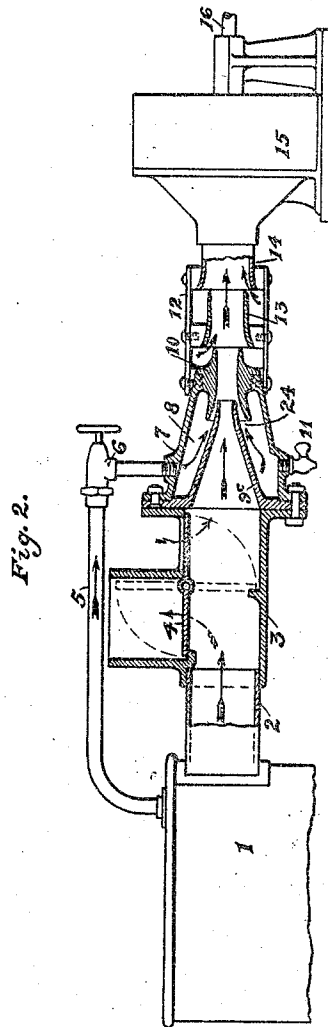
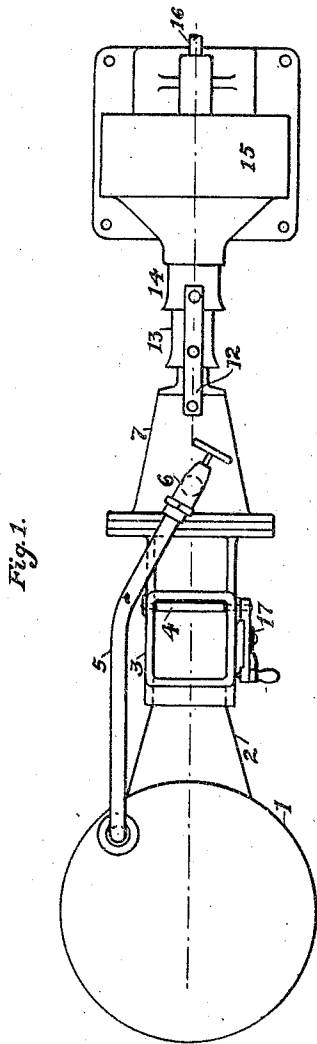


A. WILSTAM.  
MOTIVE POWER SYSTEM.  
APPLICATION FILED MAR. 1, 1909.

940,769.

Patented Nov. 23, 1909.

2 SHEETS-SHEET 1.



WITNESSES:

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INVENTOR

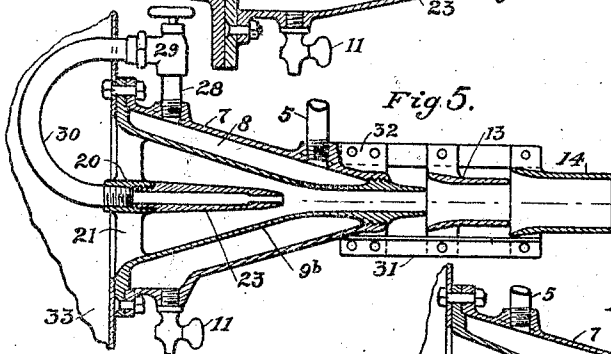
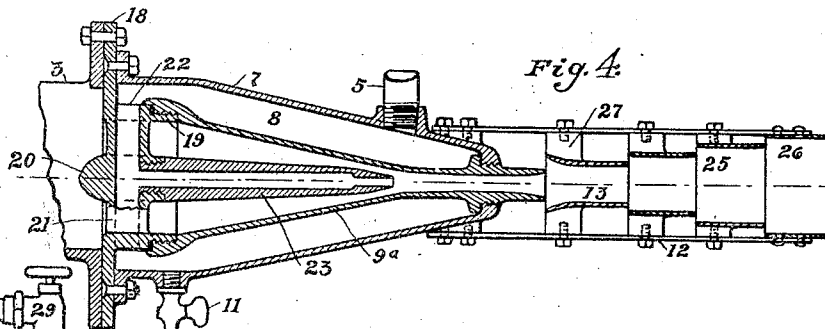
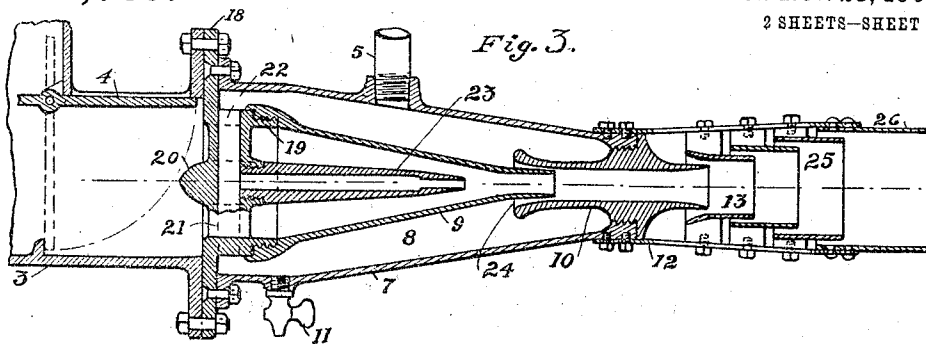
*A. Wilstam*

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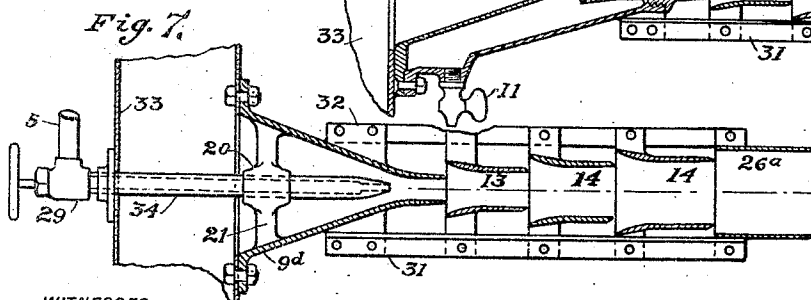
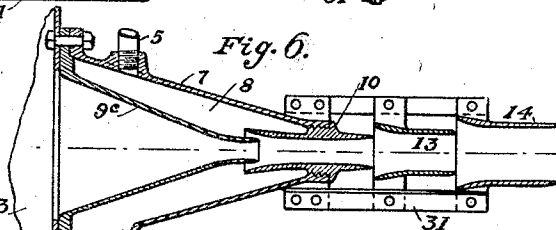
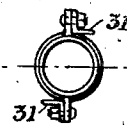
940,769.

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2 SHEETS—SHEET 2.



*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

ALFRED WILSTAM, OF LOS ANGELES, CALIFORNIA.

## MOTIVE-POWER SYSTEM.

940,769.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed March 1, 1909. Serial No. 480,718.

*To all whom it may concern:*

Be it known that I, ALFRED WILSTAM, a citizen of the United States, residing in the city and county of Los Angeles, State of California, have invented a new and Improved Motive-Power System, of which the following is a specification.

My invention relates to a motive power system using steam as the primary motive medium, into which the hot gases of combustion and atmospheric air may be combined, to add to the volume of the working medium.

The principal working action of this system may be briefly stated as follows:—Steam from a steam generator or boiler having a flue, is forced through a combining superheater and injector device, and takes up, through injective action, under high velocity, the hot gases of combustion coming from the steam generator, and forms with them a movable gaseous mass of high temperature and expansive qualities, which is then ejected through an injector battery, exposed to the open air, and there further expands and injects into the path of action a certain quantity of atmospheric air, until the desired final volume, temperature and velocity has been attained, when it discharges into the intake of a rotary motor of the turbine type, and through the same the kinetic energy of the issuing jet is converted into rotary motion and thus caused to produce useful work.

The invention consists in the combination and details of construction, hereinafter described and claimed, and illustrated in the accompanying drawings forming a part of this specification, in which—

Figure 1 is a top plan view and Fig. 2 a side elevation and part in section, showing the combinations of the general parts of my system, when applied to a horizontally driven motor. Figs. 3 to 8 are sectional views showing my invention in various combinations of the different elements constituting the superheater and injector device and the attachment and arrangement of injector battery.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawing.

Referring to the drawings, 1 designates a steam generator or boiler having a flue 2, carrying the hot gases of combustion, and to which a flue damper casing 3 is attached

having a damper 4, which may be operated by device 17 shown in Fig. 1. To the flue damper casing 3 is flanged and bolted as shown, an inner funnel shaped casing 9<sup>c</sup> terminating in a nozzle shaped opening; this part will hereinafter be referred to as the flue nozzle. To the flue nozzle 9<sup>c</sup> is attached, as shown, an outer casing 7, which, together with the flue nozzle 9<sup>c</sup>, forms an annular chamber 8 which hereinafter may be referred to as the superheater, and the outer casing 7 the superheater casing. A steam supply pipe 5, having a regulating valve 6, and leading from the steam generator, is connected to the superheater casing and the superheater is provided with a drain 11 fitted to the casing as shown in the different Figs. 2 to 6. To the terminating end of the superheater casing is connected an outer steam nozzle 10, substantially as shown in Figs. 2, 3 and 6, and forming with flue nozzle 9<sup>c</sup> a steam port 24. The superheater casing is further provided with lugs to which the supporting strips 12 are fastened as shown in Figs. 1 to 4. A slight modification of this fastening, being also a part of my invention, is to run these lugs out farther so as to form ribs 32 on the superheater casing 7 and fasten to them the supporting strips 31, as shown in Figs. 5 to 8. To the supporting strips 12 or supporting strips 31 are attached one or more outer nozzles 13, 14, 25 and 26, constituting what I prefer to call, and will hereinafter refer to, as the injector battery, and connected through its terminating nozzle to a turbine 15, having a driving shaft 16, substantially as shown in Figs. 1 to 2.

As stated above, Figs. 3 to 8 are sectional views showing my invention in various combinations of the different elements constituting the superheater, injector and the attachment and arrangement of injector battery. Fig. 3 illustrates the principal combinations of these parts and Figs. 4 to 8 slight modifications of that combination, all of which is a part of my invention.

Referring to Fig. 3 it will be seen that the flue nozzle is made up from the flanged portion 18 to which is connected the nozzle part 9, the flanged portion having armlike projections 21 extending inward and terminating in a central hub 20. These projections 21 have conduits 22 which communicate with an inner steam jet nozzle 23 connected to the central hub 20. The outer steam nozzle 10,

which is connected to the terminating end of superheater casing 7 and whose internal areas gradually diminish from the inlet end toward the middle, then gradually increasing to its outlet, and made purposely long to permit thorough mixing and expansion of the steam and hot combustion-gases passing through same, and which, in combination with nozzles 9 and 23, form a novel compound injector device. The first nozzle 13 in the injector battery has an outwardly diverging inlet, while the others 25 and 26 consist of straight concentric ring-sections arranged telescopically in tandem of successively increased capacities, so that each succeeding nozzle partly surrounds the preceding one.

In Fig. 4 the nozzle battery is shown made up of similar nozzles, but arranged slightly different, so that the discharge-end of each, ends ahead or in line with the receiving end of the succeeding one, and the combination as shown in Fig. 4 is further modified by lengthening flue nozzle 9 so as to take in the position held by outer steam nozzle 10, thereby forming an extended flue nozzle 9<sup>a</sup> and closing up the steam port 24.

Fig. 5 illustrates another form of my invention in combining the different parts. Here the discharge from the superheater to the centrally located steam jet nozzle 23 is accomplished through steam pipe connections 28 and 30 and regulating valve 29 as shown, and omitting conduit 22, and forming through the making of the flanged portion 18 and nozzle part 9<sup>a</sup> into one piece, the flue nozzle 9<sup>b</sup>. The nozzles in the battery are as shown arranged in tandem of successively increased capacities, whose respective internal areas gradually diminish from the inlet end toward the middle, then gradually increase slightly toward their outlets.

Fig. 6 is another modification of my invention in combining my parts in this device. Here, as seen from the drawing, the inner steam jet nozzle 23, with projection 21, is omitted and steam port 24 reopened as shown in Fig. 3, forming a slightly modified flue nozzle 9<sup>c</sup>.

Fig. 7 shows the last stage in my several combinations, omitting the superheating casing 7 and providing a flue nozzle with inwardly projected arms and a central hub similar to nozzle 9<sup>b</sup> and also ribs 32 forming thereby the flue nozzle 9<sup>d</sup> which may be connected to a flue pipe or conduit 33. And a central steam jet nozzle 34 is connected to a regulating valve 29 and supply pipe 5 substantially as shown in drawing.

In the operation of the system thus far described, the hot gaseous products of combustion, coming from the steam generator, have been referred to as drawn into and mixed with the steam and air and been thus made a part of the working medium, and the di-

rection of flow been that indicated by full line arrows, and with the position of damper as shown in Fig. 2. But when the damper 4, Fig. 2 is set to position indicated by dotted lines in that view, the gases will be directed as shown by dotted arrows, and only fresh air will enter into the system, and the principal working parts in the system then consist only of a steam generator, an injector device and a motor, and if the damper is set to any intermediate angle a certain amount of combustion gases and fresh air will be drawn into the system. This arrangement is also a part of my invention, and enables me to control the temperature of the gaseous mass, or working medium through the system.

In the foregoing specification, only such parts have been shown and described as are thought to be important and necessary for the complete understanding of my motive power system, but as the requirements imposed on the system as a whole will naturally vary, so may the detailed construction and arrangement vary, particularly so with the different nozzles in the injector battery, and I desire it to be understood that various departures may be made from the forms of detailed construction herein shown and described, without departing from the spirit of my invention.

Having thus described my invention, what I claim as new in a motive power system, of the class described, and desire to secure by Letters Patent, is:—

1. In a motive power system of the class described, the combination of a steam generator, a flue for conveying the gaseous products of combustion, and provided with a damper and a damper operating device, and having a flue gas discharge and an air inlet, a combined superheater and injector device connected to the flue, and said superheater having steam connection with the steam generator and means for discharging superheated steam into one or more nozzles of the injector, so as to create a flowing current of mixed flue gases and steam, an injector battery, exposed to the open air and consisting of a number of nozzles arranged in tandem of successively increasing capacities and adapted to inject atmospheric air into the path of the jet and expand the mixed aeriform fluid, and a turbine motor, into the intake of which said injector battery discharges for the purpose set forth substantially as described and shown.

2. In a motive power system of the class described, the combination of a steam generator, a flue, a flue nozzle and a superheater, said superheater consisting of an outer casing connected to a flanged portion of the flue nozzle and surrounding same, forming thereby a concentric space, constituting the superheater chamber, and having

a steam supply connection, a drain and means for discharge into the injector device, for the purpose set forth substantially as described and shown.

3. In a motive power system of the class described, the combination of a steam generator, a flue, a superheater and an injector, said injector consisting of an inner steam nozzle having a central aperture terminating in an outwardly diverging suitable jet opening, and communicating through a central hollow hub with the superheater, and arms in said hub within the flue, and an outer steam nozzle whose internal areas gradually diminish from its inlet toward the middle, then gradually increase to its outlet, which nozzle is connected to the terminating end of the superheater casing, and a flue nozzle connected to the flue and having its terminating end projecting within the receiving end of the outer steam nozzle, for the purpose set forth substantially as described and shown.

4. In a motive power system of the class described, the combination of a steam generator provided with a combustion chamber, a flue for conducting the gaseous products of combustion, said flue having a funnel-

shaped part terminating in a flue-nozzle, a steam superheater surrounding the terminating part of the flue whereby heat from the combustion gases in passing through the contracted end of the terminating flue conducts through the separating wall of the superheater into the superheater chamber, means for conducting steam from the steam generator to the superheater, one or more steam nozzles forming an injector battery, means for conducting steam from the superheater to said nozzle or nozzles, said nozzle or nozzles in combination with the flue-nozzle being so arranged that the issuing steam will act injectively on the combustion gases, and succeeding nozzles exposed to the open air, said succeeding nozzles consisting of a number of concentric ring-sections, all said nozzles being arranged in succession and being of successively increasing capacity so that each preceding one discharges into the one succeeding, for the purpose set forth substantially as described and shown.

ALFRED WILSTAM.

Witnesses:

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A. G. ANDERSON.