G. MEYERSBERG.

EXPANSION MOTOR.

APPLICATION FILED OCT. 1, 1908.

923,680. Patented June 1, 1909.

Fig. 1

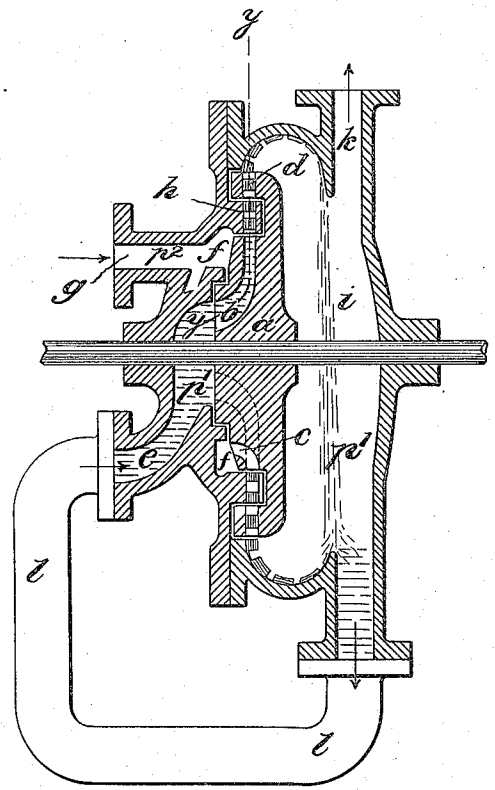
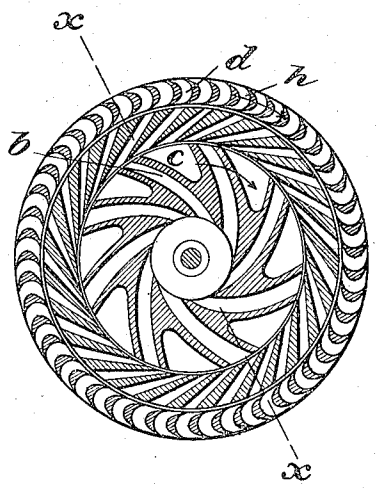


Fig. 2.



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UNITED STATES PATENT OFFICE.

GUSTAV MEYERSBERG, OF BERLIN, GERMANY.

EXPANSION-MOTOR.

No. 923,680. Specification of Letters Patent. Patented June 1, 1909.

Application filed October 1, 1908. Serial No. 455,734.

To all whom it may concern:

Be it known that I, GUSTAV MEYERSBERG, engineer, a subject of the Emperor of Austria, and a resident of Berlin, Barbarossastrasse 25, in the Empire of Germany, have invented certain new and useful Improvements in an Expansion-Motor, and do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of references marked thereon, which form a part of this specification.

It is already known to conduct a mixture of liquid and gas or steam from a high pressure chamber to a chamber of lower pressure, so that the gas which is carried along with the liquid expands and the energy of expansion thus set free serves for increasing the energy of the moving column of the mixture. By far the larger part of this energy is found at the end of the operation in the liquid while the gas only takes with it quite a small fraction of the energy. The apparatus with which this operation is carried out can be termed "a hydraulic expansion apparatus" or "a hydraulic expansor".

A liquid which has been furnished with energy in this manner can be employed for driving motors if it is allowed to act upon the movable portion of the motor (such as the turbine wheel or the like) and wholly or partly expend its energy thereon. The mixture of liquid and gas can be allowed to stream directly from the expansor upon the turbine wheel so that the liquid and gas can act upon it together. This method of operating a motor possesses the advantage over the direct action of a moving column of gas or vapor upon the turbine that a considerably lower speed of revolution and fewer stages are necessary. The liquid moves with the same amount of energy considerably more slowly than gas or vapor, so that a smaller peripheral speed of the turbine is necessary. A further advantage which is particularly noticeable in the use of gas turbines consists in the fact that it is not necessary to bring the hot gases of combustion into contact with the moving parts of the motor. It is true that the hot gases come into contact with the metal sides of the expansor but they only remain there for a very short time. Moreover the passage ways of the expansor are very considerably cooled by the constantly flowing liquid. The liquid after it has done work in the motor can be led back again to the expansor. It can be freed at one or more points in its circuit from the heat which it has acquired by coming into contact with the hot gases and the heated sides of the apparatus as well as by the loss of energy during its passage. The whole process can be carried out by cycles of the expansor being made to synchronize with the cycles of the motor or being independent of them.

The invention is illustrated in the accompanying drawings in which a turbine motor is shown by way of example.

Figure 1 is a section of the apparatus, and Fig. 2 is a section of a part thereof taken on the line y—y of Fig. 1.

The turbine wheel a is provided with two sets of passage ways. The inner set b and c enable the wheel a to be worked after the manner of a pressure pump, the outer set d making it act as an impulse turbine. Through the pipe e there streams water at a pressure p^1 which passes through the circular passages b and is thereby brought to the higher pressure p^2 which exists at the outer periphery of the passages b and in the space f—f. Between the passages b is a second series of passages c for the passage of the gassy medium. In the present instance it is assumed that steam is used which leaves the boiler at a pressure p^2 and passes through the pipe g to the annular chamber f—f. From this chamber it passes into the passages c, which open on one side toward f, and it passes through these passages between the streams of water leaving the passages b. The section shown in Fig. 1 is taken so that a passage for the water can be seen in the upper half of the wheel a and a passage for the steam in the lower half. From the passages b the water passes to a ring of fixed directing or guide passages h (the expansor). The dividing partitions of these passages are beveled at their inner edges and divide the streams of water into separate sections between which the steam coming from the passages c enters. The turbine wheel is surrounded by a chamber i in which there is a pressure p^1 which is lower than p^2. There consequently takes place in the passages h an expansion of the moving column of mixture from the pressure p^2 to the pressure p^1. The steam particles which are carried between the water particles expand and quicken the passage of the water particles. These latter now enter the

turbine passages *d* at an increased speed whence after doing work they reach the space *i*. The water and uncondensed steam here separate. The latter passes out through the passage *k* to the exhaust, or is led off into a condenser or for use in another cycle of operations. The water is led off through the pipe *l* and can be led back again for further use in the apparatus through the pipe *e*.

In Fig. 1 the pressure pump passages and the impulse turbine passages are both shown applied to a single wheel. It may however be found advantageous to form these two sets of passages in independent bodies. The essential feature is that the ring or segment of expansor passages should lie immediately between the two rotating sets of passages, so that they can serve simultaneously both as directing passages from the pressure pump passages and as nozzles for the impulse turbine passages. The passages *c* may also be replaced by an annular air space.

The direct connection of the two wheels, besides offering the advantages of reducing space, has the further purpose of reducing to a minimum the loss of energy in the passage from one wheel to another.

That, what I claim is:

1. In a motor driven by means of a moving column of fluid composed partly of a liquid and partly of gas or steam, a passage for the admittance of the liquid, a passage for the admittance of the gas or steam, a wheel portion adapted to rotate, a series of alternatively disposed gas and liquid passages in said wheel portion, and in communication respectively with said gas and liquid admittance passages, a series of directing passages arranged adjacent to the exits from the passages in the wheel portion and a series of passages also formed in a wheel portion of the motor adapted to rotate and arranged about the directing passages and adapted to receive the jets of mixed liquid and gas or steam which leave the directing passages, substantially as described.

2. In a motor driven by means of a moving column of fluid composed partly of a liquid and partly of gas or steam, a wheel portion adapted to rotate, a series of alternatively disposed gas and liquid passages in said wheel portion, and in communication respectively with said gas and liquid admittance passages, a series of directing passages in the wheel portion and a second series of passages formed in the said rotating wheel portion of the motor arranged about the directing passages and adapted to receive the jets of mixed liquid and gas or steam which leave the directing passages, the dividing walls of said directing passages being formed with beveled edges toward the exits from the liquid and gas or steam passages, substantially as described.

3. In a motor driven by means of a moving column of fluid composed partly of a liquid and partly of gas or steam, a passage for the admittance of the liquid, a passage for the admittance of the gas or steam, a wheel portion adapted to rotate, a series of alternatively disposed gas and liquid passages in said wheel portion, and in communication respectively with said gas and liquid admittance passages, a series of directing passages arranged adjacent to the exits from the passages in the wheel portion, a series of passages also formed in a wheel portion of the motor adapted to rotate and arranged about the directing passages and adapted to receive the jets of mixed liquid and gas or steam which leave the directing passages, and a chamber for the separation of the liquid and condensed steam or gas from the uncondensed steam or gas, substantially as described.

4. In a motor driven by means of a moving column of fluid composed partly of a liquid and partly of gas or steam, a passage for the admittance of the liquid, a passage for the admittance of the gas or steam, a wheel portion adapted to rotate, a series of alternatively disposed gas and liquid passages in said wheel portion, and in communication respectively with said gas and liquid admittance passages, a series of directing passages arranged adjacent to the exits from the passages in the wheel portion, a series of passages also formed in a wheel portion of the motor adapted to rotate and arranged about the directing passages and adapted to receive the jets of mixed liquid and gas or steam which leave the directing passages, a chamber for the separation of the liquid and condensed steam or gas from the uncondensed steam or gas, and a passage for returning the liquid and condensed steam or gas to be used again in the motor, substantially as described.

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

GUSTAV MEYERSBERG.

Witnesses:
WOLDEMAR HAUPT,
ARTHUR SCHROEDER.