

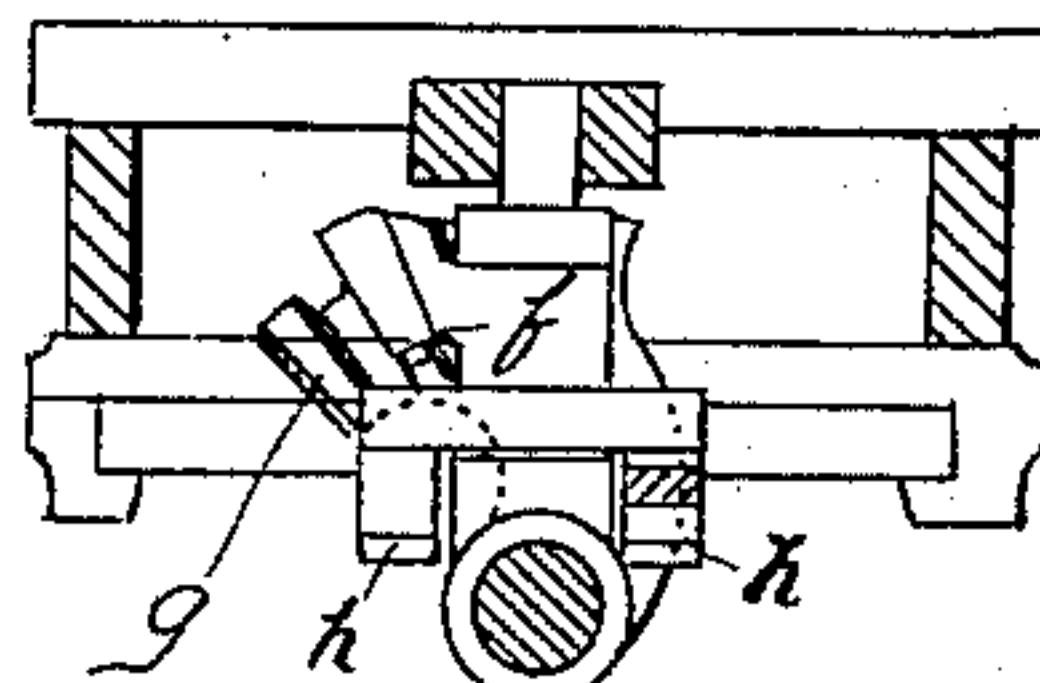
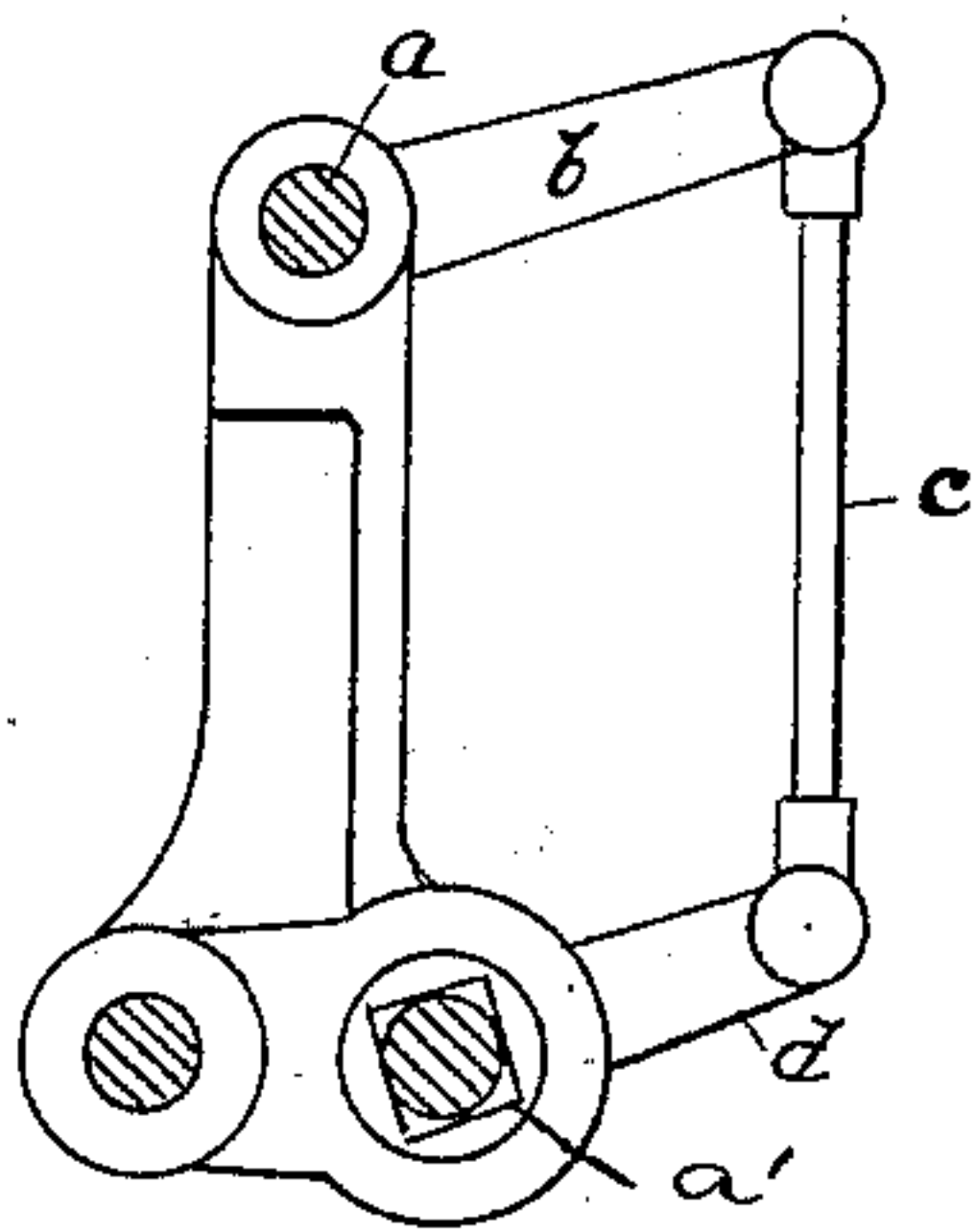
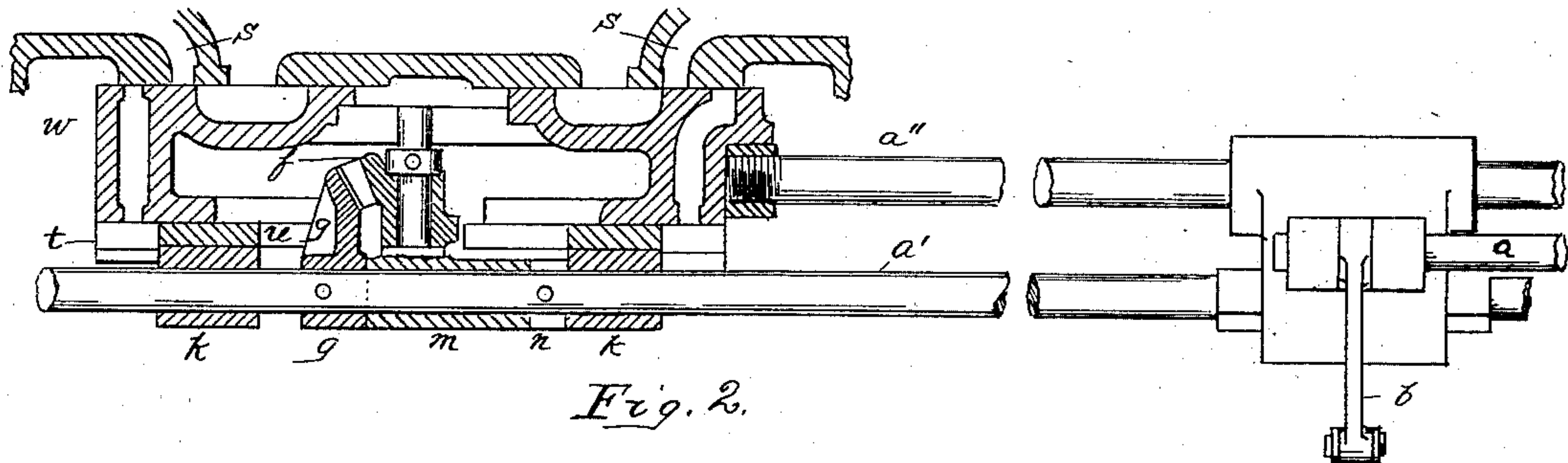
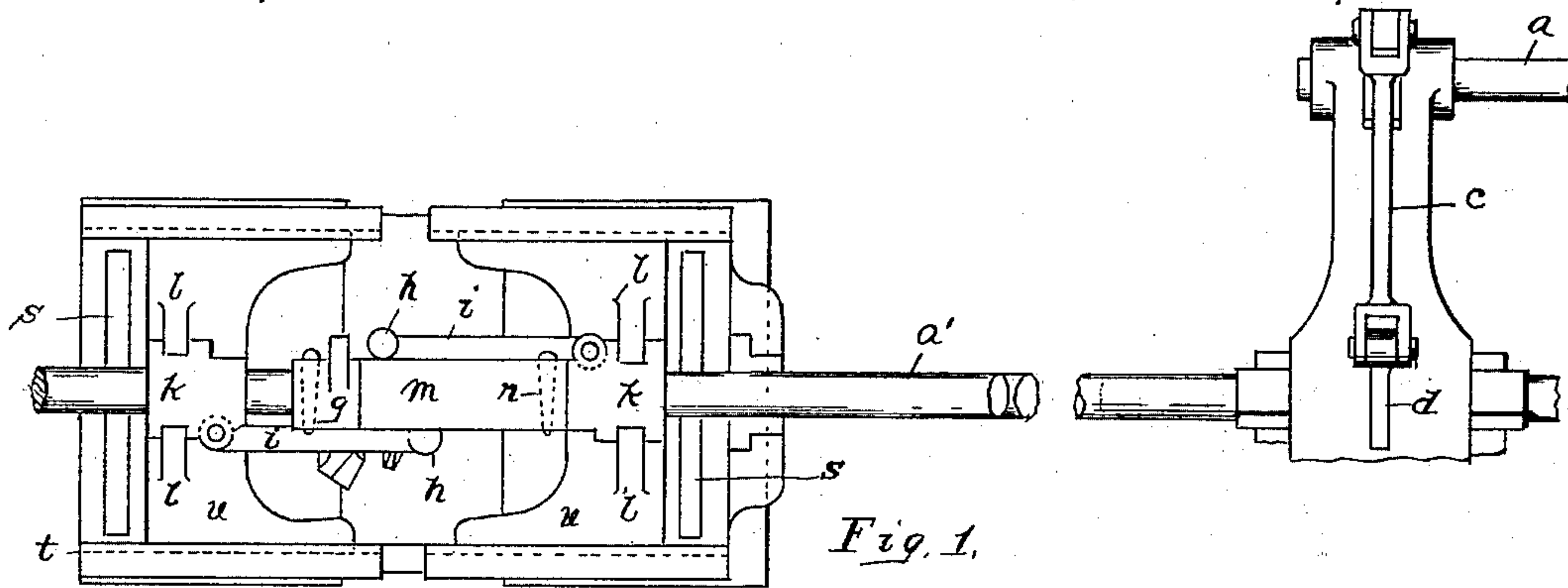
(No Model.)

L. ENGBRETSØN.

SLIDE VALVE.

No. 374,463.

Patented Dec. 6, 1887.



WITNESSES:

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Attorney.

UNITED STATES PATENT OFFICE.

LARS ENGBRETSSEN, OF CHRISTIANIA, NORWAY.

SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 374,463, dated December 6, 1887.

Application filed January 11, 1887. Serial No. 224,019. (No model.) Patented in Norway November 23, 1885, No. 244, and in Sweden February 19, 1886, No. 275.

To all whom it may concern:

Be it known that I, LARS ENGBRETSSEN, of Christiania, Norway, have invented a new and useful Improvement in Slide-Valves for Steam-Engines, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of my improved slide-valve; Fig. 2, a plan view of the same in section through the central line of the guides of the slide-valve spindles; Fig. 3, a transverse vertical central section through the slide-valve spindles at X, and Fig. 4 an end elevation of the slide-valve in section.

The object of this invention is to provide a slide-valve of such construction that an even speed of the engine is obtained, and to that end the regulation of the steam is provided by expansion slide-valves, which are placed on the back of the distributing slide-valve, and are directly combined with the governor, so that as the said governor is sunk or raised the expansion-valves enlarge or contract, and in this manner cut off the steam for a longer or shorter portion of the stroke and supply just sufficient quantity of steam into the cylinder as is required for performing its work evenly and continuously, as will be now fully set forth.

In the accompanying drawings, *a* represents a horizontal shaft connecting with a governor. (Not shown.) This shaft has a right-angled lever, *b*, which in turn is connected with a shaft, *a'*, by means of a connecting-rod, *c*, attached to a right-angled lever, *d*, on the said shaft. The lever *d* is provided at its inner end with a sleeve, *e*, having therein a square opening to embrace a corresponding square portion of the shaft *a'*. Thus the governor is connected with the shaft *a*, and this in turn is connected with the shaft *a'*. This latter shaft is journaled so as to have somewhat of a rotary motion. At each end of the steam-chest are provided inlet-ports *s s*. On the inner side of the steam-chest are placed longitudinal ways or grooves *t*, and into the said ways are snugly fitted two sliding plates, *u*, so disposed as to fit closely against the outer face of the slide-valve *w*. A stud, *o*, projects rigidly from the walls of the steam-chest toward the shaft *a'*. This stud carries

a stout collar provided on either side with wings and on one portion with a segment of toothed gearing *f*. Engaging with this is a segment of toothed gearing, *g*, securely fixed on the said stem. On the wings are affixed pins *h*, which, with the rods *i*, are connected with collars *k*, which slide on the shaft, but are combined with the expansion slide-valves by the ribs *l*. Thus the expansion-sleeves will thereby follow the motion of the wings *h*, to make the distance between the expansion-valves longer or shorter as the governor sinks or lifts, and in this manner cut off the steam earlier and cause easy working of the engine, however variable the work to be performed.

To keep the expansion-valves in position, a proportion of the distributing slide-valve or sleeve *m* is loose on the spindle of the shaft *a'*, so that the latter can be turned independent of the sleeve, which, however, must follow the longitudinal motion of the shaft, but secured in position by the segment toothed wheel *g* on one end, and by a collar, *n*, which is fixed to the spindle on the other. The pivot *o*, which is forged integral with the sleeve *m*, serves as the shaft for the pinion *f*, and is adjusted by the wings *h*, and the rods *i*, connected with the expansion slide-valves, will necessarily always be in a right position.

When the engine is working against a strong resistance, the sleeves are withdrawn and the ports entirely open. When the resistance is removed, the connecting-rod of the governor rises, and the arm *d* causes the revolution of the segment *g*. This engaging with the collar *o* partially rotates it and causes it, by means of the expansion carrying the connecting-rod, to shove the plates *u u* partially over the ports *s s*, and thus automatically reduces the admission of the steam.

It is evident that this mechanism is serviceable both for land and marine engines, though occasional modifications may be necessary in order to make it adaptable.

Having described my invention, what I claim is—

1. In a slide-valve, the pair of sliding plates fitted within longitudinal ways or grooves in close connection with the outer face of the slide-valve and connecting-rods engaging with

the wings of a collar having a segment or toothed gearing engaging with a corresponding segment of a collar on the rotating shaft, connecting with the governor so as to form cut-
5 offs, and thus regulate the quantity of steam introduced into the cylinder, as and for the purpose substantially as herein set forth.

2. In a slide-valve, the pair of sliding plates fitted with longitudinal ways or grooves in
10 close connection with the outer face of the slide-valve and connecting-rods engaging with the wings of a collar having a segment or toothed gearing engaging with a corresponding segment of a collar on the rotating shaft,
15 with the shaft having thereon the collar having the segmental gearing, the opposite end having a square portion to receive a sleeve at the inner end of the lever, and a connecting-rod attached thereto engaging with the shaft
20 in connection with the governor, substantially as herein set forth.

3. The combination of the shaft *a*, in communication with the governor, and the shaft *a'*, connected by means of a rod, *c*, the said shaft
25 *a'* so disposed with the square portion inserted within the collar of the connecting-rod lever

as to be rotated and form an extension-rod with the collars *g*, provided with a segment of toothed gearing to engage with a corresponding gearing on a vertical stem of another collar on the shaft, so disposed as to operate the
30 slide-valves *u* by means of connecting-rods when the shaft *a'* is rotated, and thus form cut-offs for the inlet-ports, substantially as herein set forth.

4. The combination of the rotating expansion-shaft *a'*, the parallel governor-shaft *a*, connecting-rod *c*, the sleeve *g*, having thereon the segmental gearing to engage with corresponding segmental gearing *f* on the stem of a second collar on the expansion-shaft *a'*, the valves
40 *u*, the connecting-rods *i*, the wings *h*, and inlet-ports *s*, the whole arranged as and for the purpose substantially as herein set forth and described.

In testimony that I claim the foregoing I have hereunto set my hand, this 3d day of August, 1886, in the presence of witnesses.

LARS ENGBRETSSEN.

Witnesses:

OLAF SOTAAEN,
OVE A. OLSEN.