No. 696,809.

Patented Apr. 1, 1902.

J. C. GELLY.

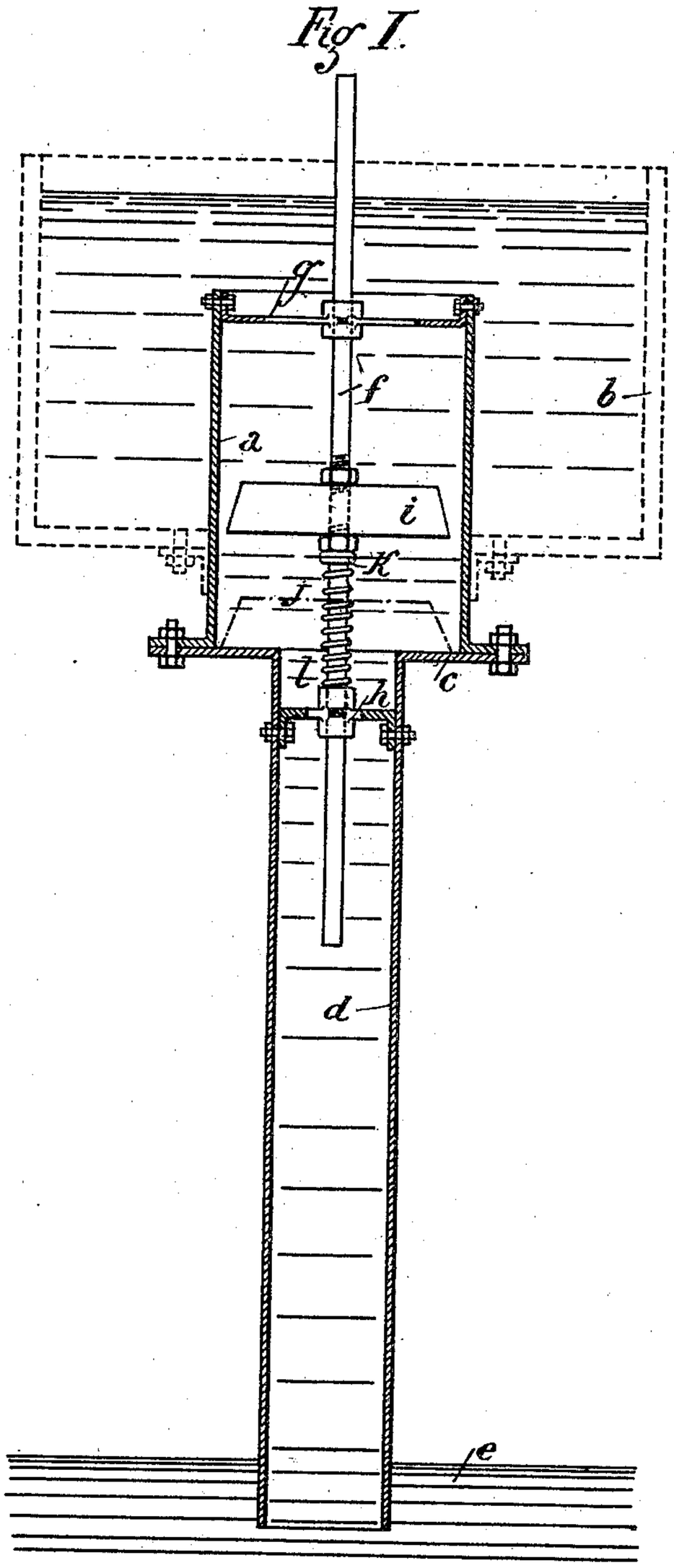
HYDRAULIC MOTOR.

(Application filed Jan. 24, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.




Witnesses:

W. M. Avery

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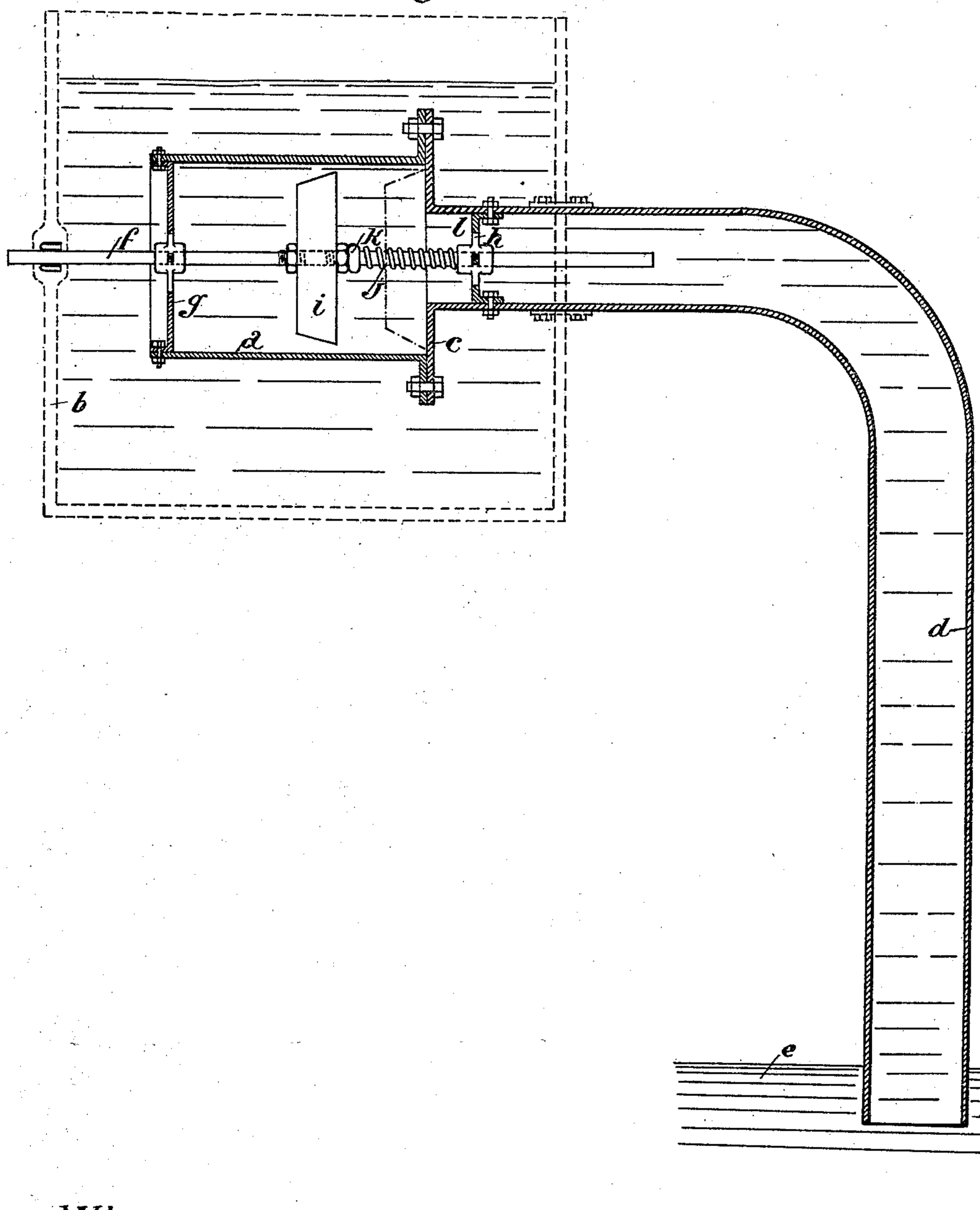
Fig 2.

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# UNITED STATES PATENT OFFICE.

JOSEPH CHARLES GELLY, OF PARIS, FRANCE.

## HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 696,809, dated April 1, 1902.

Application filed January 24, 1901. Serial No. 44,513. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH CHARLES GELLY, a citizen of the Republic of France, and a resident of the city of Paris, France, have invented certain new and useful Improvements Relating to Hydraulic Motors, of which the following is a full, clear, and exact description.

This invention relates to motors, and has for its object to construct a reciprocating hydraulic motor operating automatically without the intermediary of any distributing mechanism (thus rendering the construction of the apparatus extremely simple) and adapted for erection in either a vertical, horizontal, or inclined position.

In order that my invention may be readily understood and carried into effect, I will describe the same fully with reference to the accompanying drawings, in which—

Figures 1 and 2 show in longitudinal axial section a vertical hydraulic motor and a horizontal hydraulic motor, respectively, embodying my invention.

Whether my improved motor is to be employed as a vertical, horizontal, or inclined motor it consists of a cylinder *a*, Figs. 1 and 2, one extremity of which, entirely open, is immersed in the mass of motive water, which is maintained at a constant level in the upper reservoir *b*, while the other extremity is closed by a flange *c*, from the center of which branches a pipe *d*, terminating at the lower or discharge reservoir *e*, into which its lower extremity plunges a few centimeters.

In the axis of the apparatus a movable rod *f* is guided in two cross-pieces *g* and *h*, the first of which is fixed at the open extremity of the cylinder *a* and the second near the commencement of the pipe *d*. Upon this rod, within the cylinder *a*, is mounted a piston *i*, either of wood or metal, presenting the form of a truncated cone, the large base of which is smaller in diameter than the inner wall of the cylinder *a*, so that there exists between this latter and the periphery of the piston *i* an annular space for the passage of the water. Between the cross-piece *h* and the piston *i* is interposed a spiral spring *j*, bearing against an elastic buffer *k*, fixed upon the rod *f* in proximity to the piston *i*, the said spring serving, on the one hand, to support the piston *i* in its initial position or to bring it back to the same and, on the other hand, to deaden the shock of this latter against the cylinder-flange, as hereinafter explained.

The operation of my improved motor is as follows: The normal level is established and maintained in the reservoir *b*, which is fed from a river or any suitable source of supply—that is to say, the open extremity of the cylinder *a* is completely covered by a certain height of water. The piston *i* being in the position represented in the drawings, the water first of all flows slowly between this piston and the inner wall of the cylinder *a* and then escapes into the reservoir *e* through the downflow-pipe *d*. The velocity of the stream of liquid increases gradually until the supply becomes sufficient to charge the pipe *d*, which then acts as a siphon. At this moment, by reason of the suction produced by the descending column of liquid within this pipe, the velocity of the water in the cylinder *a* increases suddenly and becomes sufficient to displace the piston *i*, which is applied (in the position represented by broken lines) upon the flange *c*, compressing the spring *j*, the initial tension of which should be regulated in such a manner as to permit of this displacement, while at the same time taking up the thrust of the said piston upon its seat *c*. The upper orifice of the downflow-pipe *d* is therefore closed, and the water, which is brought to a state of rest in the cylinder *a*, only acts upon the piston *i* by its hydrostatic pressure, which is sufficient to maintain this latter upon its seat; but the liquid column in the pipe *d* continues to descend by virtue of its acquired velocity and produces a vacuum behind it in *l*. Its velocity, therefore, gradually decreases and finally becomes *nil*. At this moment the atmosphere-pressure which by the intermediary of the water in the reservoir *e* is exerted upward upon the lower orifice of the pipe *d* reacts upon the liquid column contained in this latter and causes it to rise with an accelerating velocity as far as the upper orifice of the pipe *d*. Arrived at this point it strikes against the lower face of the piston *i* and exerts a return thrust upon it, which, assisted by the recoil of the spring *j*, causes it to resume its initial position, which is

shown in full lines in the drawings. During this return stroke of the piston *i* the upper portion of the liquid column in movement reënters the cylinder *a* and is thus recuperated in order to again serve to actuate the piston. When the *vis viva* of the ascending liquid column is completely exhausted, the whole of the liquid mass surrounding the piston *i* is again in a condition of repose. The flow of water through the annular space comprised between the piston *i* and the wall of the cylinder *a* then recommences, and the same phenomena are reproduced indefinitely until the operation of the apparatus is stopped by closing either the admission-aperture of the reservoir *b* or a cock (not shown in the drawings) arranged upon the pipe *d*. The reciprocating movements of the rod *f* thus obtained may be utilized by means of a suitable transmission-gear for operating a machine of any kind. If this latter is provided with a fly-wheel, the spring *j* may be dispensed with.

I do not, of course, wish to confine myself strictly to the forms, dimensions, proportions, materials, and accessory details as above specified, and which must obviously vary according to the fall available, the power of the motor, the nature of the machines to be driven, the work to be performed, &c.

I claim—

1. A hydraulic motor, comprising a reservoir, a tube depending from the same and entering below the surface of a body of water of lower level, a current-operated valve connected to a power-transmitting rod for closing said tube, the arrangement of the parts being such as to form successively partial vacuums in the tube for the purpose of utilizing the pressure due to the entire depth of water from the surface water in the reservoir to the surface of the water below.

2. A hydraulic motor, comprising a reservoir, a discharge-tube depending therefrom and entering below the surface of a body of water of lower level, an automatic valve connected to a power-transmitting rod for intermittently closing said tube, and a spring for normally holding said valve open, the arrangement being such that the sudden closing of the tube causes the volume of water in the tube to rebound and thereby assist the spring in opening the valve.

3. A hydraulic motor comprising a cylinder open at one end to a body of water, a pipe leading from the opposite end of the cylinder to another body of water at a lower level and immersed therein, a puppet-valve held to reciprocate in the cylinder and controlling the communication of the cylinder with the said pipe, and a power-transmitting rod connected with said puppet-valve.

4. A hydraulic motor comprising a cylinder open at one end to a body of water, a pipe leading from the opposite end of the cylinder to another body of water at a lower level and immersed therein, a puppet-valve held to reciprocate in the cylinder and controlling the communication of the cylinder with the said pipe, a spring opposing the movement of the puppet-valve toward its seat, and a power-transmitting rod connected with said puppet-valve.

5. A hydraulic motor comprising a cylinder open at one end to a body of water, a pipe leading from the opposite end of the cylinder to another body of water at a lower level and immersed therein, a puppet-valve held to reciprocate in the cylinder and controlling the communication of the cylinder with the said pipe, said puppet-valve being arranged to move up and down, and a power-transmitting rod connected with said puppet-valve.

6. A hydraulic motor comprising a cylinder open at one end to a body of water, a pipe leading from the opposite end of the cylinder to another body of water at a lower level and immersed therein, a puppet-valve held to reciprocate in the cylinder and controlling the communication of the cylinder with the said pipe, said puppet-valve being free to reciprocate, and a power-transmitting rod connected with said puppet-valve.

In testimony whereof I have hereunto signed my name in presence of two subscribing witnesses.

JOSEPH CHARLES GELLY.

Witnesses:

GEORGES DELOM,

EDWARD P. MACLEAN.