(No Model.)

R. M. McKINNEY.

AIR OR LIQUID BRAKE.

No. 293,764. Patented Feb. 19, 1884.

Fig. 1.

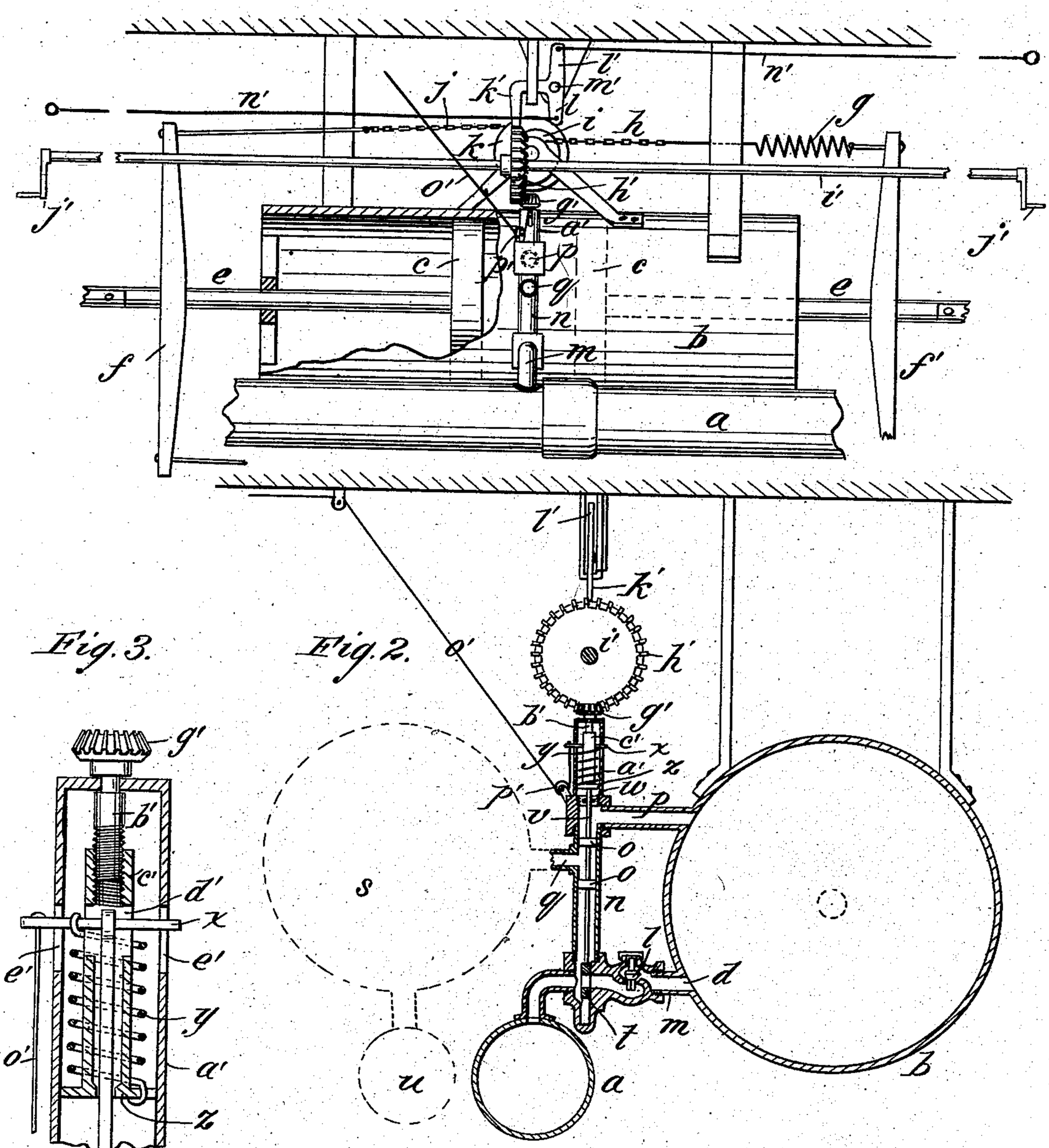

Fig. 3.

Fig. 2.

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AIR OR LIQUID BRAKE.

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Application filed October 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. MCKINNEY, of Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Air and Liquid Brake, of which the following is a full, clear, and exact description.

My invention consists of contrivances whereby air or liquid pressure may be made to hold springs in tension, which, when released from the effect of the air or liquid pressure, will apply the brakes to the car-wheels, the pressure of the liquid or air being under the control of the engineer in such manner that the brakes may be applied alike to all the cars in a train, or the apparatus may be so adjusted that the brakes may be applied to part only of the cars, either singly or in one or more groups of cars along the train, and the brakes will be applied automatically to both sections of a train in case it parts, and the conductor may cause the application of the brakes, all as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is partly a side elevation and partly a sectional elevation of my apparatus as applied to the cars. Fig. 2 is a transverse section of the same, parts being omitted. Fig. 3 is a detail of Fig. 2, represented on a larger scale.

With a suitable conducting-pipe, *a*, extending along the train from the engine where said pipe is connected with a pump to be charged with air or water under any desired pressure, I connect a cylinder, *b*, on each car, preferably containing two pistons, *c*, to be forced apart by the fluid which enters the cylinder at *d* between said pistons. The pistons are connected by their rods *e* with the cross-heads *f f'*. The cross-head *f'* is connected by one or more coiled springs, *g*, and chains *h* with one or more scroll-pulleys, *i*, and the cross-head *f* is connected by one or more chains, *j*, with one or more concentric pulleys, *k*, said scrolls and concentric pulleys being attached to each other, respectively, so that as the pistons are forced apart and the springs extended the tension of the springs will be uniform by the chains *h* drawing from the larger radius of the scrolls when the springs are weakest, and from the gradual decrease of the radius as the springs acquire greater resistance. The chains by which the brakes are to be applied are to be connected with the piston-rods *e* in such arrangement that when the pistons are forced apart by the fluid-pressure the brakes will be released fron the car-wheels, and when the fluid is allowed to escape from cylinder *b* the brakes will be applied to the wheels by the springs. The fluid is therefore to be constantly in action on the pistons, except when the brakes are to be allowed to act by the discharge of the fluid, which is then to be released as follows: The engineer allows a small quantity to escape from the conducting-pipe *a* at the engine to lessen the pressure in it, so that the check-valves *l* in the branch pipes *m*, connecting the cylinder *b* with the main conductor *a*, will close. The pressure in the valve-pipe *n*, above the double balance-valve *o*, having communication with the cylinder *b* through branch *p*, will then be greater than below said valve, the under side of which is in communication with the supply-pipe *a*, and will force said valve down, opening the exhaust-passage *q* into the air if air is used, or into the tank *s* if water is used, also closing slide-valve *t* and preventing further passage of fluid into cylinder *b* while the exhaust-valve is open; then the springs will by their recoil draw the brakes on the wheels with uniform pressure. When the brakes are to be released, the engineer causes a suitable increase of pressure in the main conductor *a*, which raises valve *o*, closes the exhaust, and opens slide-valve *t*, admitting the fluid to cylinder *b* between the pistons again and forcing them apart, as before. The water will then be pumped back to the engine through return-pipe *u* from tank *s*.

When the brakes of all the cars in the train are to be worked alike, the arrangement thus described is sufficient; but for enabling the brakes of some cars to be worked without working the rest, I have contrived the following apparatus: The rod *v* extends up through a packing-box, *w*, in the top of the pipe *n*, and connects with a cross-bar, *x*, which is attached

to the upper end of a coiled spring, *y*, resting on and connected with a disk, *z*, which is made to shift up and down in the case *a'* by a screw, *b'*, suitably fitted in the top of said tube and screwing into the upper end of the tubular stem *c'* of the disk *z*. The cross-bar *x* extends through a slot, *d'*, of said tubular stem, allowing the bar to rise and fall along said stem, and the bar also extends through slots *e'* in the sides of the case, by which said tubular stem *c'* is prevented from turning by the friction of the screw. By this means the valves *o* of the different cars may be set to open by different degrees of pressure from the cylinder *b*, so that some will open while others will not. For instance, if the spring *y* is so adjusted as to have no upward pressure on the valve-stem *v*, the valve *o* will open quickly with but slightly greater pressure above than below it, so that a slight reduction of pressure in the main cylinder *a* will offset the exhaust of the cylinder *b;* but if said spring *y* be set so as to press upward on the valve-stem, a greater difference of pressure above than below the valve will be required to open the exhaust, so that the engineer will understand by his pressure-gage how much to reduce the pressure in the main pipe *a* to cause some brakes to act without the rest, and also how much to cause them all to act.

For a convenient means of setting the springs *y*, the screws *b'* are geared by a bevel-pinion, *g'*, and wheel *h'* with a shaft, *i'*, extending under the car the length of the same, and having a crank, *j'*, at each end, by which the trainmen may adjust the springs at will. A dial and pointer or other indicator may be arranged with the shaft, by which to set the springs to any predetermined tension. A holding-pawl, *k'*, is arranged with the wheel *h'*, to prevent the shaft from shifting by the shaking of the cars, and in order to enable the pawl to be disconnected from either end of the car it is provided with the vertical arms *l'*, projecting above and below its pivot *m'*, respectively, from which arm cords *n'* extend to the ends of the car.

There is a conductor's cord, *o'*, extending from each bar *x* through a guide-pulley, *p'*, into the car, to enable the conductor to shift the valve *o* at any time to apply the brake. The tank *s* is designed to have about the same holding capacity as cylinder *b*, to enable the cylinder to be wholly discharged at any time, and is to be emptied by pumping the water back to the engine after each operation of the brakes when water is used; but if air is used the said tank and return-pipe will be dispensed with, as before stated.

In practice it will probably be found best to employ four springs, *g*, and pulley devices, said springs being located at equidistant points around the cylinder, and the cross-heads having four arms or branches radiating suitably from the rods *e* for the connection of the springs.

It will be seen that in case the train should part and the supply-pipe *a* should be separated the exhausts will open along all the cars automatically and the brakes will be applied to all the cars.

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

1. The combination, in a fluid-brake apparatus, of one or more springs, *g*, to apply the brakes to the wheels, cylinder *b*, pistons *c*, and a fluid substance under pressure to force back the springs and release the brakes, and a balanced valve, *o*, to open the exhaust and close the same, according as the pressure is increased or diminished in the supply-pipe to the cylinder, substantially as described.

2. The combination, in a fluid-brake apparatus, of the cylinder *b* and pistons *c*, to release the brakes from the wheels by the effect of fluid-pressure on the pistons, and allow said brakes to act when the fluid-pressure is diminished, the pipe *a*, for supplying the liquid under pressure to the cylinder, check-valve *l*, and slide-valve *t* in the branch *m*, connecting said pipe *a* and cylinder, and the balanced exhaust-valve *o* in stand-pipe *n*, connecting with the cylinder and supply-pipe, said exhaust-valve *o* being connected with the slide-valve *t*, substantially as described.

3. The combination, in a fluid-brake apparatus, of the supply-pipe *a*, cylinder *b*, pistons *c*, one or more springs, *g*, scroll-pulleys *i*, and concentric pulleys *k*, and means for closing and opening the exhaust of said cylinder, the said supply-pipe being charged with fluid under pressure, substantially as described.

4. The combination of a spring, *y*, with the balanced valve *o*, said spring being adapted to vary the balance of pressure on the different sides of the valve *o*, and said valve being arranged in the pipe *n*, and with relation to the supply-pipe *a*, cylinder *b*, exhaust *q*, and the slide-valve *t*, substantially as described.

5. The combination of the adjusting-screw *b'* with the spring *y* and the balanced valve *o*, said valve being arranged in the pipe *n* and in relation to the supply-pipe *a*, cylinder *b*, slide-valve *t*, and the exhaust-passage *q*, substantially as described.

6. The adjusting-shaft *i'*, adjusting-screw *b'*, and spring *y*, in combination with the balanced valve *o*, said valve being arranged in the pipe *n* and with relation to the supply-pipe *a*, cylinder *b*, exhaust *q*, and the slide-valve *t*, substantially as described.

7. The adjusting-screw *b'*, hollow stem *c'*, disk *z*, spring *y*, and bar *x*, in combination with the balanced valve *o*, said valve being arranged in the pipe *n* and with relation to the supply-pipe *a*, cylinder *b*, exhaust *q*, and the slide-valve *t*, substantially as described.

8. The combination of the conductor's cord *o'* with the spring *y* and valve *o*, said valve

being arranged in the pipe *n* and with relation to supply-pipe *a*, cylinder *b*, exhaust *q*, and the slide-valve *t*, substantially as described.

9. The combination, in a brake apparatus having springs to apply the brakes, of the pistons *c*, cross-heads *f f'*, springs *g*, chains *h*, scroll-pulleys *i*, chains *j*, and concentric pulleys *k*, substantially as described.

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