F. DOUGLAS.

CUT-OFF GEAR FOR STEAM-ENGINES.

No. 180,211. Patented July 25, 1876.

Fig. 1

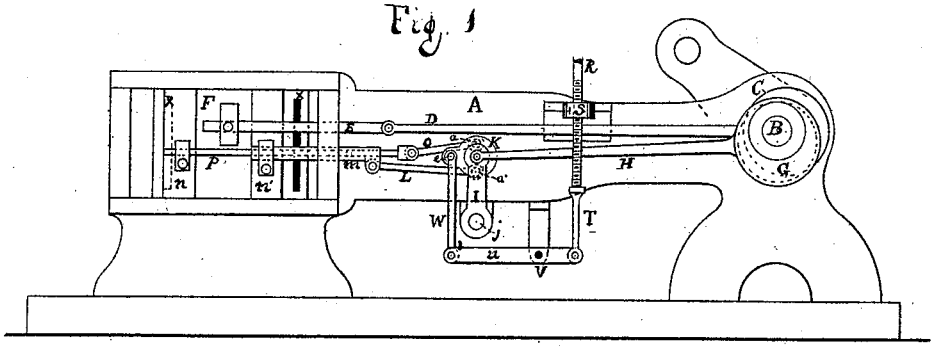
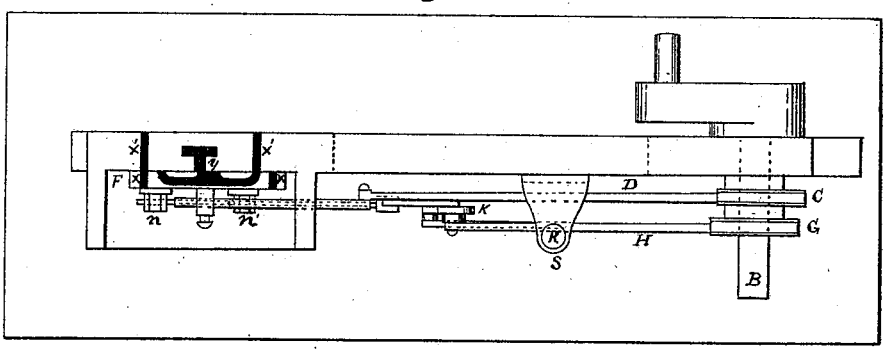


Fig. 2



Witnesses.

Chas. A. Hague.

Thomas Lebonnoy.

Inventor.

Frank Douglas.

UNITED STATES PATENT OFFICE.

FRANK DOUGLAS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN CUT-OFF GEAR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **180,211**, dated July 25, 1876; application filed February 2, 1876.

To all whom it may concern:

Be it known that I, FRANK DOUGLAS, of Chicago, State of Illinois, have invented certain Improvements in Valve-Gearing for Steam-Engines, of which the following is a specification:

My invention relates to the class of steam-engines known as the "automatic cut-off engines," in which the induction or cut-off valves are actuated by the governor in such a manner as to promptly cut off the steam at any point of stroke, the cut-off taking place earlier or later in the stroke, to accommodate the varied loads on the engine and the varied pressure in the boiler.

The valves, with their connections to the governor-screw, and, by eccentric rods, to the shaft, are very clearly shown in the accompanying drawing, Figure 1. The valves and ports are more clearly shown in the plan view, Fig. 2.

A represents the frame of the engine; B, the shaft; C, the main valve-eccentric; D, the eccentric-rod; E, the valve-rod; F, main valve, which acts as induction and exhaust valves; G, the eccentric that imparts motion to the cut-off valves; H, the cut-off eccentric-rod; I rocking arm, pivoted at J. Disk K is pivoted on arm I, and has two steel wrist-pins, *a a'*, placed diametrically opposite each other. Rod L connects pin *a'* with sleeve valve-stem *m*, which is locked to cut-off valve *n'*. Rod O connects pin *a* with valve-stem P, which stem passes through sleeve *m*, and is locked to cut-off valve *n*. Screw R is intended to represent part of the screw of my governor patented September 8, 1863. Nut S, which is bolted to the bed of the engine, is also a part of the governor. Connection T connects screw R to lever *u*, pivoted at V, and connection W connects lever *u* with pin *e* on disk K.

The effect produced by a change of speed is to run the governor-screw R up or down, and thereby rotate the disk correspondingly. The rotation of disk K on its pivot draws one cut-off valve toward it, and pushes the other the same distance in the opposite direction, the effect of which is to separate or bring toward each other the cut-off valves *n n'*, cutting the steam off sooner in the stroke when the valves are separated, and allowing the steam to follow further when they are drawn closer together, thus automatically governing the engine while the steam is admitted to the piston under full boiler-pressure, and a saving of its full expansive force is maintained.

The governor is so constructed that its belt turns the screw R, and actuates the cut-off valves, while the centrifugal force of the governor-balls only indicate how much shall be done, the effect of which is to give great power and perfect regulation.

The main valve F has two induction-ports through it, marked *x x*, which admit steam to the cylinder-ports *x' x'*. The exhaust steam passes out through main valve F to exhaust chest or port *y*. The cut off valves *n n'* have their seat on top or outside of main valve F, and as the motion of the main valve by eccentric C is nearly opposite to the motion of cut-off valves by eccentric G, the cut off valves rapidly close the port through valve F, and thereby cut off the steam, as indicated by the governor.

What I claim as my invention is—

The combination of valves *n n'*, working on top of valve F, sleeve *m*, disk K, on rock-arm I, with lever *u*, and governor-screw R, substantially as herein specified.

FRANK DOUGLAS.

Witnesses:

THOMAS C. CONNOLLY,

ULYSSES G. WHITE.