

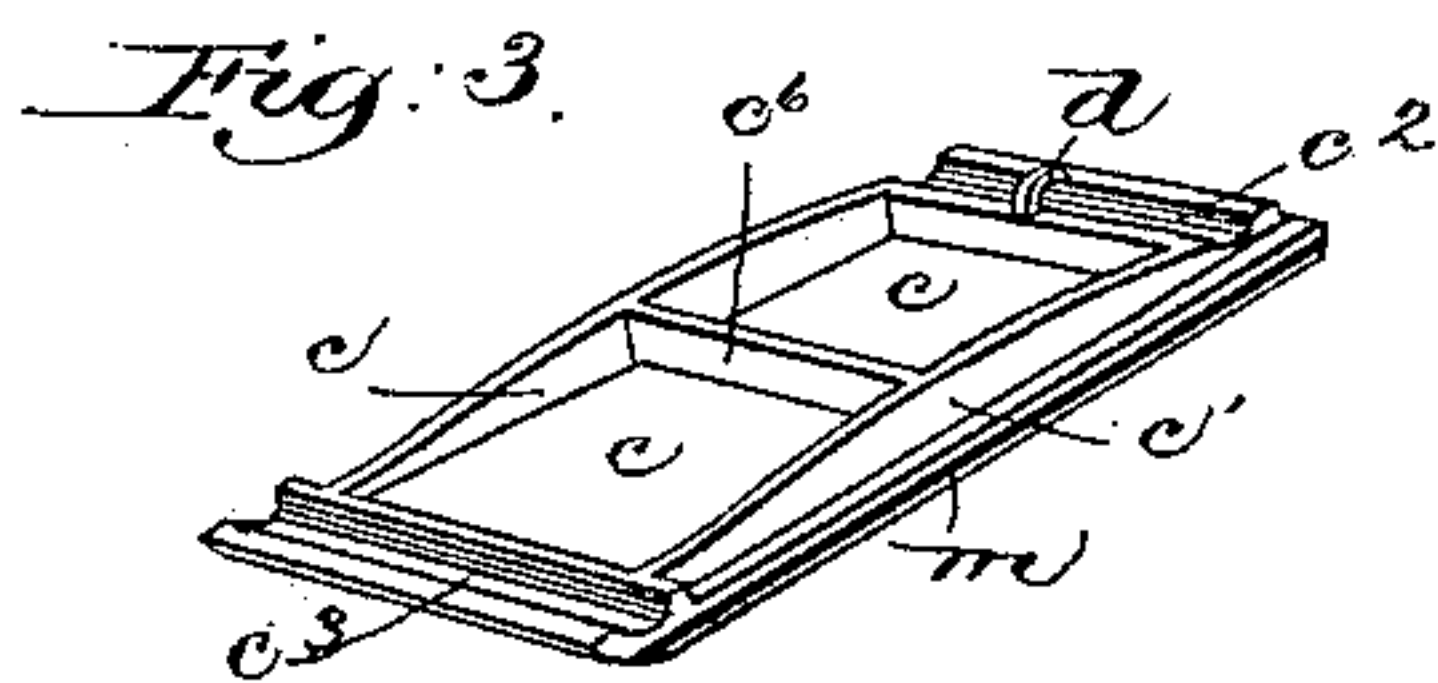
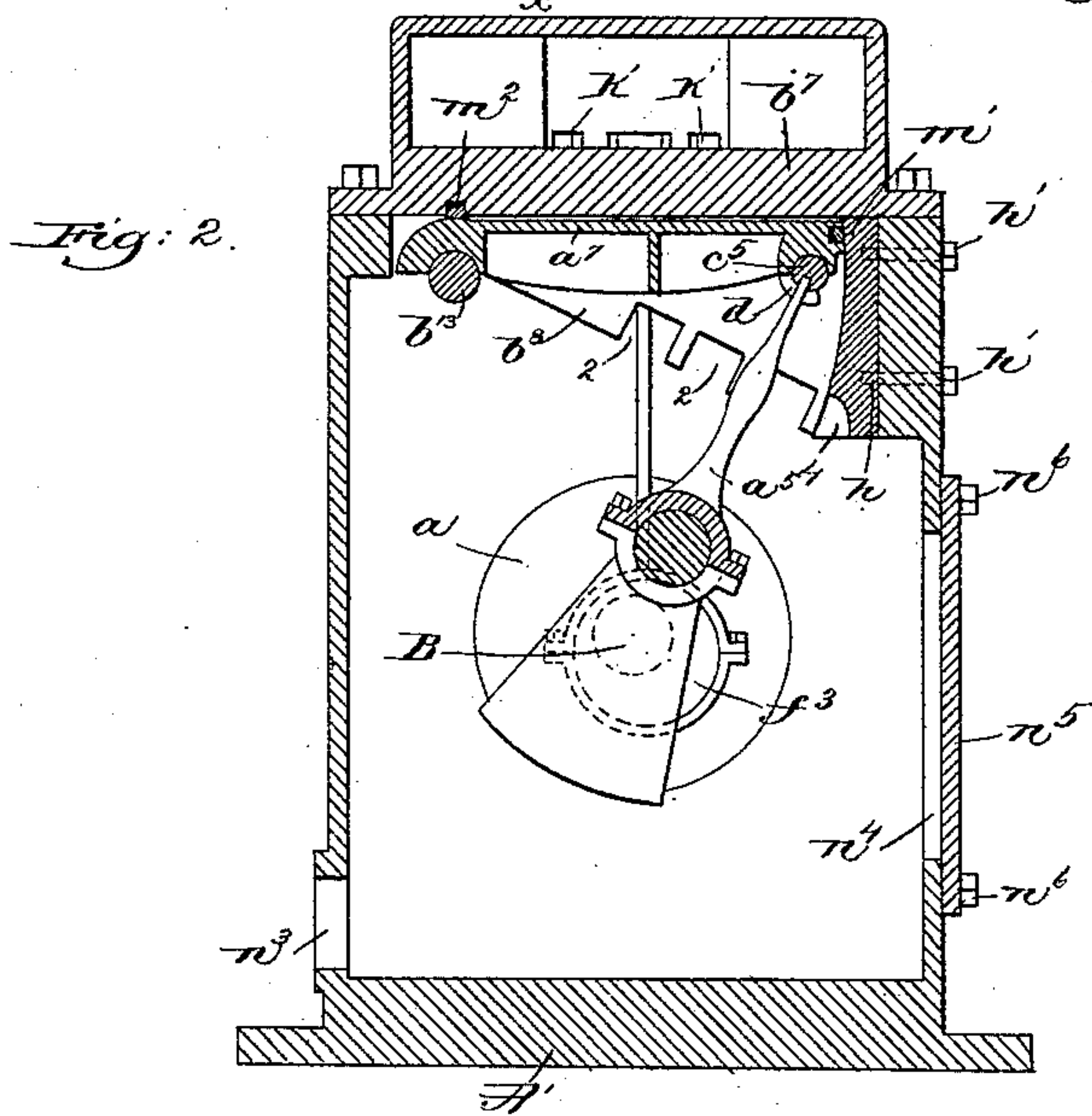
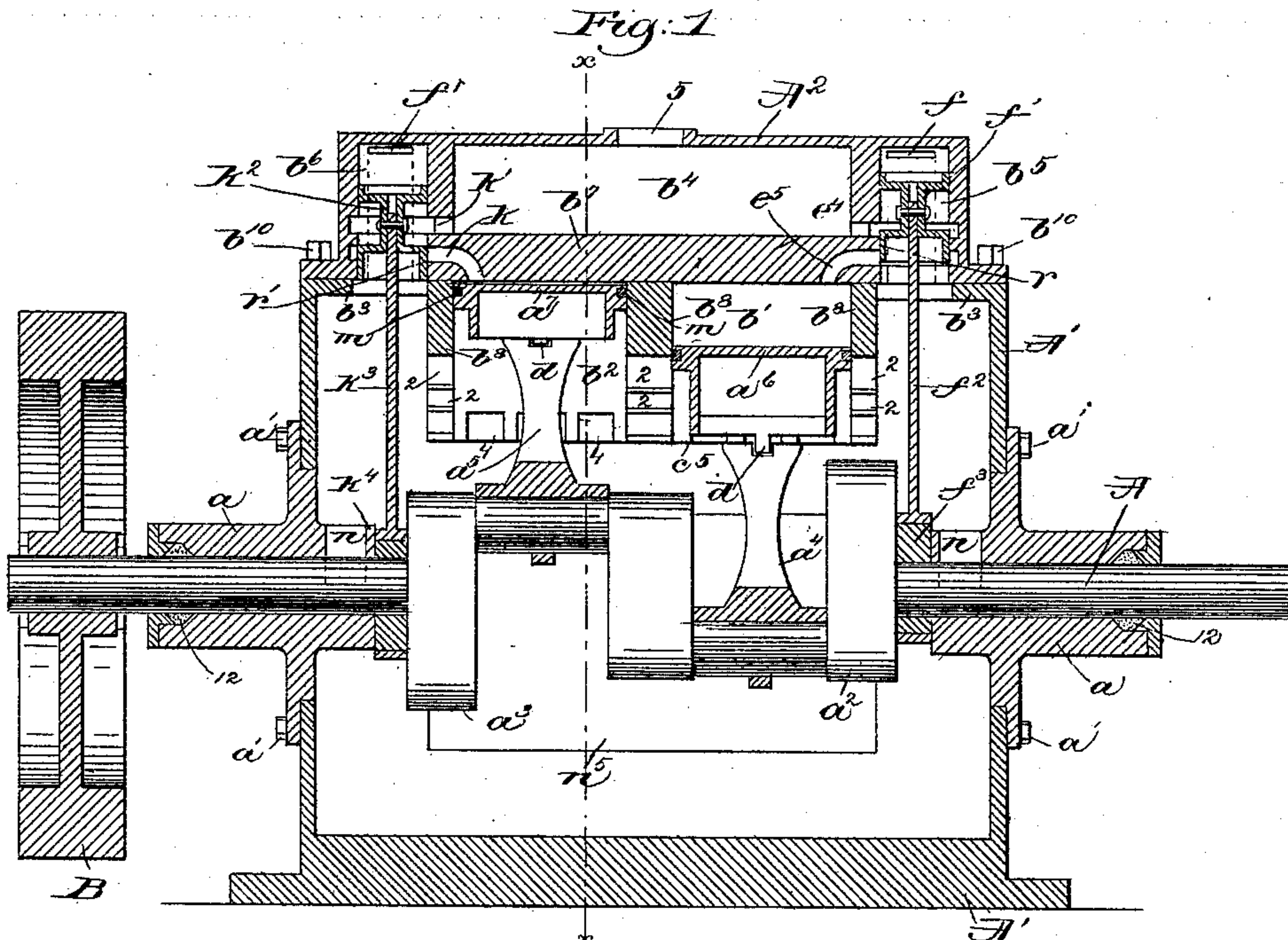
(No Model.)

F. C. MORTON.

STEAM ENGINE.

No. 349,171.

Patented Sept. 14, 1886.



Witnesses
Fred L. Emery
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UNITED STATES PATENT OFFICE.

FREDERIC CHAUNCEY MORTON, OF CHELSEA, MASSACHUSETTS.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 349,171, dated September 14, 1886.

Application filed December 26, 1885. Serial No. 186,769. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC CHAUNCEY MORTON, of Chelsea, county of Suffolk, and State of Massachusetts, have invented an Improvement in Steam-Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is herein shown embodied in a steam-engine designed to be used where a very high speed is desired, and has for its object to improve and simplify the construction of the class known as "high-speed" engines.

My invention consists, essentially, of a containing-case, one or more chambers within said case, and a vibrating piston within each of said chambers, combined with a piston valve or valves reciprocating in a valve chest or chests communicating with said piston-chambers, said valve or valves controlling the operation of the vibrating pistons, as will be hereinafter fully described.

My invention consists, also, in providing the vibrating-piston chambers referred to with additional exhaust-ports at or near one end thereof, whereby the steam within said chambers may exhaust into the interior of the containing-case.

My invention further consists in details of construction, to be hereinafter described, and pointed out in the claims at the end of this specification.

Figure 1 is a partial longitudinal section and elevation of a steam-engine embodying my invention, the crank-shaft, its cranks, and the connecting-rods of the pistons being in elevation; Fig. 2, a section of Fig. 1 in line $x x$, looking toward the left; and Fig. 3, an inverted view of one of the vibrating pistons.

The crank-shaft A of the engine, provided with the usual fly-wheel, B, is supported in journal-bearings a in opposite sides of a case, A', the said journal-bearings being herein shown inserted through openings in sides of the said case, and secured thereto by screws a' , said bearings forming covers for said openings. The bearings have usual stuffing-boxes, 12.

The cranks $a^2 a^3$ on the crank-shaft A are herein shown as set substantially opposite, and have attached to them the connecting-rods $a^4 a^5$ of the vibrating or pivoted pistons $a^6 a^7$, ar-

ranged to oscillate in chambers $b' b^2$, as will be hereinafter fully described.

The sides of the case A' are cast to leave at their upper ends a flange, as at b^3 , which supports a box, A², divided so as to form a steam-chest, b^4 , and valve-chests $b^5 b^6$, the bottom b^7 of said box forming a top plate for the case A', said box being secured to the case A' by screws b^{10} . The chambers $b' b^2$, in which the pistons $a^6 a^7$ oscillate, are formed at the upper part of the interior of the case A' by metal ribs b^8 , integral with said case, the bottom plate, b^7 , of the box A² forming the top or ceiling of said chambers, and the metal ribs b^8 side walls of the same, as shown in Fig. 1. Each rib b^8 is cut away or notched, as at 2, to form exhaust-ports for the chambers $b' b^2$, said ports communicating with the interior of the case A'. Each vibrating piston, of substantially the shape shown in Fig. 3, is composed of a top plate, c , longitudinal trusses c' , connected at their ends by thickened grooved portions $c^2 c^3$, and near their center by a cross-truss, c^6 . The groove c^2 in one of the thickened portions referred to of each piston forms a bearing for wrist-pin c^5 , there being one for each piston, as shown in section, Fig. 2, and in elevation, Fig. 1, and the groove c^3 in the other thickened portion of each of said pistons rests upon and is shaped to partially surround a rod, b^{11} , (shown in section, Fig. 2,) said rod being preferably extended through the case A' and supported in the sides of said case, said pistons rocking upon said supporting-rod.

The grooved thickened portion c^2 of each piston has a hook, d , (see Figs. 1, 2, and 3,) which enters an eye in the connecting-rod of each piston, each connecting-rod being fitted into a longitudinal slot in the wrist-pin c^5 belonging to said piston, said hook serving to securely unite the vibrating piston, its wrist-pin, and connecting-rod, as shown in Fig. 2, thus preventing accidents which might arise from a disengagement of said parts.

The rod b^{11} , forming a rocking or pivotal support for each vibrating piston, causes said pistons to describe an arc of a circle both when forced downward by steam and when carried upward by the momentum of the crank-shaft A'.

Steam is admitted to the steam-chest b^4 through the opening 5, said steam passing from the steam-chest b^4 to the valve-chest b^5 through the port or passage e^4 , thence from said valve-chest into the chamber b' by passage e^5 .

Admission of steam to the chamber b' is controlled by a piston-valve, f' , preferably balanced, as shown in Fig. 1, said valve being herein shown as connected by rod f^2 to an eccentric, f^3 , on the crank-shaft, revolution of the crank-shaft producing a reciprocation of said piston-valve to open and then close the port or passage e^5 . The port e^4 may communicate at all times with the valve-chest; or it may be closed when the port e^5 communicates with the exhaust.

The chamber b^2 is connected with the valve-chest b^5 by the passage k , the passage or port k' connecting said valve-chest with the steam-chest b^4 .

The admission of steam from the steam-chest b^4 to the chamber b^2 is controlled by a piston-valve, k^2 , preferably balanced and connected by rod k^3 with an eccentric, k^4 , on the crank-shaft.

The eccentrics f^3 k^4 are herein shown as set substantially opposite on the crank-shaft A, in order that when one piston-valve, as k^2 , is about to uncover the passage k to admit steam to the chamber b^2 , thus forcing the piston a^1 downward, the other valve, as f' , will commence to open the passage e^5 , placing the same in communication with the interior of case A', thus affording an exhaust-passage for the steam in the chamber b' , as shown in Fig. 1.

The valve-chests b^5 b^6 are herein shown as connected with the interior of case A' by exhaust-passages f f^* , respectively.

The case A' is provided with an outlet-port, n^3 , for the exhaust-steam, said port having connected to it pipe (not herein shown) which conveys said exhaust-steam away to the atmosphere or to a condenser.

Inside each chamber b' b^2 , and at one end thereof, is an arc-piece, h , herein shown as held in place by bolts h' , extended through the sides of the case A', as shown in Fig. 2.

The arc-pieces referred to are herein shown as notched or cut away at their lower ends, as at 4, to form additional exhaust-ports, by which to facilitate the exhaust of steam from said chambers into the case A', the pistons a^6 a^7 , near the end of their downward stroke, uncovering said ports and the ports 2, formed in the walls b^8 of the chambers b' b^2 , thus providing for a most rapid exhaust—a desideratum specially sought for in high-speed engines.

Each piston is herein shown as provided with suitable packing, m , (see Figs. 1 and 3,) placed in a slot in the sides of the top plate, c , and a packing, m' , at its wrist-pin end, (see Fig. 2,) the latter rubbing against the arc-piece h . A packing, m^2 , in a slot in the under face of the plate b^7 prevents leakage at the rocking support of the pistons.

Each journal-bearing a has its upper part

cut away, as at n , (see Fig. 1,) to expose the shaft A to the action of exhaust-steam, said exhaust-steam carrying with it particles of oil which serve to lubricate said shaft.

Access to the interior of case A' is obtained through an opening, n^4 , closed by a cover, n^5 , secured to said case by bolts n^6 .

I do not desire to limit myself to the means shown to reciprocate the piston-valves, as the same might be accomplished in other well-known ways.

Many forms of piston-valves might be used in connection with my improved engine; and so I wish it to be understood that I do not limit myself to the form of piston-valves shown. It is also evident that my invention is equally applicable to an engine having but one chamber and one vibrating piston.

Instead of having the pistons rock on the rod b^3 , said rod may be integral with the pistons and rock in its bearings in the sides of the case A'; but I prefer the arrangement shown.

As a modification of my engine, I may extend the laps r and r' of the valves f' and k^2 , respectively, so that said laps will not uncover the admission-ports e^5 and k , to permit steam from the chambers b' b^2 to exhaust through said ports, in which case the steam will exhaust through the ports 2 and 4, when said latter ports are uncovered by the vibrating pistons.

I claim—

1. In an engine, a case, one or more chambers within said case, a vibrating or oscillating piston in each of said chambers, a main or crank shaft, and a connecting-rod attached to said shaft for each piston, said connecting-rod being joined to its vibrating piston at or near the end opposite to the center of oscillation of said piston, combined with a piston-valve reciprocating in a valve-chest, one for each chamber, said valve or valves controlling the operation of the vibrating piston or pistons, the combination being and operating substantially as described.

2. In an engine, a case, one or more chambers within said case, a vibrating or oscillating piston within each of said chambers, said chambers being provided with an inlet port or ports, and with exhaust-ports independent of the inlet-ports, said exhaust-ports being controlled by the vibrating piston within said chamber, combined with a valve or valves, one for each of said chambers, to control the admission of steam thereto, the combination being and operating substantially as described.

3. The case, one or more chambers within said case, and a vibrating or oscillating piston within each chamber, combined with a valve for each of said chambers, and with an independent arc-piece provided with exhaust-ports for each chamber, substantially as described.

4. The case A', provided with vibrating-piston chambers, each having an independent arc-piece and a vibrating piston in each cham-

ber, combined with the shaft A and journal-bearings *a*, cut away, as at *n*, said bearings being supported by said case, substantially as described.

5 5. The case A', provided with vibrating-piston chambers having arc-pieces, and vibrating pistons in said chambers, combined with the bearings *a*, cut away, as at *n*, and supported by said case, and with the box A², supported
10 by the case A', and provided with the slot at its under side to receive the packing *m*² for the vibrating piston, substantially as described.

15 6. The case A', vibrating-piston chambers contained therein, vibrating pistons in said chambers, each of said pistons being provided with the safety-hook *d*, combined with a connecting-rod for each piston, said connecting-rod having an eye through which the hook *d* is passed, as and for the purpose specified.

20 7. In an engine, a case provided with independent vibrating-piston chambers and a vibrating piston in each of said chambers, combined with the shaft A, provided with cranks, one for each of said pistons and located within the case, and set substantially as described, as
25 and for the purpose set forth.

8. The case A', provided with vibrating-piston chambers and vibrating pistons therein,

combined with the shaft A, provided with cranks set substantially opposite, and with 30 journal-bearings *a* for said shaft, said journal-bearings being cut away, as at *n*, to expose said shaft, as and for the purpose specified.

9. The case A', vibrating-piston chambers contained therein, vibrating pistons within 35 said chambers, said pistons being composed of a top plate, longitudinal trusses, and a cross truss or trusses, said longitudinal trusses being connected at their ends by grooved thickened portions *c*² *c*³, said portion *c*² having a 40 safety-hook, *d*, combined with a connecting-rod for each of said pistons, said connecting-rod having an eye through which the hook *d* is passed, as and for the purpose specified.

10. In an engine, the case A', and a chamber 45 therein having side walls provided with exhaust-ports, combined with a vibrating piston, and with a crank and shaft operated thereby, substantially as described.

In testimony whereof I have signed my name 50 to this specification in the presence of two subscribing witnesses.

FREDERIC CHAUNCEY MORTON.

Witnesses:

G. W. GREGORY,
J. H. CHURCHILL.