A. RUTHEL.

CUT-OFFS.

No. 188,419. Patented March 13, 1877.

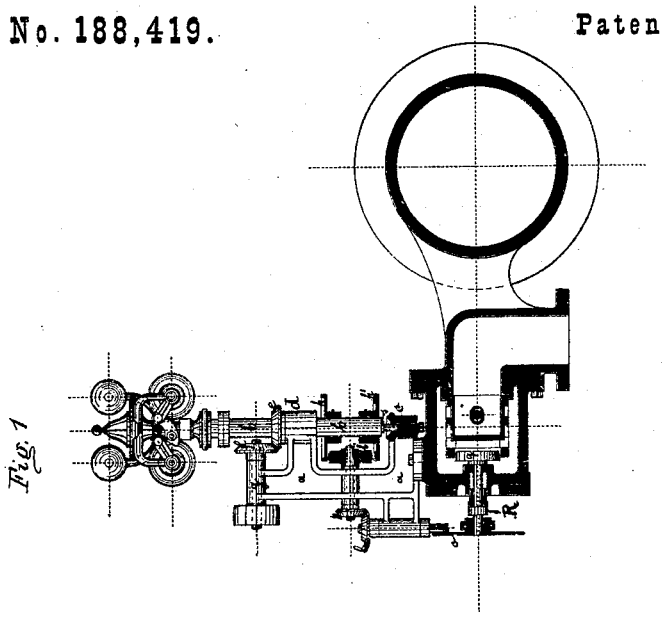

Fig. 1

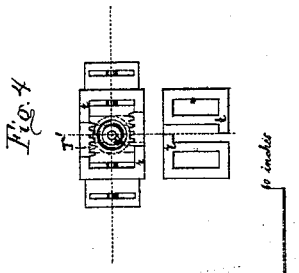

Fig. 4

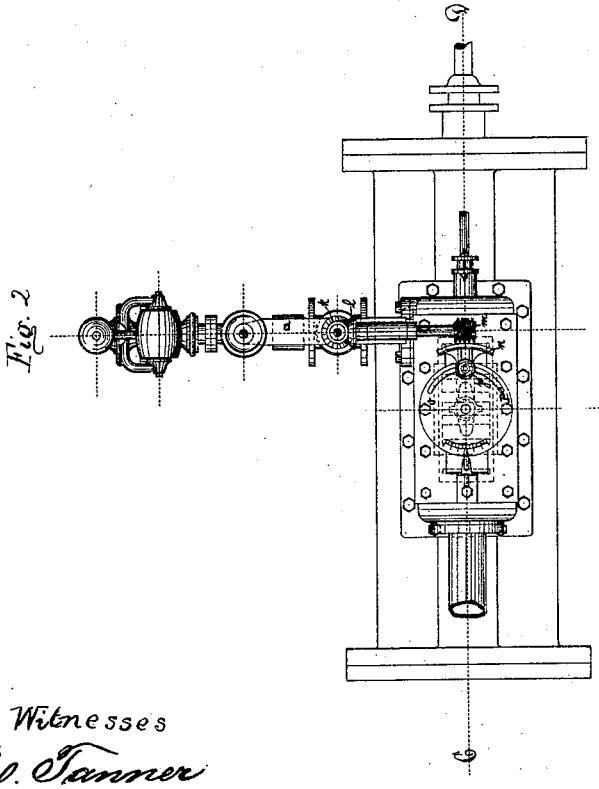

Fig. 2

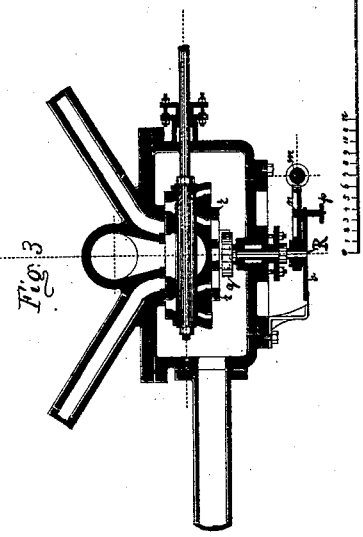

Fig. 3

Witnesses
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UNITED STATES PATENT OFFICE.

ADAM RUTHEL, OF STETTIN, PRUSSIA.

IMPROVEMENT IN CUT-OFFS.

Specification forming part of Letters Patent No. **188,419**, dated March 13, 1877; application filed January 26, 1877.

To all whom it may concern:

Be it known that I, ADAM RUTHEL, of Stettin, Prussia, have invented Improvements in a Steam-Engine Governor, of which the following is a specification:

The present invention relates to a new variable cut-off for steam-engines, which is connected with the governor, so that it will be automatically adjusted as the pressure of the steam comes above or below a certain desired degree.

The invention consists in a two-part cut-off valve, which slides upon the back of the ordinary slide valve, and is provided with teeth into which meshes a pinion on a horizontal shaft, operated through the medium of the governor. The pinion-shaft bears a disk or plate at its outer end, which disk is provided with an arc-shaped slot for permitting the adjustment of an arm bearing a segmental rack which engages with a worm on a vertical shaft driven by the governor. The rack-arm is retained in position by means of a clamp-screw and thumb-nut. The governor mechanism is so contrived that the cut-off valves are moved toward each other or separated according to the varying pressure of steam in the cylinder and speed of the engine. When the valves are moved close together steam will be cut off sooner, and if separated it will be cut off later.

The construction and operation of the various parts will be hereinafter more fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, of the governor and cut-off devices. Fig. 2 is a side elevation of the same. Fig. 3 is a horizontal longitudinal section taken through the line C D of Fig. 1. Fig. 4 is a detail view of the two-part cut-off valve.

The steam chest, piston, cylinder, and main valve, for admitting the steam to the cylinder and discharging it therefrom are of the ordinary construction and need no special description. On the top of the valve-chest is secured a frame, *a*, which receives the vertical tubular shaft *b*, to the upper end of which is screwed or otherwise attached the movable collar or sleeve of a governor, which may be of any desired construction. I prefer, however, to use the governor forming the subject-matter of the patent granted to Edward Buss, July 1, 1873, No. 140,467, in which are employed upper pendulum-weights and lower barrel-shaped weights, shown connected in the present instance with the solid shaft *s* passing through the tubular shaft *b*. Said shaft *s* has its lower bearing in a step, *c*, on the frame *a*, and is centered by means of a set-screw, as shown in Fig. 1. The frame *a* is provided with an upper bearing or eye, *d*, through which pass the governor-shafts, and in which is seated a bevel-gear wheel, *e*. Said wheel is connected with the tubular shaft by an ordinary feather and slot, so as to permit the vertical movement of said shaft, and serve to turn the same, the regulator-balls, and the solid main shaft. A second bevel-gear wheel, *f*, meshes into the wheel *e*, and is attached to a horizontal shaft, which has its bearing at *g*, and is operated from the fly-wheel or main shaft of the engine. On the tubular shaft are secured by means of set-screws the friction-disks *h h*, which are alternately thrown in gear, according to the position of the governor, with a third friction-wheel, *i*. The latter is keyed to a horizontal shaft, which carries at its outer end a bevel-gear wheel, *k*, meshing into a corresponding wheel on the vertical shaft of a worm-wheel, *m*. Said worm-wheel engages with a segmental rack, *n*, which is movable on the disk *o*, having an arc-shaped slot, P, for receiving a clamp-screw, *p*. The arm of the rack *n* is turnable on the hub or shaft of the disk *o*, and can be adjusted thereon and retained at any desired position within the limit of the slot by simply loosening the clamp-screw. The disk *o* is keyed to a shaft, R, which passes through the steam-chest, and bears a toothed wheel, *q*, at its inner end. Said wheel meshes into rack-teeth *r'* on a cut-off valve, *r*, formed of two parts, which overlap each other, and are capable of being moved toward each other, or separated, according to the direction in which the shaft R is turned. The two-part cut-off valve slides upon the back of the main valve, and it will thus be perceived that, by causing the parts of the valve to move close together or to separate, the admission of the steam into the cylinder can be regulated, as is the case with the ordinary varia-

ble cut-off valves. The movement of the cut-off valve or valves in opposite directions is accomplished entirely by the governor, as the friction-disk *i* is alternately caused to bear on the upper and lower disks *h h'* of the shaft *b*. The extent of motion of the valves is regulated by adjusting the rack *n* on the disk *o*, and the pressure at which the engine works is indicated by a series of graduation-marks on the disk *o*, and a fixed pointer on the valve-chest.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the adjustable segmental rack *n*, movable upon the hub of disk *o*, and the horizontal shaft R, having the slotted disk *o* and pinion *q*, with the two-part cut-off valve *r*, having rack-teeth *r'*, and the vertical worm-shaft *m*, and governor mechanism, all constructed and relatively arranged as herein set forth, for the purpose specified.

2. The disk *o*, provided with the arc-shaped slot P, and clamping-screw *p*, in combination with the movable segmental rack *n*, shaft R, cut-off valve *r*, and governor mechanism, as and for the purpose described.

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

ADAM RUTHEL.

Witnesses:

HERMANN BREISMANN,

GERARD WENSESLAUS NAWROCKI,
Engineer.