No. 736,091. PATENTED AUG. 11, 1903.

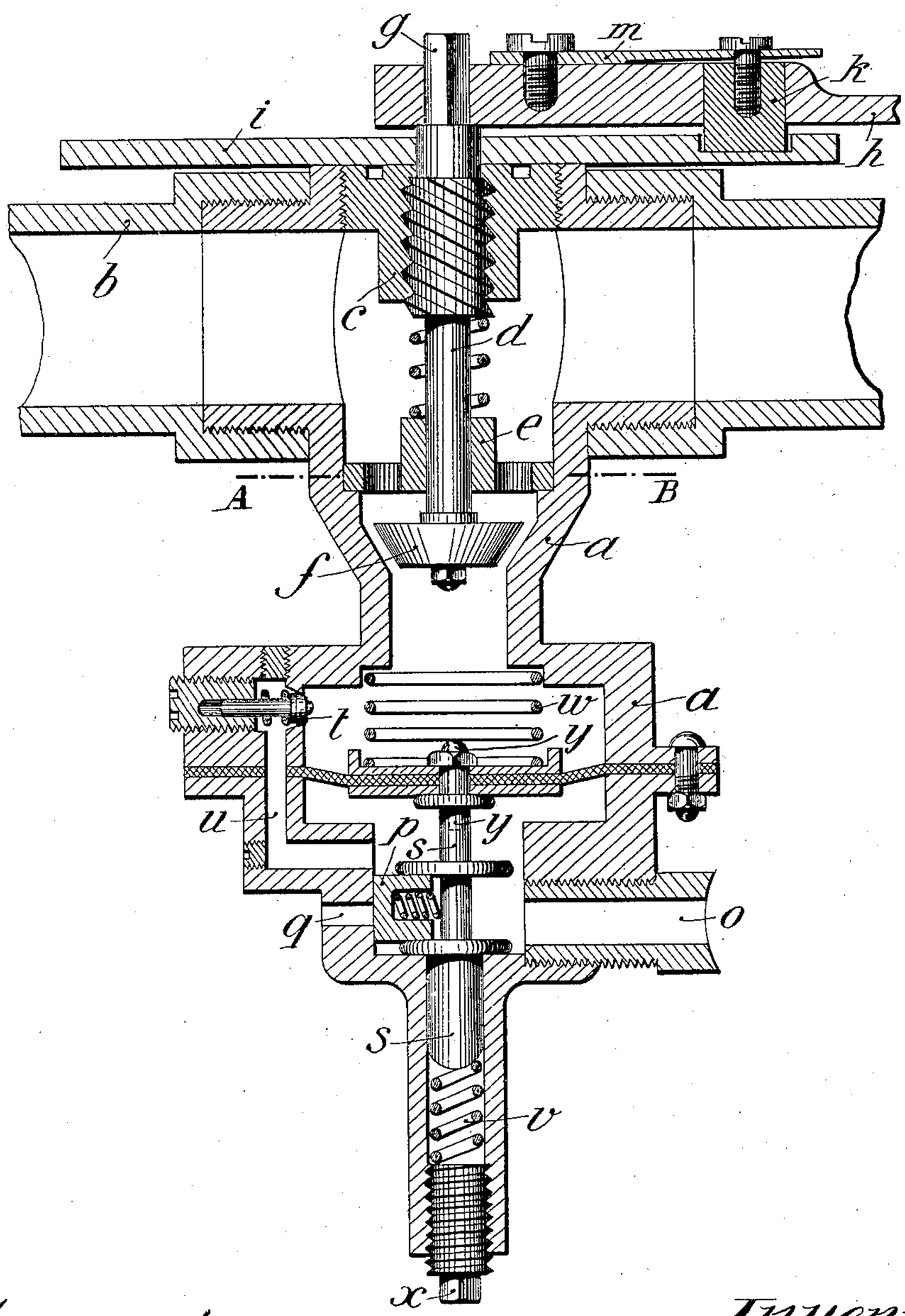
P. HALLOT.

RAILWAY BRAKE.

APPLICATION FILED JULY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1



Witnesses,
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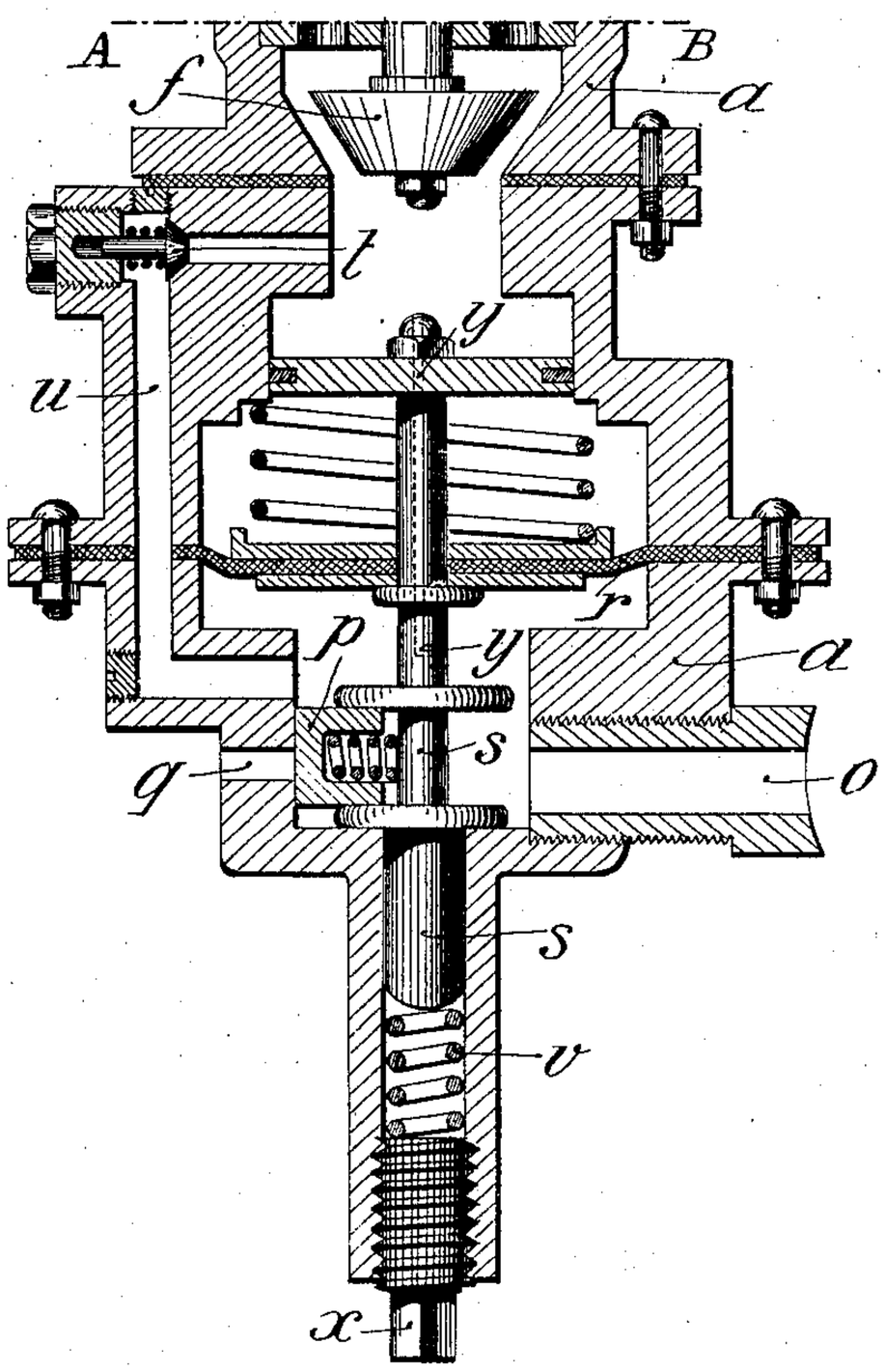
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

PAUL HALLOT, OF VINCENNES, FRANCE.

RAILWAY-BRAKE.

SPECIFICATION forming part of Letters Patent No. 736,091, dated August 11, 1903.

Application filed July 26, 1902. Serial No. 117,194. (No model.)

To all whom it may concern:

Be it known that I, PAUL HALLOT, engineer, a citizen of France, residing at Vincennes, France, have invented certain new and useful Improvements in or Relating to Railway-Brakes, of which the following is a specification.

This invention relates to certain new and useful improvements in fluid-pressure railway-brakes; and it consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawings, and particularly pointed out in the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, wherein like characters of reference indicate corresponding parts throughout the several views, and in which—

Figure 1 is a central vertical sectional view thereof. Fig. 2 is a sectional view of a double valve for reducing the fall of pressure in the brake-cylinder.

So as not to encumber the drawings, Fig. 2 shows only that part of the apparatus situated below the line *a b* of Fig. 1, the portion of the apparatus adapted to be situated above said line being the same as in Fig. 1.

Referring to the drawings by reference characters, *a* denotes a casing or chest in which is securely fixed a diaphragm *r*, the central portion of which is connected to a rod or stem *s*, engaging with and operating a slide-valve *p* for opening and closing a port *q* in the casing or chest *a*. The reference character *o* denotes a pipe leading to the brake-cylinder. (Not shown.)

The main conduit or train-pipe *b* communicates with the pipe *o* through the intervention of a small valve *t* and a passage *u*. The passage *u* communicates with the interior of the casing or chest *a* above the diaphragm *r* and below the diaphragm *r*. The passage *u* is formed in the wall of the chest *a* and is closed by means of the valve *t*, seated in the wall of the casing or chest *a*. When the air-pump (not shown) is in operation, the pressure of the air thus compressed in the main conduit opens the valve *t* and the air fills the brake-cylinder. (Not shown.) During this operation an equal pressure prevails on both faces of the diaphragm *r*. Arranged in the valve casing or chest *a* and engaging the diaphragm *r* is a spring *w*, which keeps the rod or stem *s* lowered, and hence the port *q* closed by the slide-valve *p*. Arranged beneath the lower end of the rod or stem *s* is a spring *v*, the tension of which can be adjusted by means of a set-screw *x*. Therefore the sensitiveness of the working of the slide-valve *p* can be regulated by adjusting the set-screw *x*.

The reference character *f* denotes a cone-valve for regulating the passage of the air from the train-pipe *b* into the chest *a*. The cone-valve *f* is set by means of a lever *h*, engaging the top *g* of the cone-valve stem *d*. The stem *d* also carries a worm or is formed with screw-threads which engage in the screw-threaded sleeve *c*, connected to the upper portion of the casing or chest *a*. The latter is connected to the main conduit or train-pipe *b*. Within the casing or chest *a* is arranged a plate *e*, forming a boss through which the stem *d* operates. The plate *e* is provided with openings for the passage of air from the conduit or train-pipe *b*. Upon the top of the casing or chest and sleeve *c* is a stop-plate *t*, provided with recesses which receive a projection *k* for fixing the lever *h* in its set position. The reference character *m* denotes a spring connected with the lever and with the projection *k*.

The operation of the foregoing construction is that a determined fall of pressure in the main conduit or train-pipe has the effect of rendering preponderant the action of the air under the diaphragm *r*, which latter rises and opens the exhaust-port *q*. The air in the brake-cylinder (not shown) therefore escapes into the atmosphere until the pressure becomes practically equal to that in the main conduit, thus allowing the diaphragm to again descend under the preponderating action of the spring *w*. This arrangement, while regulating the simultaneous action of the brakes, allows of imparting to them a gradual braking directly proportional to the decrease of pressure in the main conduit brought about by the operator, and thus by a very progressive action, as any recharge of the main conduit has the effect of progressively lowering the braking action, which is an important ad-

vantage when descending long grades and for ensuing stoppages at predetermined points.

A small escape-passage *y* is formed in the body of the rod or stem *s*, so as to prevent any untimely movement of the piston in case of accidental leakages. This passage also allows of the application of the brakes on long grades being graduated at will by means of the variations in pressure effected in the main conduit by the operator.

The operation of the apparatus is such that it will work in two different manners according to the decrease of pressure in the main conduit—that is, sudden or slow. The smaller escape-passage *y* forms a permanent communication between the main conduit and the brake-cylinder; but it is too small to allow sudden variations of pressure of being transmitted from one side of the diaphragm to the other. When a sudden decrease of pressure is produced above the diaphragm *r*, the apparatus operates as described; but when the pressure is decreased very slowly the diaphragm does not rise and the air passes slowly through the passage *y*. This action may be termed a "direct braking," and it is generally applied when the train travels down an incline. In this case the operator prevents the train from running off by progressively and slowly decreasing the pressure in the main conduit.

In the modified form shown in Fig. 2 the decrease of pressure transmitted to the brake-cylinder is less than that in the main conduit. For this purpose the differential piston has its smaller disk *r'* arranged near the main conduit and the disk of greater area, secured to the diaphragm *r*, is placed near the brake-cylinder. It is easily understood that the decrease of pressure in that part of the chest *a* or compartment above the disk *r'* produces in the compartment below the diaphragm *r* a decrease of pressure which will be, as regard to the original one, in ratio of the areas of smaller to the greater disk. By this arrangement the expense of compressed air in the brake-cylinder may be considerably diminished.

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

1. In a fluid-pressure railway-brake, a casing, a diaphragm arranged therein and dividing the same into upper and lower compartments, the wall of said casing provided with a passage for establishing communication between the upper and lower compartments of said casing, a valve arranged in the wall of said casing for closing said passage, said casing provided with an exhaust-port, a valve for closing said exhaust-port, and a spring-actuated stem connected to said diaphragm and adapted to engage the said exhaust-valve for suitably operating it.

2. In a fluid-pressure railway-brake, a casing, a diaphragm arranged therein, a spring arranged in the casing and engaging with the diaphragm, a passage formed in the wall of said casing for establishing communication between that portion of the casing above the diaphragm and that portion of the casing below the diaphragm, a valve for closing said passage, a stem connected at its upper end to said diaphragm, a spring engaging the lower end of said stem, said casing further provided with an exhaust-port, and a valve for closing said port adapted to be engaged and operated by said stem.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PAUL HALLOT.

Witnesses:
EDWARD P. MACLEAN,
ALFRED FREY.