

1,001,154.

Patented Aug. 22, 1911.

Fig. 2.

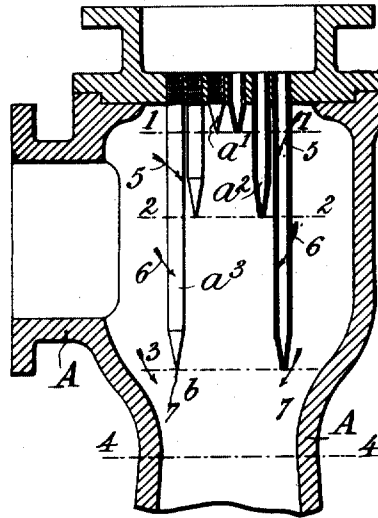
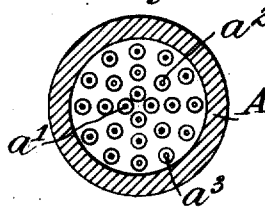


Fig. 1.



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MAURICE LEBLANC, OF PARIS, FRANCE, ASSIGNOR TO SOCIETE ANONYME POUR L'EXPLOITATION DES PROCEDES WESTINGHOUSE-LEBLANC, OF PARIS, FRANCE

JET APPARATUS.

1,001,154.

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Application filed March 31, 1910. Serial No. 552,502.

To all whom it may concern:

Be it known that I, MAURICE LEBLANC, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Jet Apparatus, of which the following is a specification.

This invention relates to an improvement in pumps and specially in apparatus of which the purpose is, to entrain any fluid by any another liquid projected at high speed so as to cause the fluid to pass from one receiver into another wherein the pressure is higher than in the first receiver.

My invention may employ water as a motive liquid, but it is not limited to water and may employ other motive liquids.

Apparatus of this kind may be regarded as composed of three parts. In the first, consisting of one or several nozzles, a high speed is communicated to the motive liquid. In the second, which may be called the mixer, the motive fluid entrains the second fluid by friction. In the third, which may be called the diffuser, the mixed fluids transform the kinetic energy into the work of compression.

The jet pump according to this invention is characterized by the particular arrangement of its nozzles and its mixer and this arrangement will be described with reference to the accompanying drawings.

Figure 1 is a cross section of the apparatus on line 4—4 of Fig. 2 which is a longitudinal section of the apparatus.

Since the entraining of one fluid by the other can only be due to friction, the motive fluid is projected through a considerable number of nozzles a^1 a^2 a^3 , of which the delivery orifices b are situated at the entrance of the diffuser A as shown in Fig. 1. This arrangement admits of developing as much as may be desired the surface of the motive stream, the friction with which is to serve the purpose in question. These nozzles a^1 , a^2 , a^3 are arranged so that their delivery orifices are uniformly distributed over the cross section of the entrance to the diffuser A (Fig. 1), in order that the fluid stream entering the diffuser may be as homogeneous as possible. But if the orifices of these motive nozzles were all on one plane the streams issuing from the nozzles of the outside zone would expand during the entraining of the other fluid in proportion as the

speed of the motive fluid is reduced by the friction; they would thus form a screen which would prevent the surrounding fluid from penetrating into the central portion of the mixer. Experience has shown that in such an arrangement all of the streams behave as a single stream the surface of which is channeled. The central streams have practically no entraining effect. In order to avoid this objection the nozzles are arranged in concentric zones in successive planes as represented in Fig. 2. In this figure it is supposed by way of example that there are 24 nozzles alike distributed on the circumferences of three concentric circles, namely, a circle of four nozzles a^1 , a circle of 8 nozzles a^2 and a circle of 12 nozzles a^3 . The apertures of such nozzles are situated in the planes 1—1, 2—2, 3—3 at different distances from the entrance to the diffuser, the plane 1—1, which contains the orifices of the central nozzles a^1 , is the farthest from the entrance to the diffuser. The plane 2—2, containing the orifices of the nozzles of the intermediate zone a^2 , is at an intermediate distance; while the plane 3—3, containing the orifices of the outside zone of nozzles a^3 , is the nearest to the entrance of the diffuser proper A which entrance may be said to be situated in the plane 4—4.

The fluid which is to be entrained by the motive streams issuing from the four central nozzles a^1 comes in contact with said streams by passing through the spaces between the other nozzles a^2 , a^3 , or the tubes carrying the nozzles as is indicated by arrows 5. The cross section of these spaces remains constant and cannot be obstructed by the spreading of the streams issuing from the nozzles of the two surrounding zones a^2 , a^3 . If the section of these spaces is sufficiently large for a fluid drawn in to traverse them at a low speed, this fluid comes into contact with the streams issuing from the central nozzles as if they alone existed. The distance between planes 1—1 and 2—2 should be such that these central streams on arriving at the plane 2 have entrained that mass of fluid which they are capable of entraining; and their action is not affected by the fact that the streams issuing from the intermediate zone of nozzles forms a screen around the first-named streams. The fluid to be entrained by the streams issuing from

the nozzles a' of the intermediate zone comes in contact with these streams after having passed through only the spaces of invariable section between the nozzles of the outside zone, following the course indicated by the arrows 6. When the motive fluid issuing from the nozzles of the intermediate zone arrives at plane 3—3 it has also entrained all the mass of fluid which it is capable of entraining and its action will not be affected by the fact that the surrounding fluid is prevented from flowing toward these streams. Finally the fluid to be entrained by the streams issuing from the nozzles of the outside zone comes into contact with these streams by flowing along paths, such as those represented by the arrows 7. Owing, therefore, to this particular arrangement of the mixer the fluid to be entrained comes into contact with the streams of the central zone as easily as with those of the outside zone. In this manner not only is the available surface for friction thoroughly used, but there is forwarded into the diffuser the resultant stream which is homogeneous and has very approximately the same speed at all points. This is an essential of good output of the diffuser.

In Figs. 1 and 2 there are twenty-four nozzles distributed in three concentric zones. It will be understood that this number has been selected merely as an example and that

the number of nozzles and of zones may be any that is desirable.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A jet apparatus provided with a number of jet nozzles distributed in concentric zones in successive planes in such a manner that the delivery orifices of the nozzles are farther from the entrance to the diffuser the nearer the axes of the nozzles are to the axis of the diffuser and through which the motive liquid is projected.

2. A jet apparatus having numerous motive liquid tubes provided with contracted orifices which are of various distances from the entrance to the diffuser, the orifice of the innermost tubes being the farthest therefrom and the distances between the orifices of the remaining tubes and the entrance to the diffuser diminishing toward the outermost tubes which have their orifices nearest said diffuser entrance.

In witness whereof I have hereunto signed my name this 16th day of March 1910, in the presence of two subscribing witnesses.

MAURICE LEBLANC.

Witnesses:

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