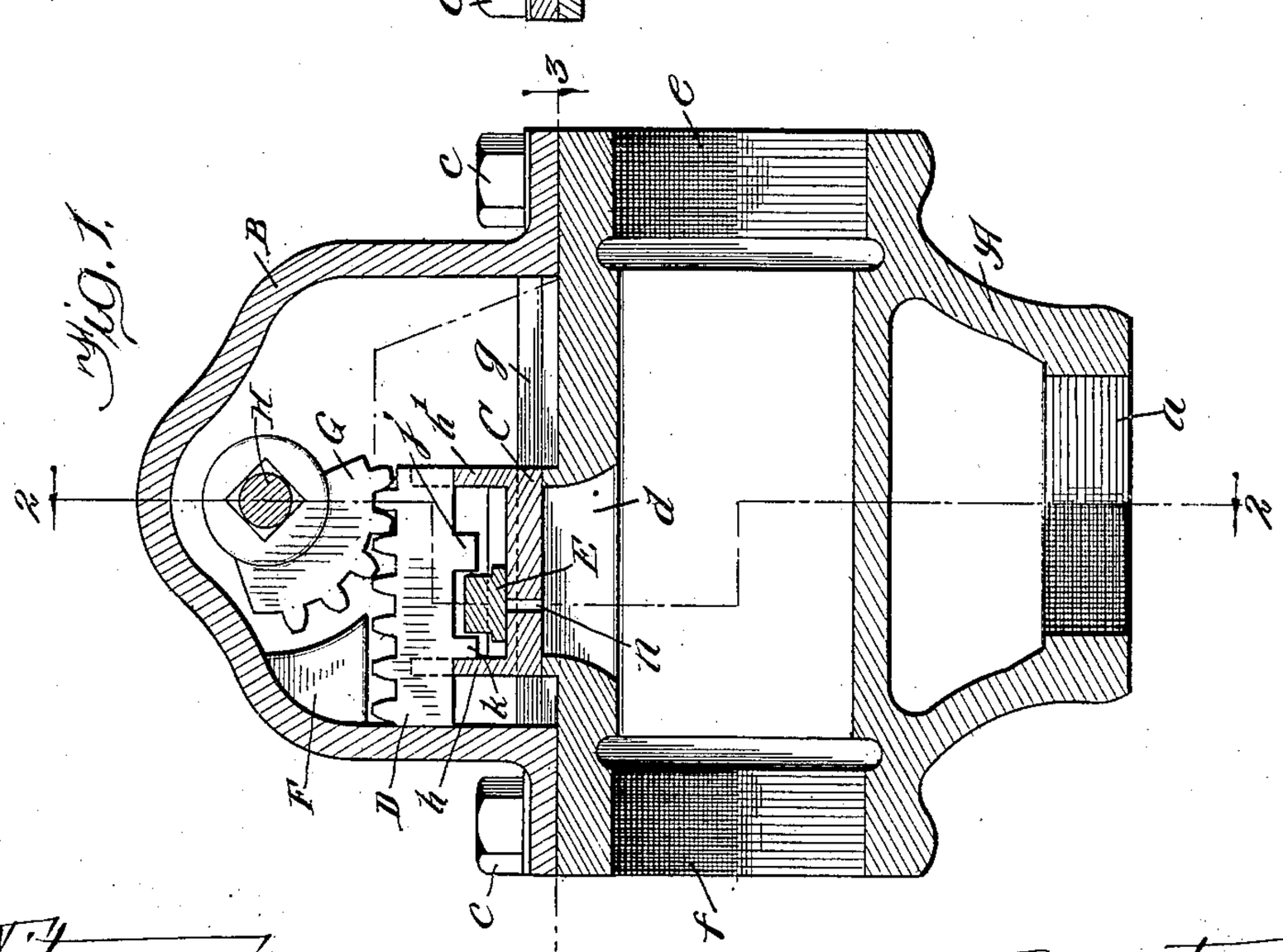


FIG. 1.



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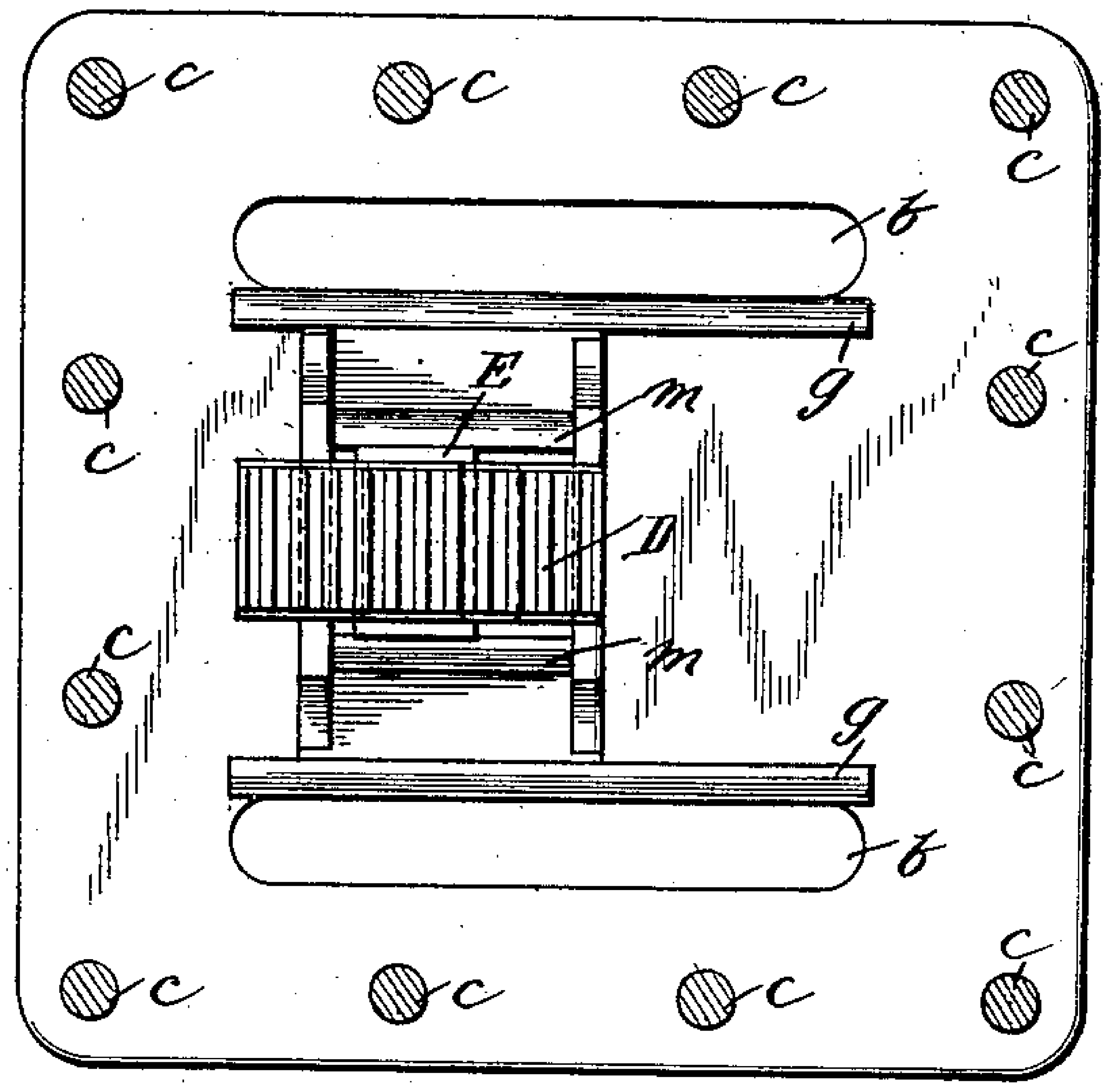
2 SHEETS—SHEET 2.

Fig. 3.



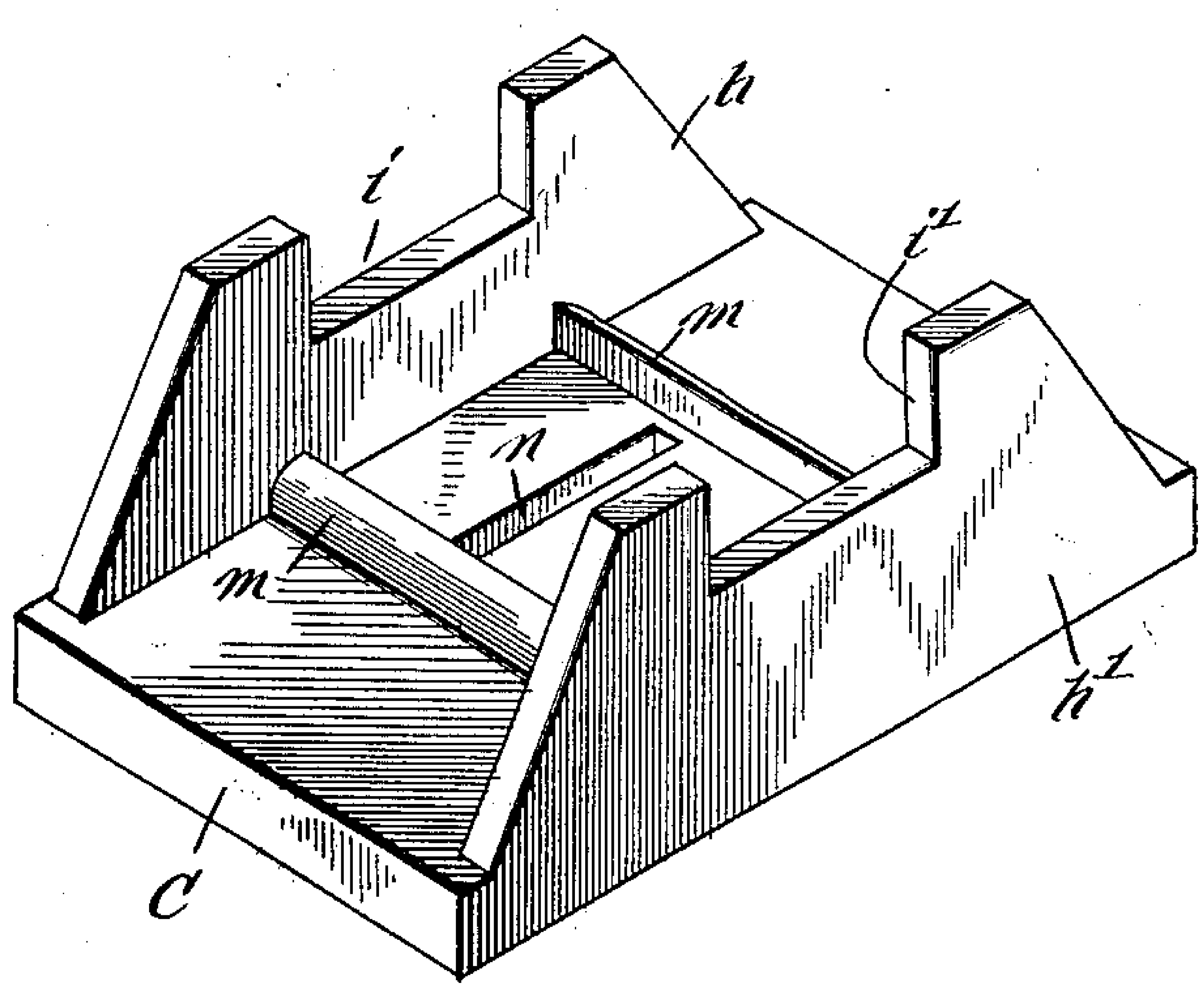


Fig. 4.

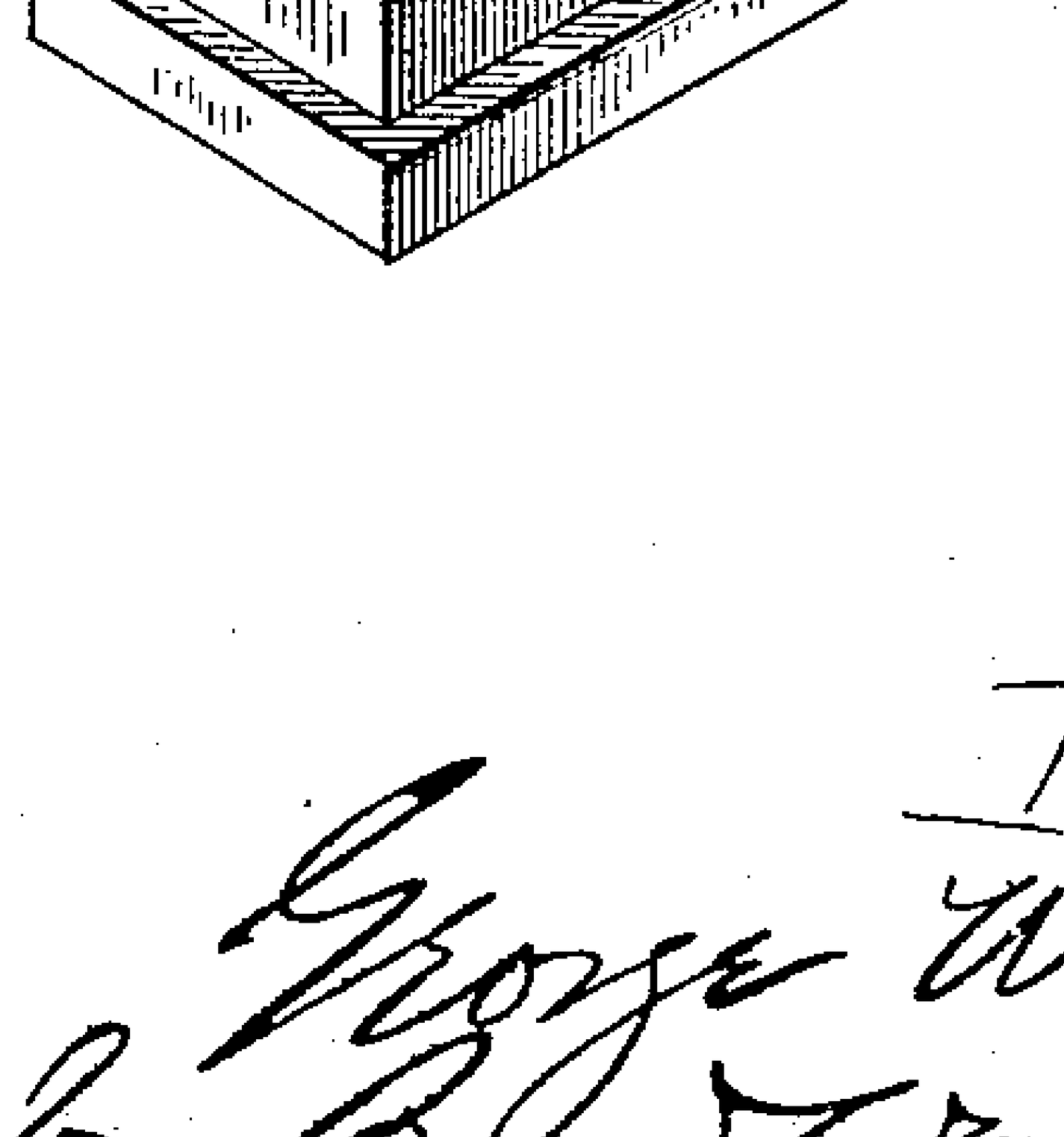


Fig. 5.

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GEORGE W. MORRIS, OF RACINE, WISCONSIN.

THROTTLE-VALVE.

No. 890,682. Specification of Letters Patent. Patented June 16, 1908.

Application filed June 17, 1907. Serial No. 379,435.

To all whom it may concern:

Be it known that I, GEORGE W. MORRIS, a subject of the King of Great Britain, residing at Racine, county of Racine, State of Wisconsin, have invented certain new and useful Improvements in Throttle-Valves, of which the following is a specification, reference being had to the accompanying drawings.

In the operation of throttle valves, it is, of course, frequently desirable to move such valve gradually to regulate the quantity of steam to the engine, but, as generally constructed, such valves can be so moved only with difficulty, owing to the frictional load occasioned by the pressure of steam on the valve.

It is the object of my invention to provide a valve of this character that can be moved very easily and as gradually as desired, and I accomplish this object by the means illustrated in the drawings and hereinafter fully described.

That which I believe to be new will be set forth in the claims.

In the accompanying drawings:—Figure 1 is a vertical section through the valve and its casing and parts connected therewith, the section being taken in the direction of the travel of the valve. Fig. 2 is a vertical section taken at line 2 2 of Fig. 1. Fig. 3 is a view, partly in section and partly in plan, the section being taken at line 3 3 of Fig. 1. Fig. 4 is a detail, being an enlarged perspective view of the main valve. Fig. 5 is a detail, being an enlarged perspective view of a supplemental valve that is mounted on the main valve.

In the several figures of the drawings, in which corresponding parts are indicated by like reference characters, A indicates a casing to which steam is admitted through the end *a*, such steam passing up through oppositely-located side-passages *b* to the interior of the valve casing B, which valve casing is suitably secured by bolts *c*, or otherwise, to said casing A. Through the upper wall of the casing A is formed a large port *d* through which the steam passes from the casing B to be conducted through the oppositely-located end openings *e* and *f* to the engine. This port *d* is controlled by a slide valve C mounted on a suitable seat and sliding between parallel guide-strips *g* preferably formed integral with the casing A.

At opposite sides of the valve C and rising vertically from the upper face thereof are walls *h h'*, in which, as best shown in Fig. 4, are formed in the upper edges wide notches *i i'*, respectively, said notches being of the same size and located in the same relative positions in the two walls.

D indicates a rack-bar fitting in the notches *i i'* in the walls *h h'* and free to be moved longitudinally in said notches, the direction of movement of said rack-bar being in the direction of travel of the main valve C. On the lower edge or face of the rack-bar D are formed two projections *j k*, respectively, each adapted to engage, when the rack-bar D is reciprocated, with a supplemental valve seated upon the upper face of the main valve C. This supplemental valve is indicated by E and is movably held between guide-strips *m m* on the face of said main valve C. This supplemental valve E lies over and closes a port *n* formed through the main valve C, and which, in the construction shown (see Fig. 4), is in the form of a slot the ends of which are near the guide-strips *m m*.

F indicates a guard-plate formed on or secured to the inner face of the valve-casing B and projecting over the rack-bar D, said guard-plate being provided to prevent accidental vertical displacement of the rack-bar from its seat in the notches *i i'*.

G indicates a toothed sector secured against turning upon a shaft H. As shown, that portion of the shaft H that lies within the upper end of the valve-casing B is squared (see Fig. 2), and it is upon this squared portion of the shaft H that the sector G is removably mounted. The shaft H is suitably journaled at the upper end of the valve-casing B, one end of said shaft having a bearing in a suitable hollow cap I which is screw-threaded into an opening through one side wall of the valve-casing B. At the opposite side of the valve-casing, the shaft H passes through a long stuffing box J, the end of which screws into a similar sized opening as that in which the cap I is screwed. By this construction, it is evident that the cap I and stuffing box J can be reversed in position so that the shaft H may project from either side of the device to adapt it for use in different positions. Upon the end of the shaft H that projects through the stuffing box J will be attached a link or lever K, through which the shaft can be rocked to operate the valve mechanism.

In operation, with the parts as shown in Figs. 1 and 2, and steam having been ad-

mitted through the passages described to the interior of the valve casing B, it is evident that, owing to the pressure of the steam upon the comparatively great area of the main valve C, it will take considerable force to move said valve. The supplemental valve E, having a very much less area of surface exposed to the action of the steam, can of course be moved much more readily, and by the mechanism described such valve will be moved so as to open the port *n* before the main valve commences to move, and it is evident that when such supplemental valve is moved sufficiently to allow steam to pass through the port *n* such steam will exert an upward pressure against the main valve C, whereby the pressure upon the upper face of the main valve will be counterbalanced, to a large extent, so that it can be moved gradually and with ease. This primary moving of the supplemental valve is accomplished by the rocking of the shaft H, which, of course, carries with it the toothed sector G that is secured to its squared portion, and, through the engagement of the teeth of such sector with the teeth of the rack D, will cause such rack to be moved and will bring the downward projection *k* against the edge of the supplemental valve so that said supplemental valve will move on the face of the main valve and uncover the port *n*. After this supplemental valve has uncovered the port *n*, the other downward projection,—namely that lettered *j*,—will strike against the adjacent wall *h'* on the main valve and move such main valve to the extent desired so that steam can pass down through the port *d*, the main valve C moving easily at this time, owing, as before explained, to the counterbalancing, in part, at least, of the pressure of the steam in the valve casing B by the steam pressure from below that had been previously admitted through the small port *n*.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a throttle-valve, the combination with a valve casing and a main slide-valve therein having a port therethrough, of walls rising from said main slide-valve, a bar slidingly supported on said walls and having a limited movement thereon in the direction of travel of the said valve, a supplemental slide-valve on said main valve adapted to close said port in the main valve, means carried by said sliding bar adapted to successively move said valves, and means for moving said sliding bar.

2. In a throttle-valve, the combination with a valve casing and a main slide-valve therein having a port therethrough, of walls rising from said main slide-valve and having notches formed in their upper edges, a bar slidingly mounted in said notches, a supplemental slide-valve on said main valve, means carried by said sliding bar adapted to successively move said valves, and means for moving said sliding bar.

3. In a throttle-valve, the combination with a valve casing and a slide-valve therein having a port therethrough, of a supplemental valve carried by said slide-valve and adapted to close said port through the main valve, a sliding rack-bar having means for successively engaging the said valves, a gear for engaging the teeth of the rack-bar, and means for moving said gear.

4. In a throttle-valve, the combination with a valve casing and a slide-valve therein having a port therethrough, of a supplemental valve carried by said slide-valve and adapted to close said port through the main valve, a sliding rack-bar having means for successively engaging the said valves, a gear for engaging the teeth of the rack-bar, a rock-shaft journaled in the said valve-casing, and means for rocking said shaft.

5. In a throttle-valve, the combination with a valve-casing and a main slide-valve therein having a port therethrough, of walls rising from said main slide-valve and having notches formed in their upper edges, a rack-bar slidingly mounted in said notches and provided on its lower edge with two projections, a supplemental slide-valve on said main-valve, said main-valve and slide-valve being adapted to be engaged successively by said projections on said rack-bar, a gear for engaging the teeth of the rack-bar, and means for rotating said gear.

GEORGE W. MORRIS.

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