J. FARCOT.

VALVE-GEAR FOR STEAM-ENGINES.

No. 181,655. Patented Aug. 29, 1876.

Fig. 1

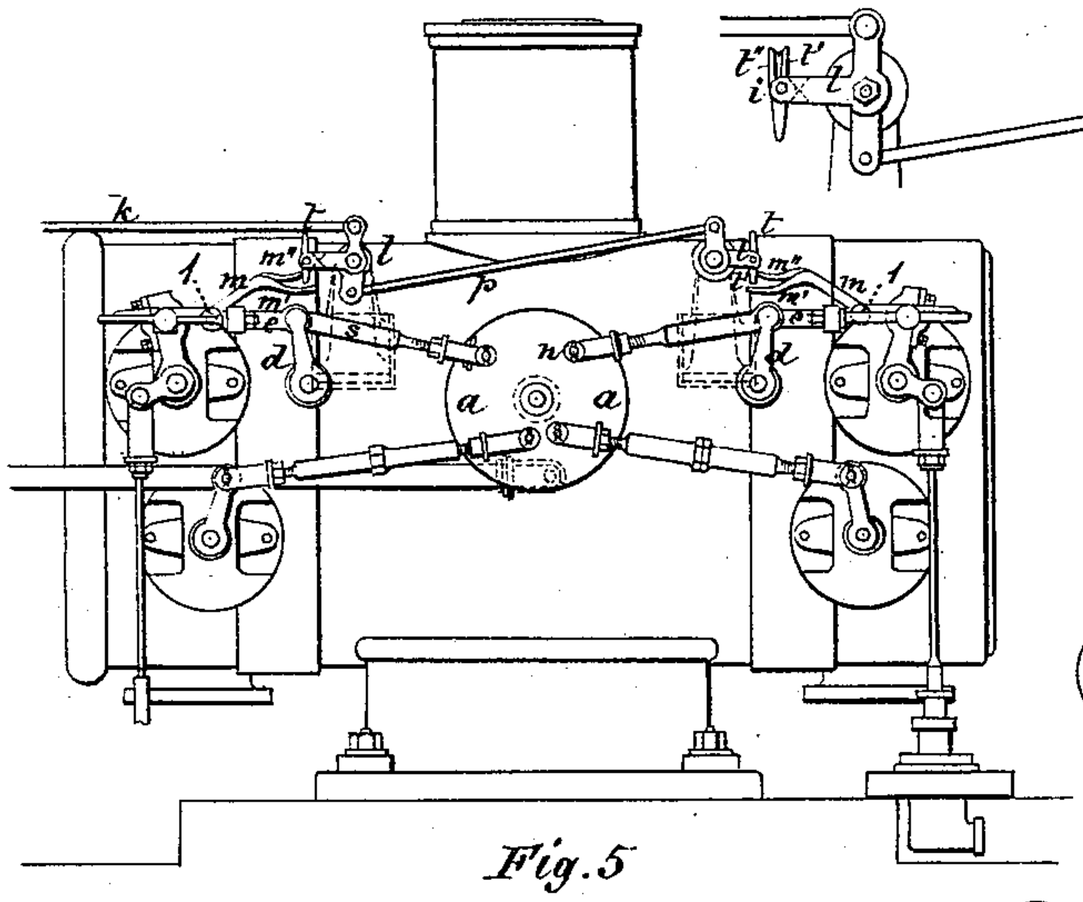


Fig. 2.

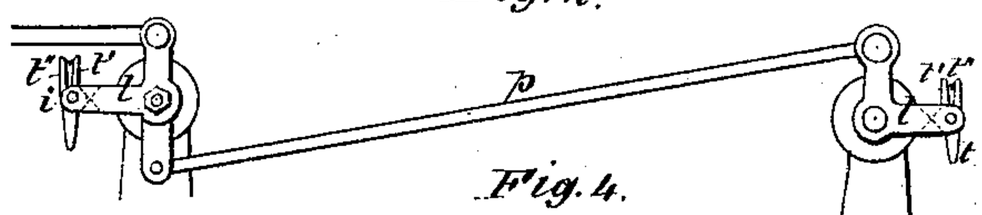


Fig. 4.

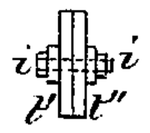


Fig. 3.

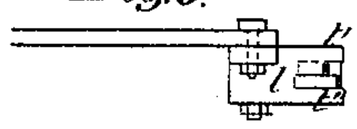


Fig. 11

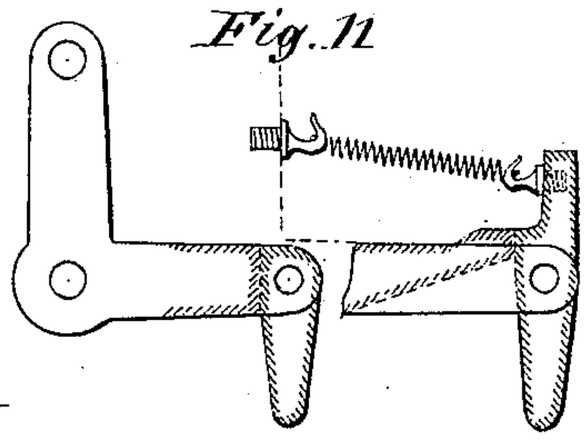


Fig. 5

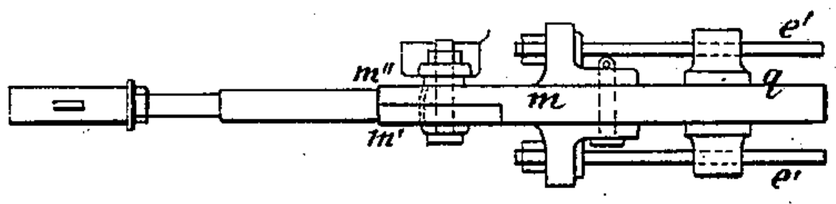


Fig. 8.

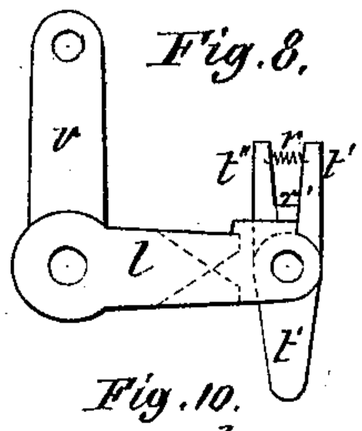


Fig. 9.

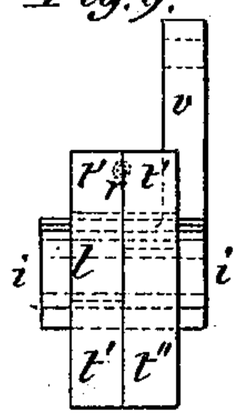


Fig. 6

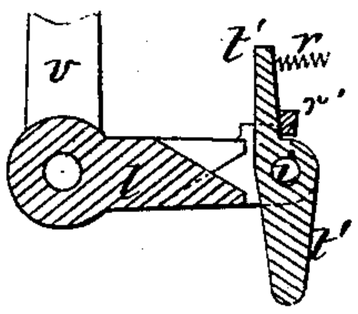


Fig. 7.

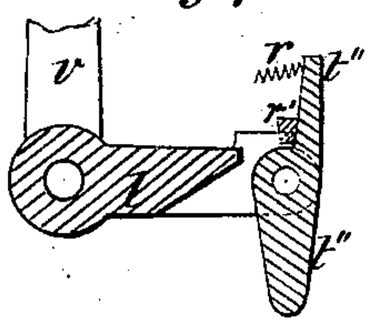


Fig. 10.

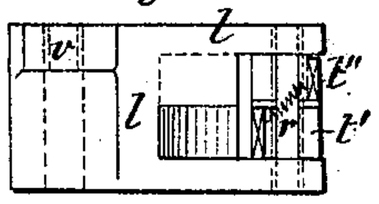


Fig. 13.

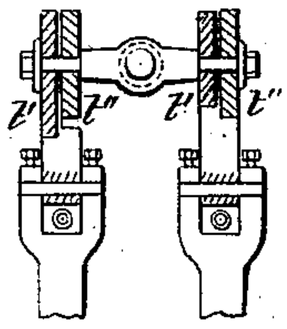
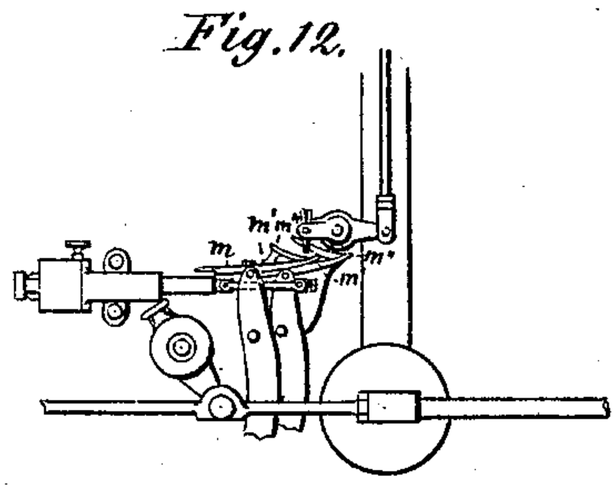


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

JOSEPH FARCOT, OF ST. OUEN, FRANCE.

IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **181,655**, dated August 29, 1876; application filed July 31, 1876.

To all whom it may concern:

Be it known that I, JOSEPH FARCOT, of St. Ouen, (Seine,) in the Republic of France, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

My improvements relate to steam-engines, whose valves are operated on the plan of Corliss, Ingliss, Nollet, Sulzer, and the like.

It is known that in the ordinary types of the Corliss engine, steam admission cannot be prolonged beyond 0.3 or 0.35 of the course of the piston without suppressing the cut-off, the release of each of the valves of admission not being practicable after the driving connecting-rod reverses its movement, and retraces its path.

The improvements that I am about to describe obviate this difficulty, and, without the use of cams, by the use of a single ordinary eccentric, realize the most approved conditions of a variable cut-off, with admissions varying from 0 to 0.75 or 0.8 or even 0.9 of the course.

This improvement naturally can be applied to all analogous machines, such as the Ingliss, &c.

To effect the desired object I proceed as follows: In order to prolong the time, or the length of course, within which the cut-off may take place, it will suffice that the action on the hook or lever that engages the valve of the finger or wiper that effects the disengagement of the two should be prolonged, even after the valve begins to retrace its path.

To this end I form or provide each one of the levers or hooks m at one end with two branches or inclines, m^1 m^2, Figs. 1, 2, 3, 4, 5, which allow the wiper t (whose position is determined by the governor) to continue to act even when the direction of movement of the levers or hooks has changed.

Figure 1 is a side elevation of so much of a steam-engine as needed to illustrate my invention. The remaining figures represent detached parts.

To attain the result I have in view it will suffice, first, that the two inclines m' m'', into which the end of the lever or hook m is divided, sloping in opposite directions, and placed in different planes, as shown, should constitute in effect a continuous ascending gradient or incline, which will be effective for the cut-off even after the direction of movement changes; second, that the wiper t, which takes the place of the ordinary regulating-cam, should be divided into two distinct fingers, t^1 t^2, arranged in different planes to coincide with their respective inclines m^1 m^2, and capable of yielding or inclining on the same axis, but in opposite directions, the height of said fingers above or with relation to the inclines m^1 m^2, being determined by the governor, and their action on the hook or lever being alternate—that is to say, the finger t^1, acting on the incline m^1 when the lever moves forward, and the finger t^2 acting on the incline m^2 when the lever retraces its path.

In Fig. 1 is represented an apparatus operating on this plan.

a is an oscillating disk, which operates the valves. The connecting-rods s, hung on crank or eccentric pins on the disk, act each on its own valves through the intermediary of auxiliary cranks d. The bars or cross-heads e are thus maintained almost horizontal, being guided by rods e' e', which traverse bearings or guides made in the axle g, which also carries the shoulder or notch which the hook m engages. This assures the parallelism of all parts of the cross-head e. The axle g is, of course, mounted in the crank-arm that extends from the stem of the valve to be operated. Each hook m is pivoted to its cross-head e at 1. Its end adjoining the wiper t is divided, as shown, into two inclines, m^1 m^2, which lie side by side in different planes.

The incline m^1 slopes from the outer end upward, the incline m^2 from the outer end downward. The lowest point of the latter coincides with the highest point of the former, so that the two constitute in effect a continuous ascending gradient, which can be traversed, however, only by retracing on the one the distance previously traveled on the other. On this gradient the double wiper t, divided into the two elements t^1 t^2, acts in the manner already indicated—that is to say, when the oscillating disk a pulls the rod s the hook m moves forward, and the branch m^1 of the hook comes under, and is acted on by, the finger t^1 of the wiper. During this time the

branch m^2 has abutted against the jointed or yielding finger t^2, and has inclined it to such an extent as to pass under and beyond it, the finger t^2, which is arranged to yield in that direction, offering no obstruction to the branch m^2. When, however, the disk a has reached the extreme of its movement in one direction, it returns in the opposite direction, pushing back the rod s and cross-head e. This causes a corresponding movement of the lever-hook m; but now the elements m^1 t^1 cease to be active, while the elements m^2 t^2 at once begin to operate the finger t^2, no longer yielding, wiping against the incline m^2, and, finally, effecting, at the proper point, the disengagement of the hook from the valve. The spring r, which brings back into position the fingers t^1 and t^2 alternately against their respective stops r' in the bearing-piece l, may be of any suitable structure and kind exercising a mutual traction on the fingers t^1 t^2. This arrangement I have represented in the accompanying drawing in Figure 2, and in detail and on an enlarged scale in Figs. 6 to 11, inclusive, which illustrate fully the construction and arrangement of the double wiper t. The supporting-arm or bearing l is one arm of a bell-crank lever, whose other arm is connected with the corresponding arm of the bell-crank on the opposite end of the engine by a rod, p. The rod k, connected with a third arm on one of the bell-cranks, leads to the governor.

It may be remarked that in reality the finger t^2, corresponding to the upper slope m^2 of the lever-hook m, is the only one that need incline or yield. The finger, which acts only on the lower slope m^1 may be fixed rigidly to the lever l.

It will be seen from the foregoing that I am enabled to prolong the time within which the cut-off may take place to almost the whole course of one back and forth movement of the oscillating disk a. The same principle may be applied to all ordinary machines whose valves operate on the general plan indicated, but in particular to the ordinary Corliss engine, as indicated in Figs. 12 and 13.

The general arrangement of the ordinary Corliss engine, so far as the part of it to which my invention relates is concerned, will there be readily recognized. It will also be seen that the pedals or hooks m are by me formed with two branches or slopes, m^1 m^2, submitted to the alternate action of a double wiper or finger, t^1 t^2, in accordance with the method already described by me. In the arrangement I have indicated a safety device, which acts only when the governor is out of order, can readily be introduced. For this purpose the bell-crank lever v l, Figs. 6, 7, 8, may be provided with a special finger or wiper, which will act on the lever-hook only when the balls of the governor are at their lowest point.

The connecting-rod P can advantageously be made in two parts, united at the center by a right and left internally screw-threaded sleeve, which will permit the working-length of the rod to be varied as circumstances may demand.

It is manifest that the arrangement of parts hereinbefore described may be varied in many particulars without departure from my invention.

What I claim, and desire to secure by Letters Patent, is—

In steam-engines of the kind herein specified, the combination, substantially as described, of the divided wiper, and the hook-lever, formed with a double incline, these elements acting together, substantially in the manner set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

J. FARCOT.

Witnesses:
EMILE BARRAULT,
AUG. VINCK.