

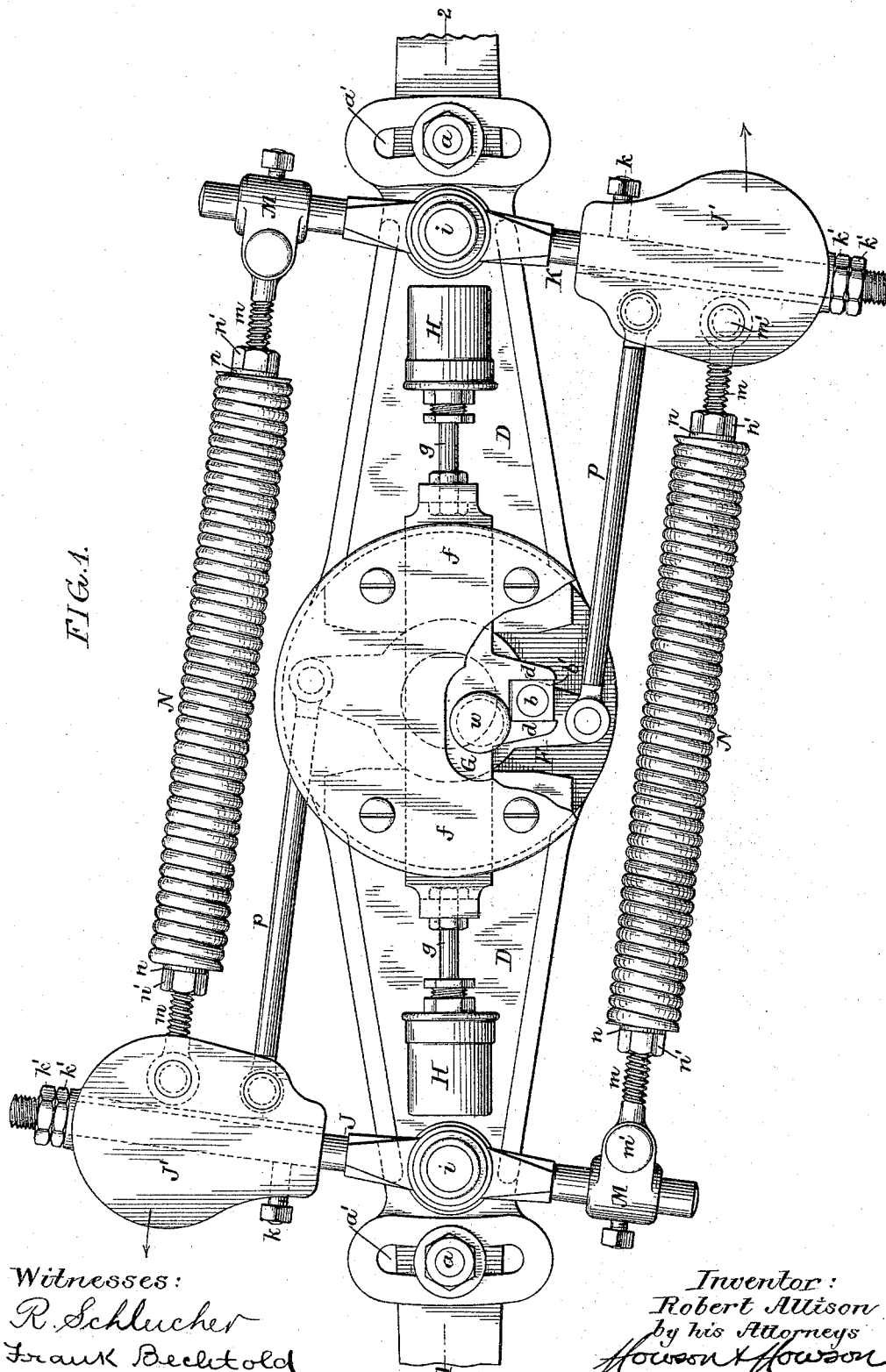
(No Model.)

2 Sheets—Sheet 1.

R. ALLISON.
GOVERNOR FOR STEAM ENGINES.

No. 492,254.

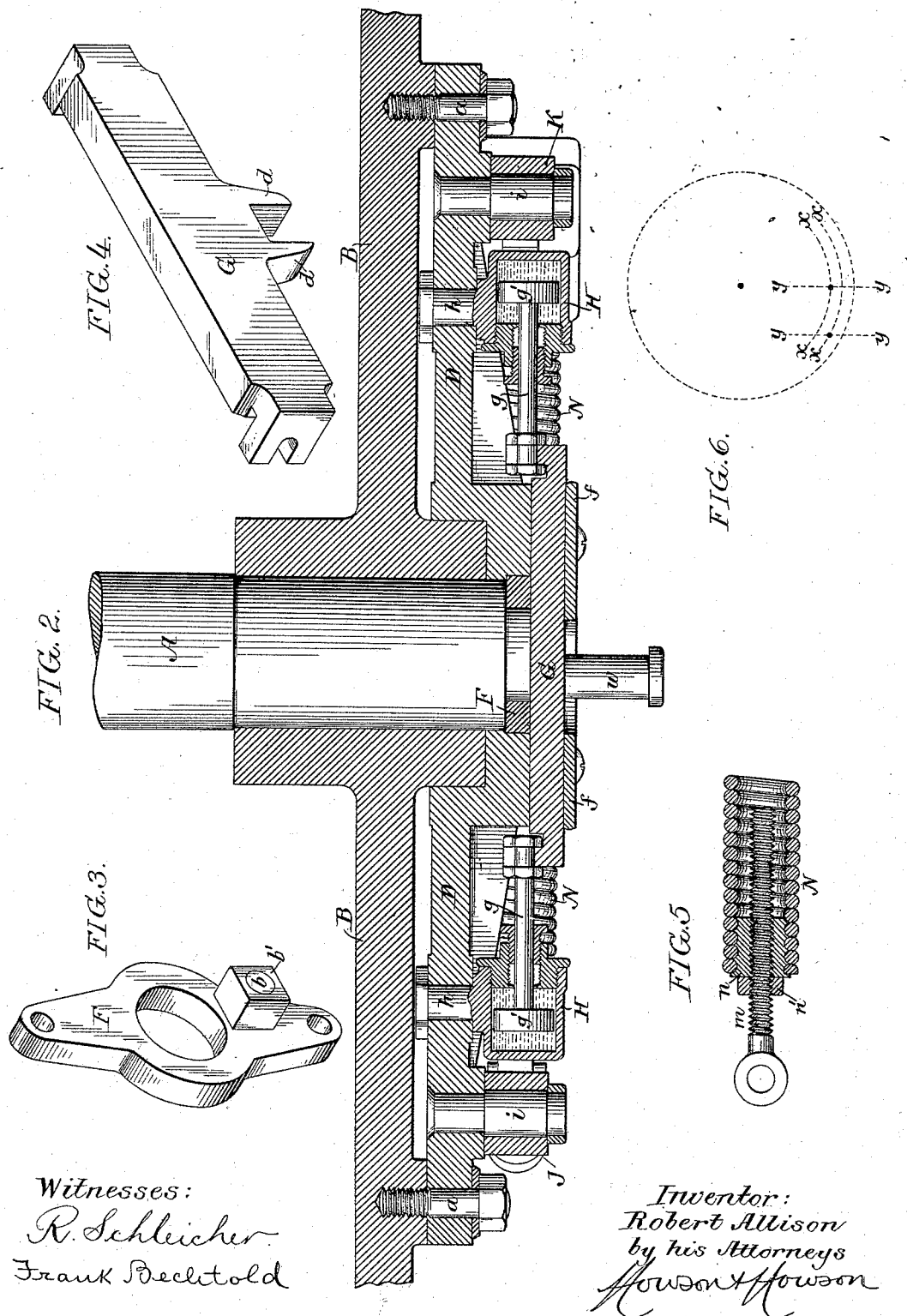
Patented Feb. 21, 1893.



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Witnesses:
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UNITED STATES PATENT OFFICE.

ROBERT ALLISON, OF PORT CARBON, PENNSYLVANIA.

GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 492,254, dated February 21, 1893.

Application filed October 4, 1892. Serial No. 447,782. (No model.)

To all whom it may concern:

Be it known that I, ROBERT ALLISON, a citizen of the United States, and a resident of Port Carbon, Schuylkill county, Pennsylvania, have invented certain Improvements in Automatic Governors for Steam-Engines, of which the following is a specification.

My invention consists of certain improvements in that class of automatic steam engine governors which rotate with the crank shaft or other rotating part of the engine and serve to vary the throw of the steam inlet valve or valves and thus regulate the cut off of the engine so as to supply the same with the proper amount of steam to perform the work required, one object of my invention being to so construct such a governor that it will be extremely sensitive and accurate in operation and will thus insure substantially uniform and regular speed of the engine, and a further object being to permit of a large range of adjustment to meet the varying conditions and speeds. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1, is a front view of my improved governor, part of the same being broken away to illustrate parts which would otherwise be covered; Fig. 2, is a longitudinal section on the line 1—2, Fig. 1; Figs. 3, 4 and 5, are detached views of parts of the device; and Fig. 6, is a diagram illustrating the operation of part of the governor.

A represents part of the main shaft of the engine, B part of a fly wheel or disk thereon, and D a plate or bar mounted on said wheel or disk, and capable of adjustment thereon by swinging it to a limited extent around the axis of the shaft A the securing bolts *a* for said plate D being adapted to segmental slots *a'* at the ends of the plate as shown in Fig. 1. While this construction is preferred, for reasons set forth hereinafter, the use of the plate D is not, in all cases, absolutely essential to the proper carrying out of my invention, as the parts carried by said plate may, in some cases, be mounted directly upon the wheel or disk B if desired.

Hung upon the reduced end of the shaft A is a lever F which may be termed an adjuster lever, the central portion or hub of the plate D being cut away or recessed as shown in

Fig. 1 to permit proper play of the opposite arms of said lever. Projecting from the face of this lever is a pin *b* upon which is mounted, so as to be free to turn thereon, a block *b'*, which is fitted between arms *d* depending from a sliding bar G which may be termed an adjuster slide, this slide being guided in suitable slots in the central portion of the hub of the plate D and being retained in position laterally by a suitable cover plate *f* but being free to move transversely to the axis of the shaft A under the influence of the adjuster lever F, sudden movement of the adjuster slide in either direction, however, being prevented, owing to the fact that each end of said slide is provided with a stem *g* which has an enlarged head *g'* working in a cylinder H hung by means of a pivot stem *h* to the plate D, these cylinders being filled with oil or other liquid so as to act as dash pots or retarding cylinders, it being understood that the pistons formed by the heads *g'* do not fit so snugly in the cylinders as to prevent the flow of oil or other liquid from one end of the cylinder to the other around said pistons.

Hung to studs *i* on the plate D are two governing levers J and K, one arm of each of these levers carrying an adjustable weight *J'* which can be secured in any desired position on the arm by means of a set screw *k* and jam nuts *k'*, the other arm of each lever carrying an adjustable sleeve M which may also be secured in position after adjustment by any suitable means, as for instance by means of a set screw, as shown in Fig. 1. A spring N is attached at one end to the weight *J'* of the lever J and at the other end to the sleeve M of the lever K and a like spring N is attached at one end to the weight *J'* of the lever K and at the opposite end to the sleeve M of the lever J, the connection in each case being effected by means of a screw stem *m* hung by means of a pivot pin *m'* to the sleeve or weight, this screw stem being adapted to a nut *n* which receives or is secured to the end coils of the spring, as shown in Fig. 5. One of the screw stems *m* of each spring has a right hand thread, and the other a left hand thread, hence, when jam nuts *n'* beyond the nuts *n* are slackened, the tension of the spring can be readily varied by turning it in one direction or the other, movement in one direction

having a tendency to stretch the spring and increase its tension, and movement in the opposite direction having the effect of slackening the spring and decreasing its tension.

- 5 The weight J' of the lever J is connected by a rod p to one arm of the adjuster lever F , the other arm of said lever being connected by a similar rod p to the weight J' of the lever K .

- 10 On the face of the adjuster slide G is a pin W which projects through a suitable elongated opening in the cover plate f and is adapted for the reception of the rod which is connected to the valve operating stem or slide of the engine in the usual manner.

- 15 It will be observed that the point of connection of the spring N to the sleeve M of each of the governing levers is closer to the fulcrum i of said lever than the point of connection of the other spring N to the weight J' of said lever, hence each of the governing levers is, in effect, a differential lever and when the governor is in action the centrifugal force has a tendency to cause the weighted arms of the levers to move outward or in the direction 25 of the arrows, Fig. 1.

- When the engine is running at its proper speed, the weighted levers J and K are practically stationary and the pin w of the adjuster slide G occupies its normal relation to 30 the axis of rotation of the governor. Any increase or decrease of the speed of the engine, however, will cause movement of the levers J and K , in one direction or the other, and such movement will be imparted to the adjuster lever F and thence to the adjuster slide G so as to vary the position of the wrist pin in respect to the axis of rotation, and thereby increase or diminish the throw of the valve to regulate the cut off, increase in the speed of 40 rotation above the normal causing movement in one direction so as to restrict the supply of steam to the cylinder, while a decrease in speed below the normal causes movement in the opposite direction, and an increase in the supply of steam to the cylinder. The governing levers J and K are quickly responsive to any change in speed of the shaft A so that the practical effect of the governor is to maintain said speed substantially uniform by supplying the engine with just the amount of 50 steam necessary to maintain such uniform speed under varying conditions of load.

- Exceedingly fine variations in the movement of the valve and correspondingly close 55 regulation of the engine are provided for by reason of the fact that the wrist pin w is adjusted in a direction transversely across the end of the shaft A and in a plane which does not intersect the center of the said shaft so 60 that the change in the distance of the pin radially from the axis of rotation is much less than the actual transverse movement imparted to it. This will be understood on reference to the diagram Fig. 6, in which the segmental 65 lines xx represent the difference in radial adjustment or throw of the wrist pin which will result from the much greater transverse

movement of the pin represented by the vertical lines yy .

In setting the valves in the first instance 70 the lead of the same may be increased or diminished to suit any ordinary changes in conditions by swinging the plate D on the wheel or disk B and the tension of the springs can be readily varied in the manner before set 75 forth, while the power of the levers J and K can be regulated by varying the relative lengths of their long and short arms by proper adjustment of the weights J' and sleeves M , these various adjustments giving a range 80 which will be amply sufficient to cover any conditions which may arise in practice.

Although I prefer in all cases to use the construction of differential levers and double springs shown and described, some of the features 85 of my invention may be used in connection with a governor in which but a single spring directly connecting the two weights is employed, the movements of the weights effecting variation in the travel of the valve in 90 the same manner as shown and described, or the differential weighted levers and double springs may be used in connection with modified forms of mechanism for transmitting the movements of said levers to the valve-con- 95 trolling wrist pin.

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

1. The combination in an automatic governor for steam engines, of the differential 100 governing levers and their weights, with a pair of springs each acting upon one arm of one lever and upon the opposite arm of the other lever, substantially as specified.

2. The combination in an automatic governor for steam engines, of the differential 105 governing levers each having an adjustable weight on one arm and an adjustable sleeve on the other arm, and a pair of springs each connected at one end to the weight of one lever and at the other end to the adjustable 110 sleeve of the other lever, substantially as specified.

3. The combination in an automatic governor for steam engines, of the rotating governor 115 shaft, an adjuster lever free to turn on the axis of said shaft, an adjuster slide guided transversely across the end of the shaft and carrying the wrist pin for the valve rod, and a sliding connection between the adjuster lever and slide, whereby rocking movement of the lever is caused to move the slide 120 to and fro, substantially as specified.

4. The combination of the rotating shaft, the adjuster lever, the adjuster slide engaging therewith and having a wrist pin for the 125 valve rod, and pistons connected to said adjuster slide and adapted to cylinders rotating with the governor and filled with liquid so as to serve as retarders for the slide, substantially 130 as specified.

5. The combination of the governor shaft and its wheel or disk, a plate mounted on said wheel or disk and adjustable around the axis

of rotation of the same, an adjuster lever
likewise movable around said axis of rota-
tion, an adjuster slide engaging with said le-
ver and carrying the wrist pin of the valve
5 operating rod, and spring controlled weights
hung to the plate and connected to said ad-
juster lever, substantially as specified.

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

ROBERT ALLISON.

Witnesses:

D. H. SEIBERT,
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