

G. WESTINGHOUSE, Jr.
LOCOMOTIVE AIR-BRAKE.

No. 175,886.

Patented April 11, 1876.

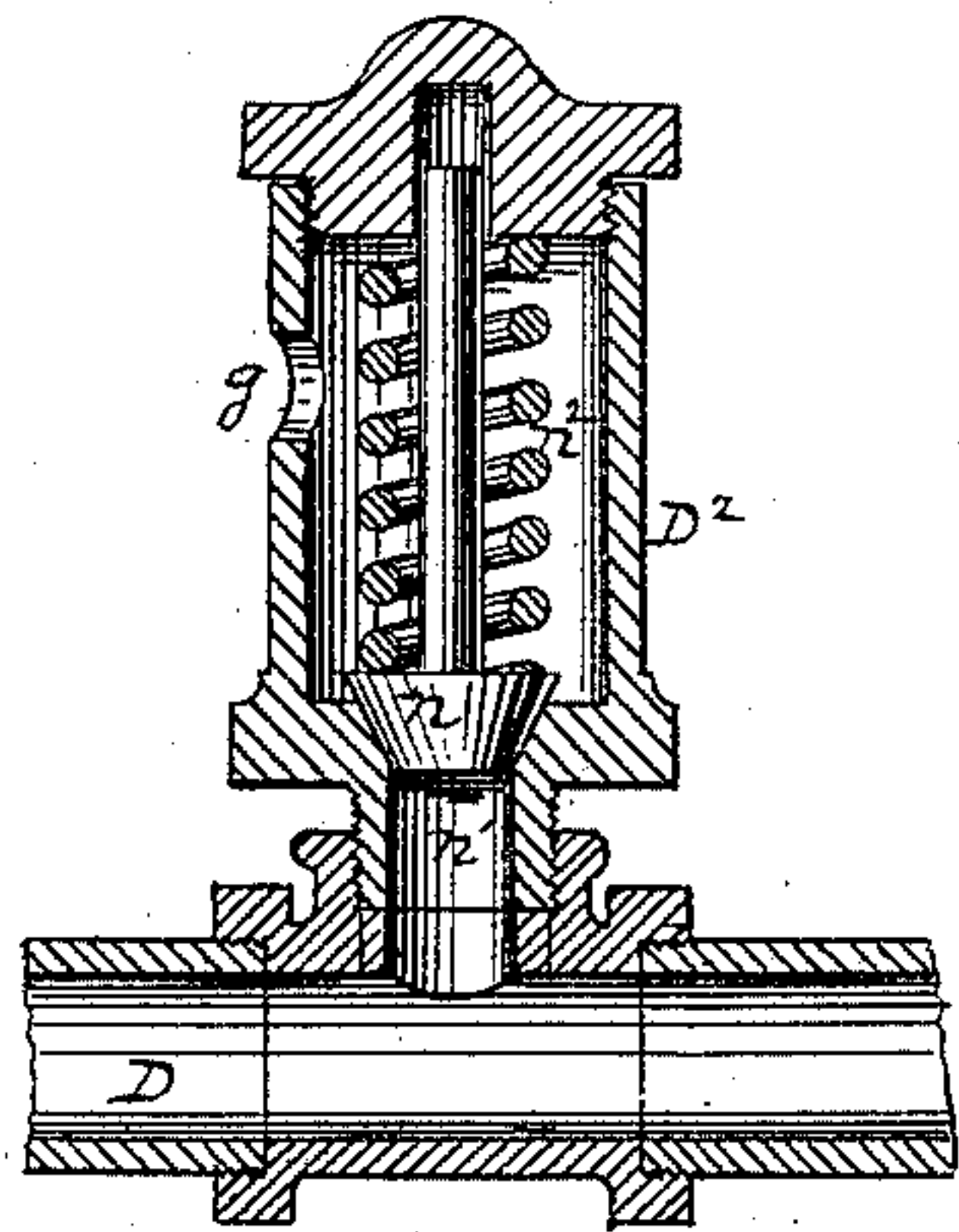


Fig. 3.

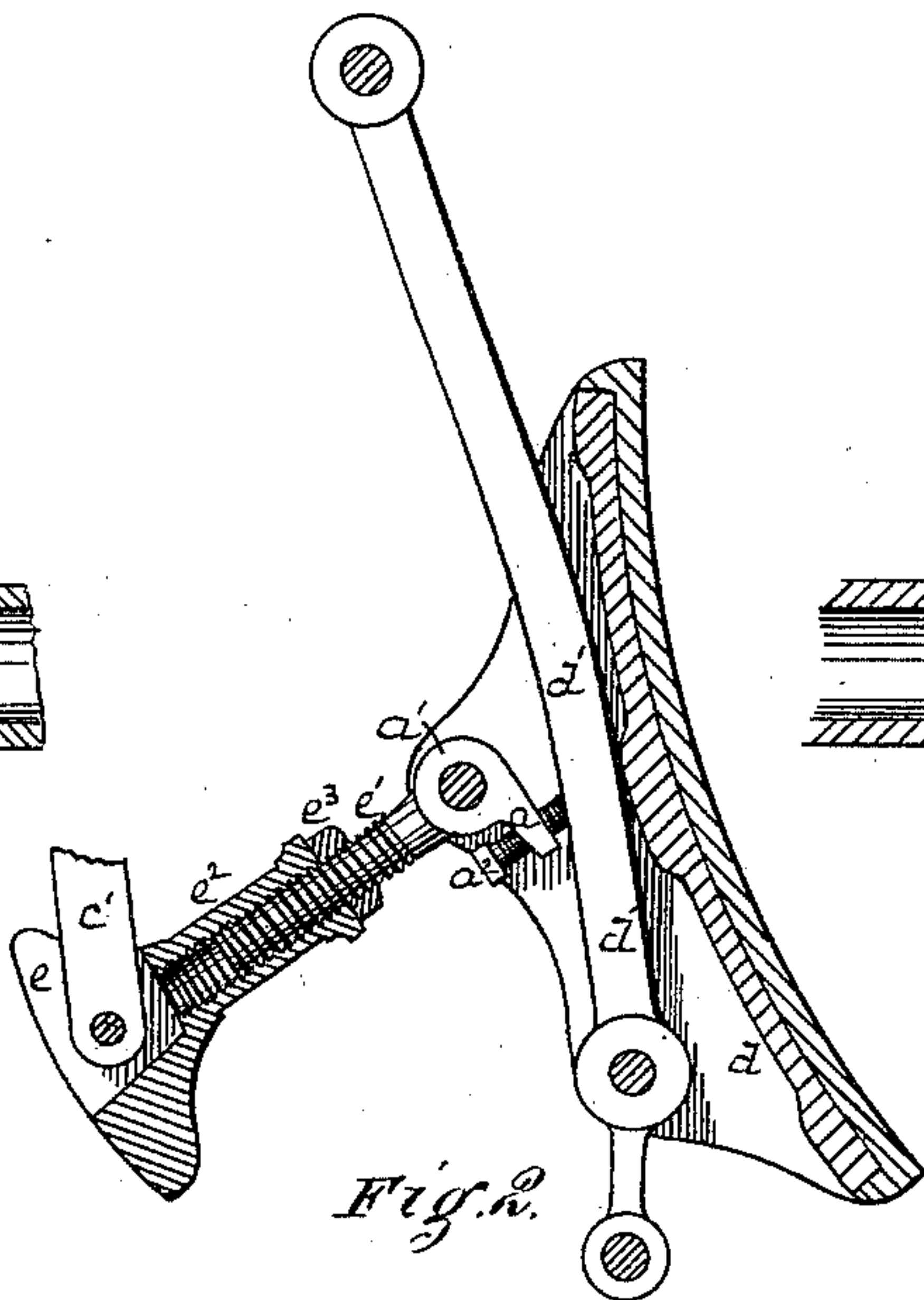


Fig. 2.

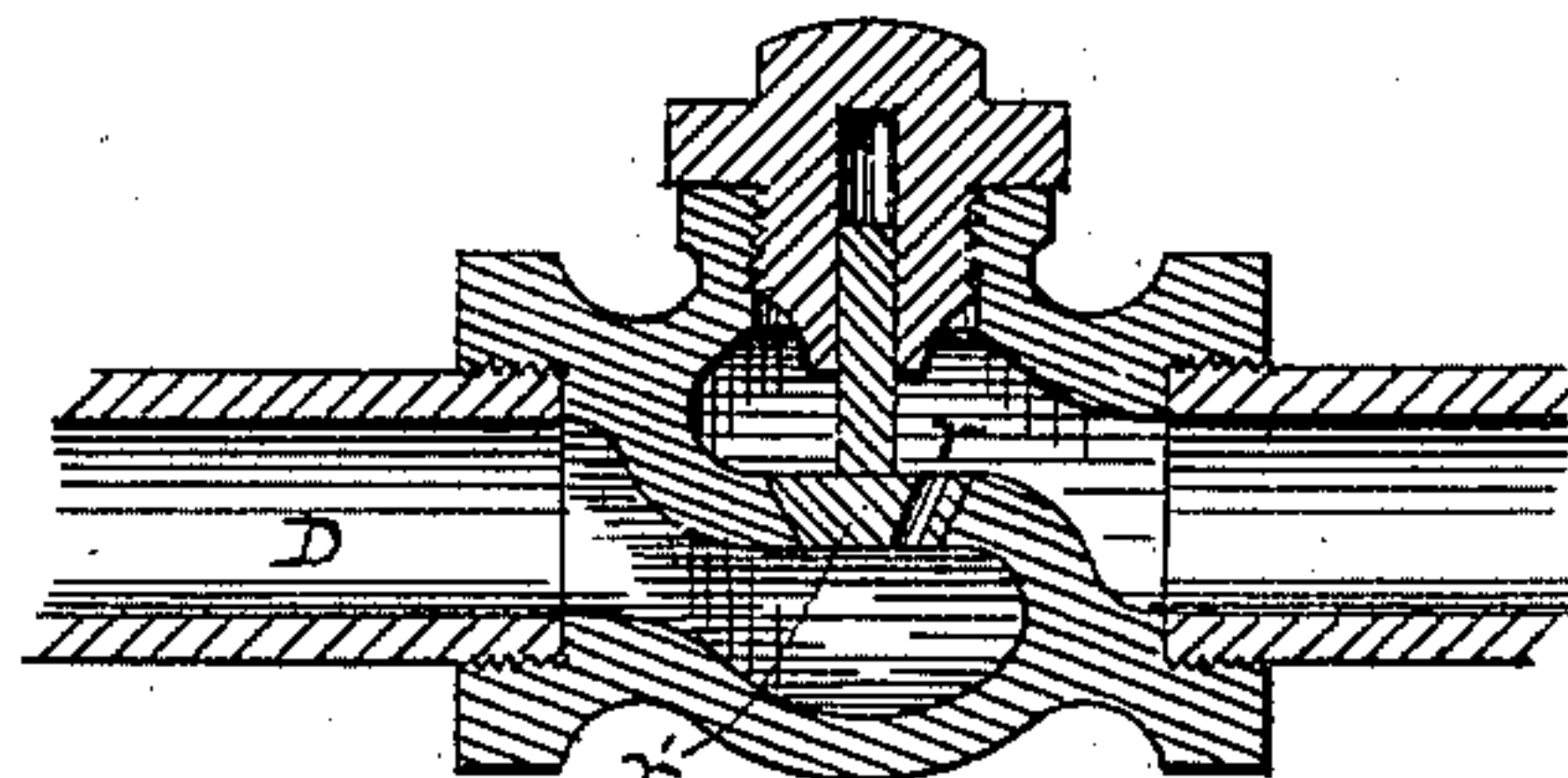


Fig. 4.

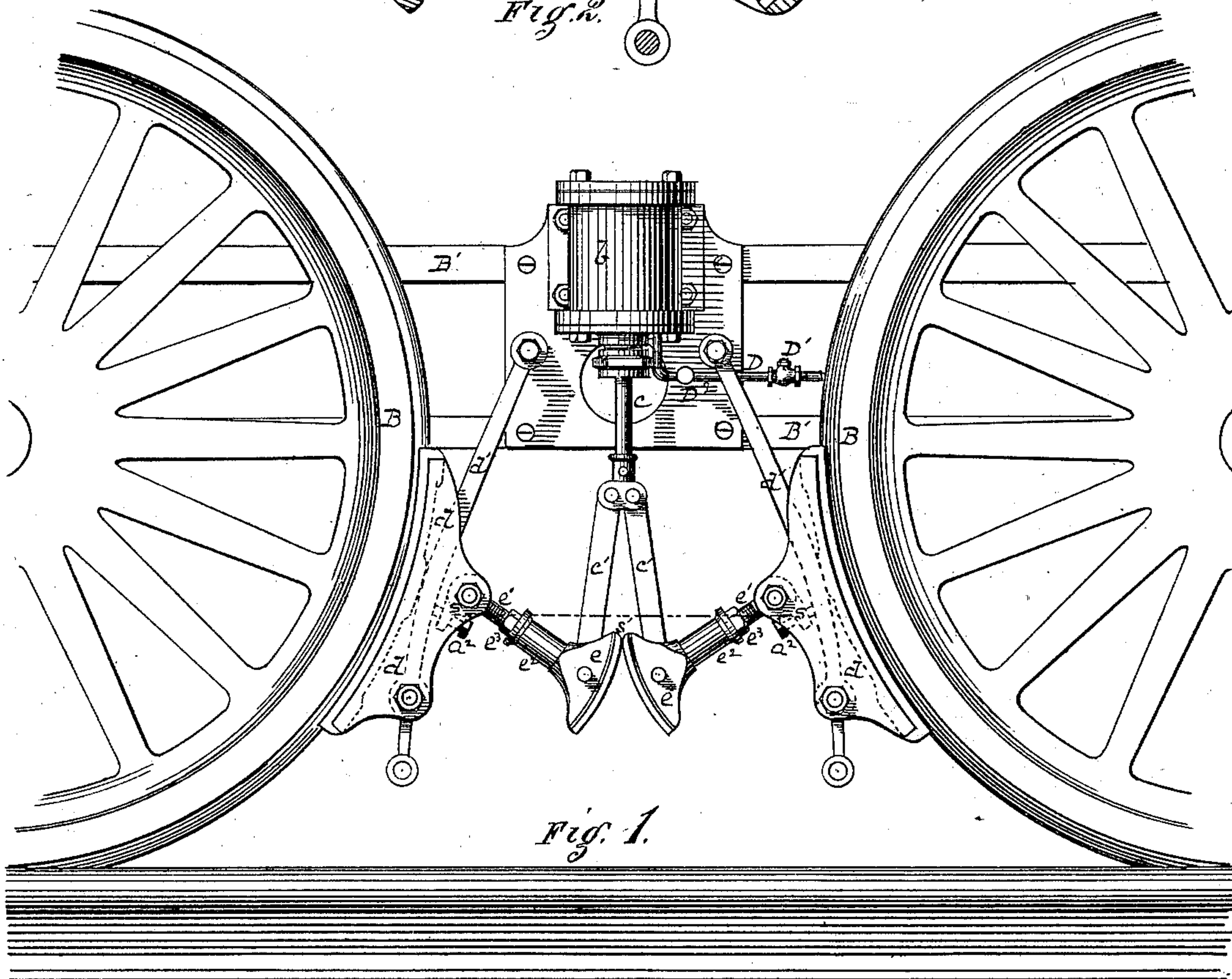


Fig. 1.

Witnesses

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN LOCOMOTIVE AIR-BRAKES.

Specification forming part of Letters Patent No. 175,886, dated April 11, 1876; application filed February 7, 1876.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Locomotive Air-Brakes; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 shows my improvements in side elevation, as applied to a pair of locomotive drive-wheels; and Figs. 2, 3, and 4 are enlarged sectional views of detached parts, as presently to be explained.

The present invention relates to certain improvements in driver-brake apparatus, such as is described in Patents Nos. 144,005, and 147,212, granted to me October 28, 1873, and February 3, 1874, respectively.

The ordinary drive-wheels of a locomotive-engine are shown at B B, and B' indicates a portion of the frame-work of the locomotive. The brake blocks or shoes *d* and hangers *d'* are of like construction, as in the patents above named, as also the brake-cylinder *b*, the stem *c* of the piston therein, and the latter is, by stirrups *c'*, connected with the eccentric-faced segment-levers *e e*. These segment-levers, in their mode of attachment to the brake blocks or shoes *d*, and in their action on each other and on the brake-shoes, and also in the manner by which they are actuated are, except as hereinafter noted, substantially the same as in said Patent No. 147,212; but they differ in one important respect—they are so hung that during the beginning of their stroke the touching-point of their operative faces shall be below the line joining their centers of curvature. Thus, *s* and *s'* being their centers of curvature, the touching-point *s'* is below the line joining such centers. Then, from the point *s'* till the touching-point comes on the line joining such centers, the segmental levers will have the functional operation of a knee-joint, so as to give to the brake-shoes a quick motion or throw, to, or nearly to, the surfaces of the wheels. After that, the motion will be uniform. Also, the devices are to be so proportioned and adjusted that this knee-joint mo-

tion shall nearly or exactly suffice to move the brake-shoes to the point at which they begin to engage the wheels; or, in other words, to take up their slack motion.

By this feature of construction, as compared with that shown in Patent No. 147,212, I am enabled to do the same work with a shorter stroke of piston, do it more quickly, and with less expenditure of air.

The forms of the segment-levers may be varied somewhat, provided, only, that through the first part of their stroke their touching-point shall be below a line joining the centers of curvature of the touching-faces, as the same intersect such line.

In order to make additional provision for the wearing away of the brake-shoes and tires, I make these segment-levers *e e* adjustable on the stems *e¹*, which carry them, and by which they are hinged or pivoted to the brake-blocks. Various known means of effecting this adjustment may be employed, one such being shown in enlarged view in Fig. 2, by means of a screw-stem and socket-joint. The segment-lever *e* has a hollow-threaded female stem or socket, *e²*, which screws the desired distance onto the threaded male stem *e¹*, and when the proper adjustment has been effected it is locked in place by a jam-nut, *e³*. Readjustment is effected whenever desired by detaching the stirrup *c'*, loosening the jam-nut *e³*, screwing the segment-lever *e* farther on or partly off to the desired point, and then tightening the jam-nut. In my present improvement I also make provision for carrying the face of the brake-shoe parallel or nearly so with the face of the wheel. To accomplish this I make a lug, *a*, on the eye *a¹* of the stem *e¹*, and pass a set-screw, *a²*, through such lug, so that its end shall bear against the hanger *d'*. By turning this set-screw in or out I throw the free end of the brake-block forward or back, to or from the wheel, and thereby bring it to a parallelism with the face or tread of the wheel.

In operating air-brakes, different degrees of pressure are employed, and sometimes, through carelessness or mistake, the pressure is made so great as to slide the wheels. In driver-brakes great injury is thus liable to be done. To guard against such liability, and also pro-

vide for a quick discharge of air in releasing the brakes, I employ the devices shown in enlarged view in Figs. 3 and 4, their arrangement with reference to the other operative devices being indicated in Fig. 1. The pipe for conveying compressed air to and from the brake-cylinder is represented at D, and at D¹, I have shown the valve-box of a check-valve, and at D², the valve-case of a safety-valve. As represented in Fig. 3, the air-pipe D communicates through a valve-port, *n*¹, with the valve-case D², in which case is an air-escape port, *g*. The valve-port *n*¹ is closed by a valve, *n*, held down by a spring, *n*². This spring is to be adjusted so as to hold the valve closed as against the maximum pressure to be employed in braking, and then any excess of air-pressure which may accidentally be turned on, over and above what is required for braking purposes, will operate to raise the valve *n* and escape; hence the greatest efficiency of the brake will be attained without sliding the wheels. Also, in the valve-box D¹ I arrange a check-valve, *r*', of any suitable construction, in such manner that it will be seated by an ingoing and opened by an outgoing pressure; and in order to conduct the air into the brake-cylinder *b*, I make around, past, or through the valve *r*' an open port, *r*, of, say, one-eighth to one-quarter of an inch diameter, more or less. This port should be small enough to prevent the too sudden application of the brakes, and thereby prevent an undue sudden strain on the running machinery, but large enough to secure a reasonably quick setting of the brakes. Then, when the cock is reversed to permit of the escape of the air, the valve *r*' will be lifted from its seat by back pressure, so as to make a free escape and quick release. The port *n*' should be as large as, or larger than the port *r*.

While designating this as an air-brake, I include in my invention the features herein-after claimed, when used with air, steam, or other fluid motor.

It will be observed that the port *r* has a transverse area less than that of the brake-pipe opening in which the valve *r*' is arranged, and also that such valve and port, operating in combination with the safety-valve and es-

cape, (which are made of a correspondingly small capacity,) provide a means for preventing the too great, as well as the too sudden, application of the brake-shoes to the drive-wheels, while not materially lessening the air-pressure, which, in the brake-pipe of the train, is employed to actuate the train-brakes.

The safety-valve device set forth will permit of the escape of excessive air-pressure so fast, and only so fast, as the same passes through the reduced port *r*; hence, the train-braking pressure will not be materially lessened by the use of the safety-valve, as would probably be the case if the reduced supply-port were not used.

I claim herein as my invention—

1. The segment-levers *ee*, arranged and connected to the piston of a brake-cylinder, substantially as set forth, whereby, during the first part of their stroke in setting the brakes, their touching-point shall be below a line connecting their centers of curvature, substantially as set forth.

2. In a driver-brake apparatus, a segment-lever, *e*, adjustably connected to the brake block or shoe, and in combination therewith, substantially as described.

3. The lug *a* and set-screw *a*², in combination with hanger *d*' and brake-block *d*, substantially as set forth.

4. In combination with a brake-pipe and brake-cylinder, a valve arranged in such pipe, closing with an ingoing pressure and opening with an outgoing pressure, and having an air-port through or past the same of a transverse area less than that of the pipe, substantially as and for the purposes set forth.

5. In combination with a brake-pipe, brake-cylinder, and air-supply port of reduced area relative to the brake-pipe, a safety-valve, arranged beyond such reduced port in the direction of the inflow of air, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

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