No. 729,178. PATENTED MAY 26, 1903.

E. HUBER.

MOTOR.

APPLICATION FILED JUNE 26, 1899.

NO MODEL. 3 SHEETS—SHEET 1.

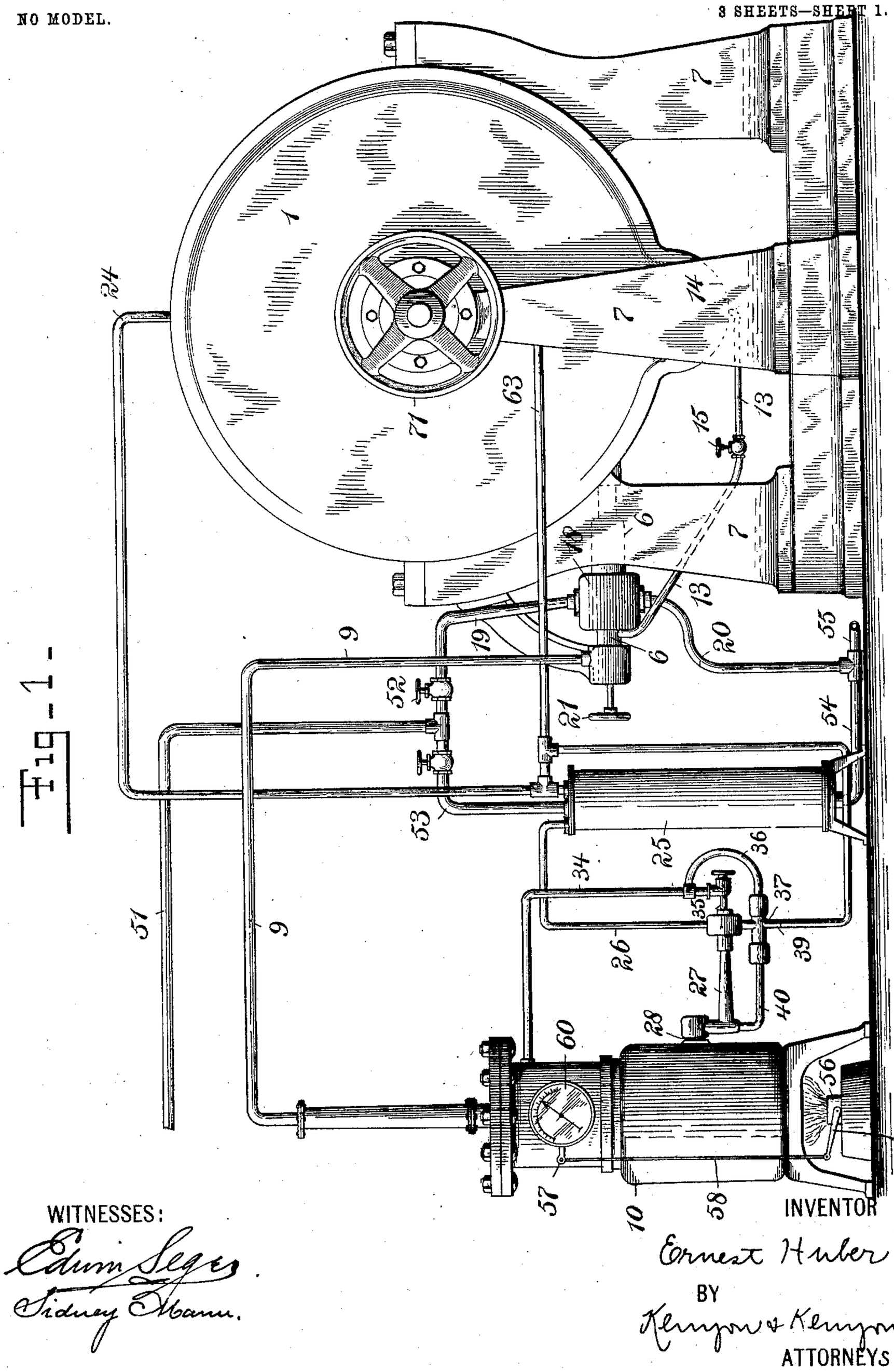

FIG. 1.

WITNESSES:

Edwin Seger

Sidney Mann.

INVENTOR

Ernest Huber

BY

Kenyon & Kenyon

ATTORNEYS

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NO MODEL 3 SHEETS—SHEET 2.

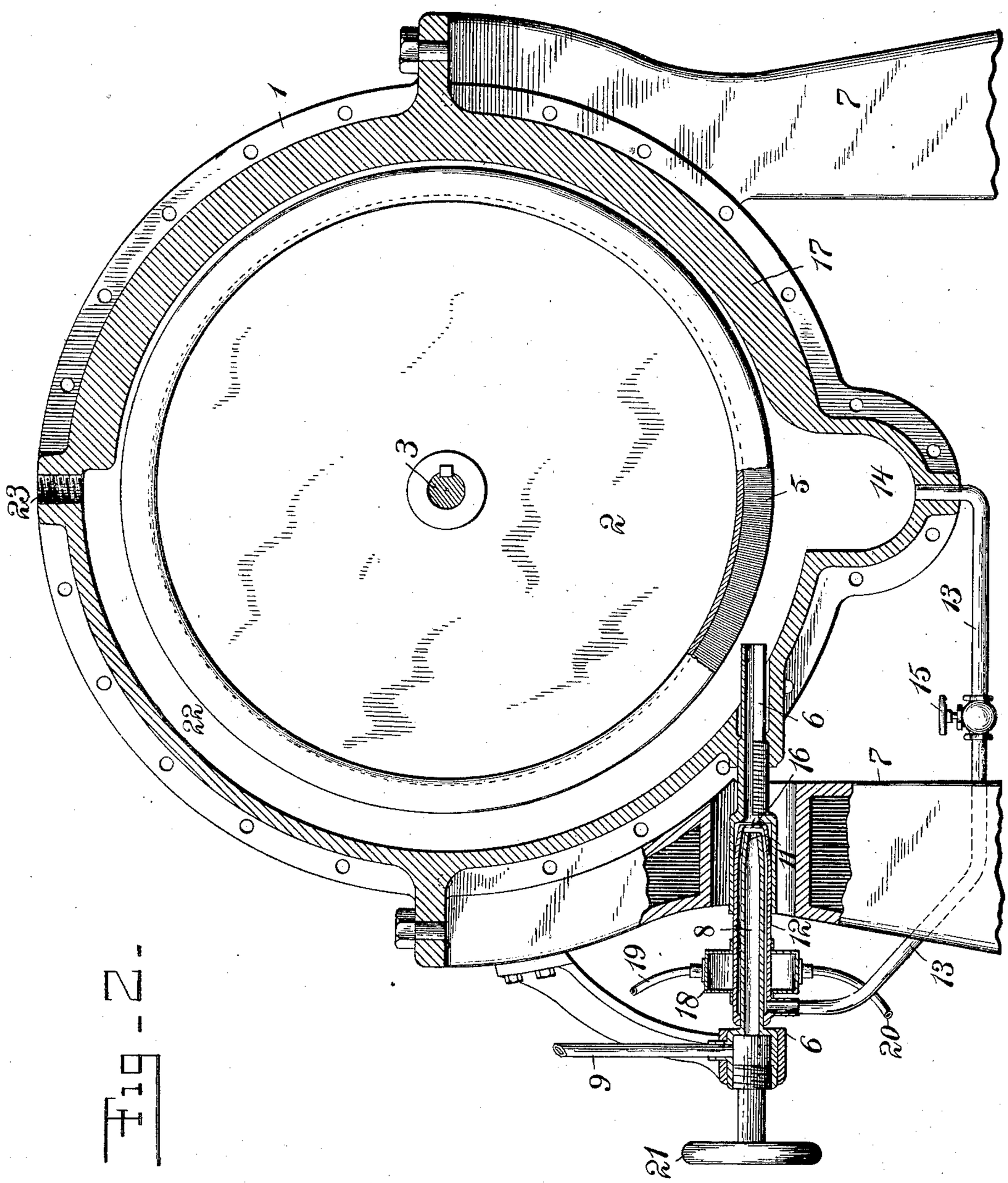

FIG. 2.

WITNESSES:

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NO MODEL. 3 SHEETS—SHEET 3.

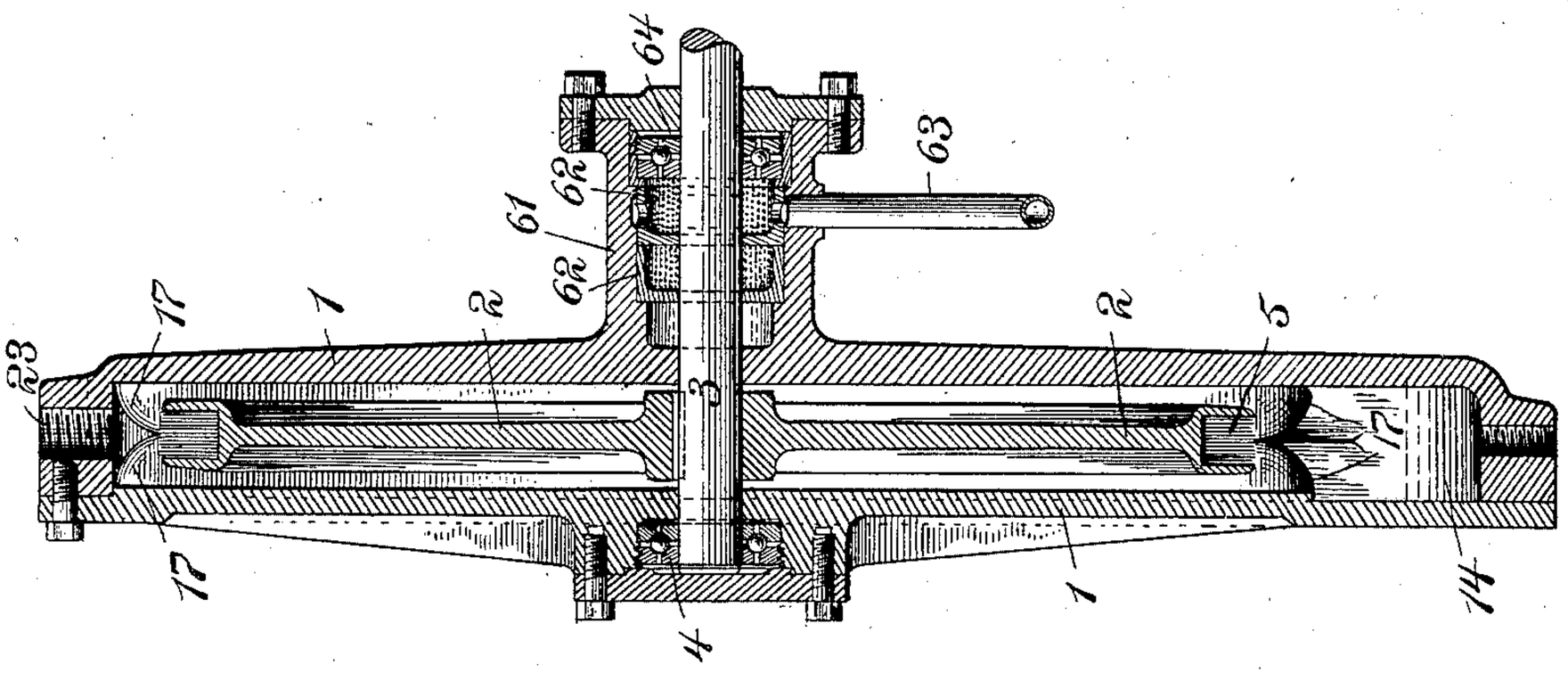
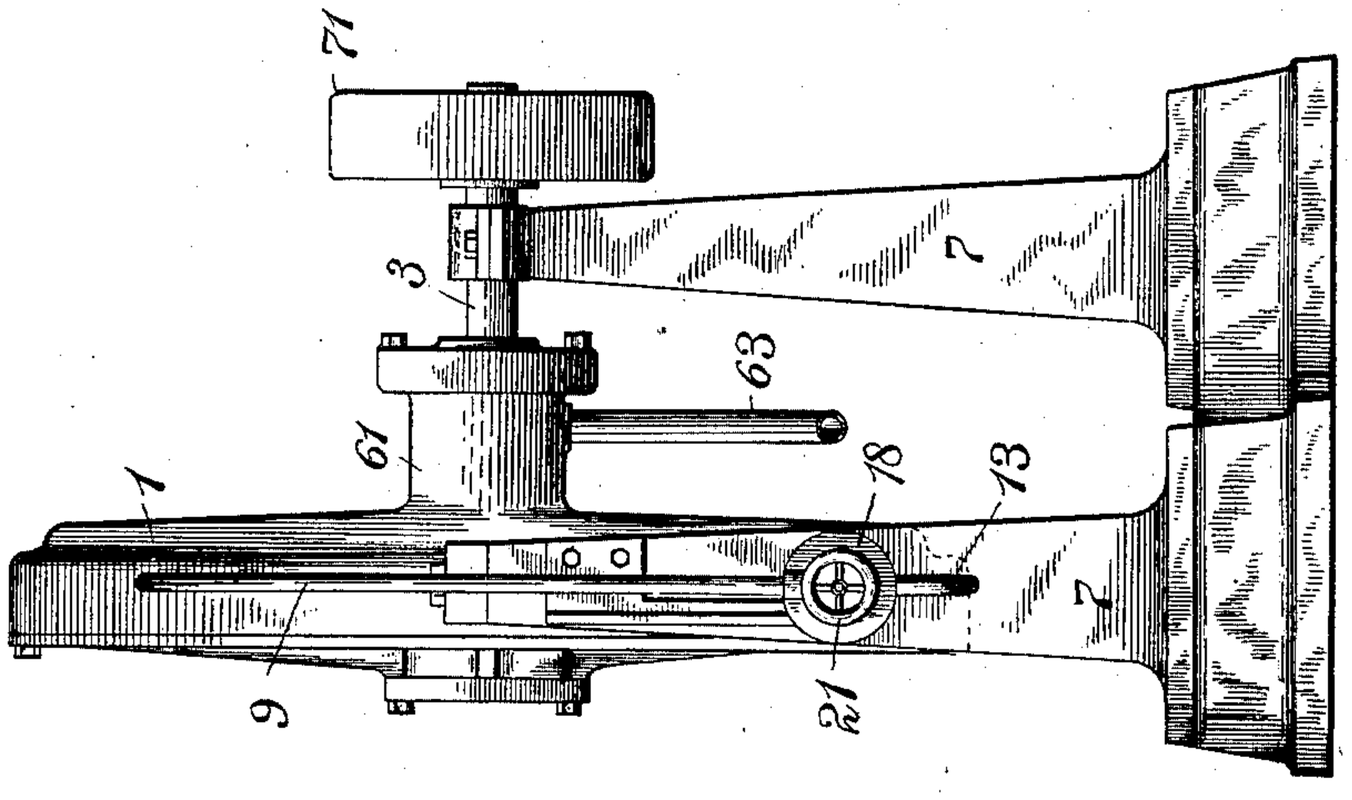


FIG. 4.



WITNESSES:

Edwin Segar

Sidney Mann

INVENTOR

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No. 729,178. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

ERNEST HUBER, OF NEW YORK, N. Y., ASSIGNOR OF FOUR-FIFTHS TO MYRON C. WICK, OF YOUNGSTOWN, OHIO, AND S. V. HUBER, OF PITTSBURG, PENNSYLVANIA.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 729,178, dated May 26, 1903.

Application filed June 26, 1899. Serial No. 721,825. (No model.)

To all whom it may concern:

Be it known that I, ERNEST HUBER, a citizen of the Republic of Switzerland, and a resident of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Motors, of which the following is a specification.

My invention relates to motors.

It has for its object to reduce the speed of motors without diminishing the amount of work done by them, and particularly of motors in which motion is imparted to a rotary wheel by a jet or stream of vapor or gas impinging upon projections of the peripheries of such wheels; also, to reduce and conserve the amount of material employed in the running of motors; also, to simplify and make more compact and efficient the running parts of motors; also, to provide new and improved means for regulating their speed; also, to prevent the escape or leakage of gas or vapor; also, to provide improved and more efficient surfaces upon the peripheries of rotary wheels against which streams or jets of gas or liquid are to impinge and surfaces less likely to retain or hold the impinging substances; also, to provide improved means for deflecting liquid thrown upon the projections of rotary wheels after its work is done in order to prevent the retardation of the revolution of the wheel; also, to provide new and improved injectors for motors.

In the drawings accompanying this specification, which form a part hereof and in which similar reference characters in the different figures represent corresponding parts, I have shown and will now proceed to describe the preferred form or embodiment of my invention.

Figure 1 is a view of a machine embodying my invention. Fig. 2 is a vertical longitudinal section through the casing of the rotary wheel, showing the wheel partly in section and also showing part of the injector in section. Fig. 3 is an end elevation of the casing. Fig. 4 is a vertical cross-section through the middle of same.

Referring now to the specific form or embodiment of my invention shown in the drawings, 1 is a gas-tight casing containing a rotary wheel 2, mounted therein upon a shaft 3, one end of the shaft being mounted in ball-bearings 4 inside of the casing and the other end of the shaft projecting through the casing for imparting motion from the wheel to any desired mechanism. The wheel is provided with projections against which a jet or stream of gas or liquid, or both combined, is adapted to impinge, as will be presently described, to revolve the rotary wheel and rotate its shaft. These projections I preferably make in the form of metallic bristles 5, radially arranged and secured in the periphery of rotary wheel 2. These bristles may be made of any suitable material, may be secured in place in any suitable manner, and may project at any desired angle. I prefer, however, to arrange them radially, as shown, and to make them of steel. As shown in the drawings, these bristles are arranged in a circular trough provided with side walls forming the periphery of the wheel and are secured to the wheel at the bottom of the trough in any suitable manner (not shown) and project radially outward. In this preferred form of construction the side walls aid in maintaining the bristles in their proper position. The rotary wheel provided with bristles is not claimed in this application, as it is intended to make it the subject-matter of another application.

6 is an injector arranged in framework 7 of the motor with its nozzle projecting through the casing and arranged so as to throw a jet of gas and liquid upon the projections of the rotary wheel to impart motion to the latter. I supply a suitable gas under pressure and also a suitable liquid to the injector in such a manner that the gas in its flow will take up a portion of the liquid and bear it against the projections of the wheel. In this way the motor will be driven at a slower rate of speed than if the gas alone were employed. Any suitable gas may be employed, and any suitable liquid may be employed which is not capable of absorbing said gas or of being acted upon thereby. I prefer, however, to use a gas which can be readily condensed or liquefied and can be readily evaporated, as thereby pressure of the gas can be easily and read-

ily restored, and the gas can be led back to the point where it takes up the liquid and is thrown against the wheel. By these means both the liquid and the gas move in a substantially endless cycle, and the amount of liquid and gas in the motor remains at all times substantially the same and needs substantially no replenishing. In practice I find that ether and mercury give excellent results. Only a small amount of either need be employed. The ether is easily liquefied and evaporated, and it moves in its cycle with great speed. The mercury is especially serviceable in view of the great weight and comparatively small masses. It therefore enables me to greatly reduce the speed of rotation.

I will now proceed to describe the means by which the ether or other gas takes up the mercury or other liquid and bears it against the projections of the wheel and the means for circulating the ether or other gas and the mercury or other liquid in a substantially endless cycle. The first part of this work is performed by the injector 6. In its preferred form this injector has an inner tube 8, connected by pipe 9 with a supply of ether-gas, in this case still 10. Tube 8 has a mouth 11 for the passage of the gas into the nozzle of the injector. The injector has an outer tube 12, as shown, encircling inner tube 8, with an intervening space between the two tubes, as shown in Fig. 2. Tube 12 is connected by pipe 13 with a supply of mercury or other liquid. As shown, this consists of reservoir 14 in the lower part of casing 1. A valve 15 on pipe 13 enables the operator to regulate the amount of flow of the mercury, thus regulating the speed at which the motor is driven. Outer tube 12 is provided with a mouth 16 slightly in advance of the mouth of tube 8. As the gas flows with great rapidity out of mouth 11 of tube 8 into the nozzle of the injector, it takes up and bears with it mercury in the outer tube 12, carrying it along in its flow and bearing it against the projections of the wheel. The mercury thus borne along retards the flow of the gas, while not diminishing the momentum of the mass, and this effects a slower rotation of wheel 2 without diminishing the amount of work done. When the particles of mercury have expended their momentum upon the projections of the wheel, they drop down into the bottom of the casing and flow into reservoir 14 or are thrown against a deflector 17, arranged in the chamber of the rotary wheel outside of and near to the periphery of the latter. This deflector is provided with sides which slope away from the periphery of the rotary wheel toward the sides of the chamber, as shown in Fig. 4, thus guiding the mercury thrown from the bristles of the wheel to prevent it from falling back upon the bristles, and thus retarding the rotation of the wheel. I find in practice that metallic bristles of the kind shown and described herein give excellent results, as they form a practically continuous resisting surface and one which does not tend to injuriously hold or retain the mercury. From reservoir 14 the mercury passes back through pipe 13 to the point where the gas takes it up to bear it against the projections of the wheel. This flow of the mercury is assisted by the partial vacuum created in the outer tube by the action of the flow of the gas, as above described. Thus the mercury moves in a substantially endless cycle and its amount remains all the time substantially the same and needs substantially no replenishing.

In order to prevent any injurious results in case any of the gas should work backward into outer tube 12, I preferably place a cooling-jacket 18 adjacent to outer tube 12 for liquefying any ether that may find its way back into such tube. As shown, this cooling-jacket is arranged to surround a part of tube 12. The jacket is provided with a supply-pipe 19 and a discharge-pipe 20 for supplying and discharging any cooling agent, such as cold water.

21 is a hand-wheel for a valve for controlling the supply of gas to tube 8.

Any suitable means for condensing or liquefying the ether and for then vaporizing it to restore its pressure may be employed.

After the ether has done its work upon the rotary wheel it passes to the top of the chamber 22 of the rotary wheel inside of casing 1 and escapes through the opening 23 of pipe 24 to a condenser 25. Any form of condenser suitable for the purpose may be employed. The details of the mechanism of the condenser forming no part of my invention are therefore not shown or described. The liquid ether then passes through pipes 26, 27, and 28 into a still 10, where the liquid ether is evaporated, whence it passes through pipe 9 to injector 6, as above described. Any suitable still and any suitable means for regulating the admission of the liquid ether into the still and any suitable means for heating the still may be employed. I prefer, however, to use devices which will heat the ether or other liquid so that its temperature cannot rise to a dangerous point and also to automatically regulate the flow of liquid ether into the still, so as to automatically maintain the level of liquid ether in the still always within certain predetermined limits.

The still for evaporating ether and the means for automatically regulating the supply of liquid ether thereto are not claimed in the present application. They form a basis for another application divisional hereof.

51 is a pipe for supplying a suitable cooling agent—as, for example, cold water—to the cooling-jacket 18 and condenser 25, pipe 19 having a valve 52 leading to jacket 18 and another branch pipe 53 leading from pipe 51 to condenser 25. Pipe 54 leads the spent cooling agent from the condenser, and pipe 20 leads it from jacket 18 to a common passage-pipe 55.

Any suitable means may be employed for

heating the still. I have shown a burner 56 of any suitable form for this purpose. I also preferably provide a suitable governor for controlling the supply of fuel to the burner. This governor may be of any well-known construction—such, for instance, as a spiral manometer governing a lever 57, connected by rod 58 with a valve-rod 59—permitting more or less fuel to the burner, according to the temperature.

60 is an ordinary dial connected to the governor to indicate the pressure.

As one end of shaft 3 passes through the casing, I prefer to place a seal surrounding the shaft as it emerges from the casing in order to prevent leakage or escape of gas from the casing. Any suitable seal may be used for this purpose. I prefer, however, to use an amalgam seal, preferably of the form shown in Fig. 4. In this form of seal 61 is a jacket surrounding shaft 3, immediately outside of the casing. As shown, it is an extension of the casing. Inside of the jacket I preferably place a plurality of sleeves containing the amalgam seal. I have shown two such sleeves 62 62, each shaped like a pan and containing in their interior any suitable amalgam. These sleeves are constructed so that they do not interfere with the revolution of the shaft. Surrounding one of them I place a groove in the interior of the jacket 61 and lead from this groove a pipe 63, which runs to the condenser, thus leading back to the condenser any gas that may escape from the casing. 64 are ball-bearings for the shaft, mounted in jacket 61. By the above means the escape of gas from the casing is substantially prevented, and any gas that does escape is led back to the condenser.

By means of my improvement the speed of motors can be greatly reduced without diminishing the amount of work done by such motors. A very small amount of material is needed for the running of such motors, and such material needs practically no replenishing. By means of my improvement motors can be made which are much more simple and compact in construction and more efficient in operation.

Many modifications and changes may be made in and from the devices shown in the drawings herein without departing from my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a motor the combination of a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if gas alone were employed.

2. In a motor the combination of a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if gas alone were employed, a reservoir for the liquid so arranged that when the momentum of the liquid has been exhausted the liquid will flow into the reservoir, and means for causing the liquid to flow back to the point where the gas takes it up to bear it along with it to again aid in driving the motor, whereby the liquid moves in a substantially endless cycle and the amount of liquid in the motor remains at all times substantially the same and needs substantially no replenishing.

3. In a motor the combination of a gas-tight casing, a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if gas alone were employed, means for leading the gas away from the power-chamber of the motor, and means for restoring the pressure of the gas and leading it back to the point where it takes up the liquid, whereby the gas moves in a substantially endless cycle and the amount of gas in the motor remains at all times substantially the same and needs substantially no replenishing.

4. In a motor the combination of a gas-tight casing, a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if gas alone were employed, a reservoir for the liquid so arranged that when the momentum of the liquid has been exhausted the liquid will flow into the reservoir, and means for causing the liquid to flow back to the point where the gas takes it up to bear it along with it to again aid in driving the motor, means for leading the gas away from the power-chamber of the motor, and means for restoring the pressure of the gas and leading it back to the point where it takes up the liquid, whereby the liquid and gas each move in a substantially endless cycle and the amount of liquid and gas in the motor remains at all times substantially the same and needs substantially no replenishing.

5. In a motor the combination of a gas-tight casing, a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to

take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate of speed than if gas alone were employed, means for leading the gas away from the power-chamber of the motor to a condenser, means for liquefying the gas therein, a pipe for leading the liquefied gas to a boiler, means for heating the same to volatilize the liquefied gas and create a pressure therein and a pipe for leading it back to the point where it takes up the liquid and is thrown to drive the motor, whereby the gas moves in a substantially endless cycle and the amount of gas in the motor remains at all times substantially the same and needs substantially no replenishing and whereby the gas is constantly kept under pressure.

6. In a motor the combination of a supply of ether-gas under pressure, means for throwing it so as to drive the motor, a supply of liquid not capable of absorbing said ether-gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if ether-gas alone were employed.

7. In a motor the combination of a supply of gas under pressure, means for throwing it so as to drive the motor, a supply of mercury not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the mercury and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if gas alone were employed.

8. In a motor the combination of a supply of ether-gas under pressure, means for throwing it so as to drive the motor, a supply of mercury and means for causing the gas in its flow to take up a portion of the mercury and bear it along with it to aid in driving the motor, whereby the motor will be driven but at a slower rate than if ether-gas alone were employed.

9. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of ether-gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of mercury and means for causing the gas in its flow to take up a portion of the mercury and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if ether-gas alone were employed, a reservoir for the mercury so arranged that when the momentum of the mercury has been exhausted upon the projections of the wheel, the mercury will flow into the reservoir, and means for causing the mercury to flow back to the point where the gas takes it up to bear it again against the projections of the wheel, whereby the mercury moves in a substantially endless cycle and the amount of mercury in the motor remains at all times substantially the same and needs substantially no replenishing.

10. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of ether-gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of mercury and means for causing the gas in its flow to take up a portion of the mercury and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate of speed than if ether-gas alone were employed, means for leading the gas away from the chamber in which the rotary wheel revolves, and means for restoring the pressure of the gas and leading it back to the point where it takes up the mercury and is thrown against the wheel, whereby the ether-gas moves in a substantially endless cycle and the amount of gas in the motor remains at all times substantially the same and needs substantially no replenishing.

11. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of ether-gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of mercury and means for causing the gas in its flow to take up a portion of the mercury and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if ether-gas alone were employed, a reservoir for the mercury so arranged that when the momentum of the mercury has been exhausted upon the projections of the wheel, the mercury will flow into the reservoir, and means for causing the mercury to flow back to the point where the gas takes it up to bear it again against the projections of the wheel, means for leading the gas away from the chamber in which the rotary wheel revolves, and means for restoring the pressure of the gas and leading it back to the point where it takes up the mercury and is thrown against the wheel, whereby the mercury and gas each move in a substantially endless cycle and the amount of mercury and gas in the motor remains at all times substantially the same and needs substantially no replenishing.

12. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of gas under pressure, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, an injector consisting of a tube connected with the gas-supply and having a mouth for the discharge of the gas and another tube connected with the liquid-supply having a mouth in line with and slightly in advance of the mouth of the first-mentioned tube, whereby a jet of gas will be thrown against the projections of the wheel and in its flow will take up a portion of the liquid and bear it against the said projections to drive the motor at a slower rate than if the gas alone were employed.

13. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of gas under pressure, a supply of mercury, an injector consisting of a tube connected with the gas-supply and having a mouth for the discharge of the gas and another tube connected with the mercury-supply having a mouth in line with and slightly in advance of the mouth of the first-mentioned tube, whereby a jet of gas will be thrown against the projections of the wheel and in its flow will take up a portion of the mercury and bear it against the said projections to drive the motor at a slower rate than if the gas alone were employed.

14. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and a deflector arranged in the chamber of the rotary wheel outside of and near to the periphery of the rotary wheel to guide to the sides of the chamber the liquid thrown from the projections of the wheel to prevent it from falling back upon the projections of the wheel.

15. In a motor the combination of a gas-tight casing, a rotary wheel mounted therein, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and a deflector arranged in the chamber of the rotary wheel outside of and near to the periphery of the rotary wheel, with sides sloping away from the said periphery toward the sides of the chamber, to guide to the sides of the chamber the liquid thrown from the projections of the wheel to prevent it from falling back upon the projections of the wheel.

16. In a motor the combination of a gas-tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the shaft projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and a seal surrounding said shaft outside of the casing, to prevent the escape of gas from the casing.

17. In a motor the combination of a gas-tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the shaft projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and an amalgam seal surrounding said shaft outside of the casing, to prevent the escape of gas from the casing.

18. In a motor the combination of a gas-tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the shaft projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, means for leading the gas away from the chamber in which the rotary wheel revolves, and means for restoring the pressure of the gas and leading it back to the point where it takes up the liquid and is thrown against the wheel, a seal surrounding said shaft outside of the casing to prevent the escape of gas from the casing, and a pipe leading from the seal to the means for restoring pressure to the gas for the return to the gas-supply of any gas that may have escaped from the casing.

19. In a motor the combination of a gas-tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the shaft projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and a jacket surrounding the shaft outside the casing, a sleeve mounted upon the shaft within the jacket and containing an amalgam seal to prevent the escape of gas from the casing.

20. In a motor the combination of a gas-

tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the shaft projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, and a jacket surrounding the shaft outside of the casing, a plurality of pan-shaped sleeves mounted upon the shaft within the jacket, and an amalgam seal in each sleeve to prevent the escape of gas from the casing.

21. In a motor the combination of a gas-tight casing, a rotary wheel therein, a shaft upon which the said wheel is mounted, one end of the jacket projecting through the casing for imparting motion from the wheel, projections from the wheel, a supply of gas under pressure, means for throwing a jet of the gas against the projections of the wheel, a supply of liquid not capable of absorbing said gas or of being acted upon thereby, and means for causing the gas in its flow to take up a portion of the liquid and bear it against the projections of the wheel, whereby the motor will be driven but at a slower rate than if gas alone were employed, means for leading the gas away from the chamber in which the rotary wheel revolves, and means for restoring the pressure of the gas and leading it back to the point where it takes up the liquid and is thrown against the wheel, a jacket surrounding the shaft outside of the casing, a plurality of pan-shaped sleeves mounted upon the shaft within the jacket, and an amalgam seal in each sleeve to prevent the escape of gas from the casing, a pipe leading from one of the seals to the means for restoring pressure to the gas for the return to the gas-supply of any gas that may have escaped from the casing.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNEST HUBER.

Witnesses:
SIDNEY MANN,
EDWIN SEGER.