(No Model.)

J. P. & W. A. STEVENSON.

FLUID MOTOR.

No. 450,981. Patented Apr. 21, 1891.

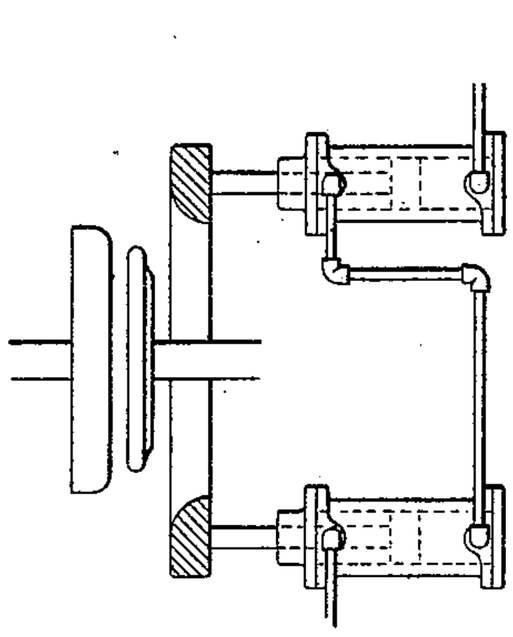

FIG. 3.

FIG. 1.

FIG. 2.

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UNITED STATES PATENT OFFICE.

JOSEPH P. STEVENSON AND WILLIAM A. STEVENSON, OF LEWISTOWN, ASSIGNORS TO THE STANDARD STEEL WORKS, OF PHILADELPHIA, PENNSYLVANIA.

FLUID-MOTOR.

SPECIFICATION forming part of Letters Patent No. 450,981, dated April 21, 1891.

Application filed February 15, 1890. Serial No. 340,523. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH P. STEVENSON and WILLIAM A. STEVENSON, both citizens of the United States, and both residing in Lewistown, Pennsylvania, have invented certain Improvements in Fluid-Motors, of which the following is a specification.

The object of our invention is to move two pistons together at the same speed and in the same relation to each other for a purpose fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of sufficient of a tire-mill to illustrate our invention. Figs. 2 and 3 are diagrams illustrating the application of the invention to other forms of machines.

We will first describe our invention in connection with a mill, whereby tires are shrunk upon or secured to the centers of car-wheels.

Referring to Fig. 1 of the drawings, A is the base of the tire-mill. B is the main roll, driven in any suitable manner. C is the pressure or inside roll, and D D′ are the side rolls. These side rolls determine the rotundity of the tire, and it is necessary in order to secure good work that they shall move exactly together, and that they shall remain in the same position with reference to one another while the tire is being rolled, as any change in the relative position of these rolls would produce an oval or egg-shaped tire. Heretofore it has been the general practice to adjust these rolls by suitable jacks, and great care had to be exercised in moving the rolls into position. We overcome this objection in the foilowing manner: The rolls D D′ are mounted in the present instance on suitable slides E E′, adapted to ways in the frame, and at the rear of each roll is a cylinder, the cylinder F being at the rear of the roll D and the cylinder G at the rear of the roll D′. The cylinder F has a piston *f* and a piston-rod *f′*, which rests against the rear of the slide E, and in the cylinder G is a piston *g*, having a piston-rod *g′* bearing against the slide E′. The rear end of the cylinder F receives the motor-liquid through the pipe *a*, which is provided with a three-way valve, so that under certain conditions the rear portion of the cylinder can communicate with the exhaust *b*. The forward end of the cylinder F communicates with the rear end of the cylinder G through a suitable pipe *c*, the cylinder F being so much larger in diameter than the cylinder G as to compensate for the diameter of the piston-rod *f′*, as the pressure to the square inch must be the same in both cylinders. The pipe *c* communicates with the discharging-pipe *c′*, provided with a suitable valve c^2. The forward end of the cylinder G communicates preferably with a pressure-tank through a pipe *d*, the pressure in this tank being merely for the purpose of returning the pistons when the working-pressure through the pipe *a* is removed. The pipe *d* may have a valve, as shown by dotted lines in Fig. 1, communicating with the exhaust when it it necessary to relieve the pressure from the upper portion of the cylinder G above the piston. It will thus be seen that if the pistons are to be moved forward pressure is applied through the pipe *a* to the piston in the cylinder F. Hence the fluid in the forward end of said cylinder will be displaced by the piston as it moves forward, and will flow into the rear end of the cylinder G through the pipe *c* and will cause a corresponding movement of the piston *g*, the fluid in the forward end of the cylinder G being displaced, as the pressure in the pipe *a* is greater than that in the pipe *d*, so that no matter how slight the movement may be both rolls D D′ will always remain the same distance from the center and the rolling of a true tire will be insured.

It will be understood that our invention can be applied in any case where two pistons are required to move at the same speed and to constantly maintain the same relation to each other—such, for instance, as a machine in which two or more hydraulic cylinders are used to raise and lower a plate or table, as shown in Fig. 2, or a flanging-machine in which two or more cylinders are used to force the flanging-die over the plate, as shown in Fig. 3.

We provide one or more petcocks *i i′ i′* either in the ends of the cylinders, as shown in the drawings, or in the pipe forming the communication between the two, so that if at any time the pistons in the two cyl-

inders should, owing to leakage, become slightly disarranged in respect to each other the defect can be remedied. If, for instance, the roller D′ is up to its work but the roller D falls short, then the petcock *i* in the cylinder F is opened and pressure is applied through the pipe *a*, forcing the piston forward and its roller D up to its work, after which the petcock *i′* is closed. If the piston *f* is to be moved back independent of the piston *g*, the cock *i′* in the cylinder F is opened, allowing the fluid to escape from the rear of the cylinder until the piston has reached the point required. The pressure is then cut off and the cock closed. In the same way adjustment of the piston *g* in the cylinder G is permitted.

We claim as our invention—

1. The combination of two cylinders, pistons therein acting in concert upon a single object and of such size that the forward end of the piston in the primary cylinder has an area equal to the rear end of the piston in the secondary cylinder, with a passage forming a communication between the forward end of the primary cylinder and the rear end of the secondary cylinder, and with a pressure-inlet for the primary cylinder at the end opposite that communicating with the passage, substantially as described.

2. The combination of the two cylinders and their pistons and piston-rods with a pressure-inlet at the end of one cylinder, a communicating passage connected to the opposite end of said cylinder and to one end of the other cylinder, and a communication between the opposite end of said cylinder and a pressure-reservoir carrying a pressure less than the forcing pressure, substantially as described.

3. The combination of the cylinders F and G, the pressure-inlet pipe *a*, communicating with the lower portion of the cylinder F, a pipe *c*, forming a communication between the forward end of the cylinder F and the rear end of the cylinder G, and a pipe *d*, forming a communication between the forward end of the cylinder G and the return-pressure tank, substantially as described.

4. The combination of the cylinders F and G, pistons and piston-rods in said cylinders, a pipe *c*, forming communication between the forward end of the cylinder F and the rear end of the cylinder G, with a valved charging-pipe *c′*, a pressure-inlet pipe *a*, communicating with the rear end of the cylinder F and with the exhaust, and a pipe *d*, forming communication between the forward end of the cylinder G and a pressure-tank, substantially as described.

5. The combination of the two cylinders F and G and their pistons acting in concert upon a single object with a pipe forming a communication between the forward end of one cylinder and the rear end of the other cylinder, a pressure-pipe communicating at the opposite end of one of the cylinders, and petcocks at each end of each cylinder to allow for the escape of fluid from the ends of either cylinder or for the escape of the fluid confined between the pistons in the two cylinders, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOSEPH P. STEVENSON.
WILLIAM A. STEVENSON.

Witnesses:
HENRY HOWSON,
HARRY SMITH.