

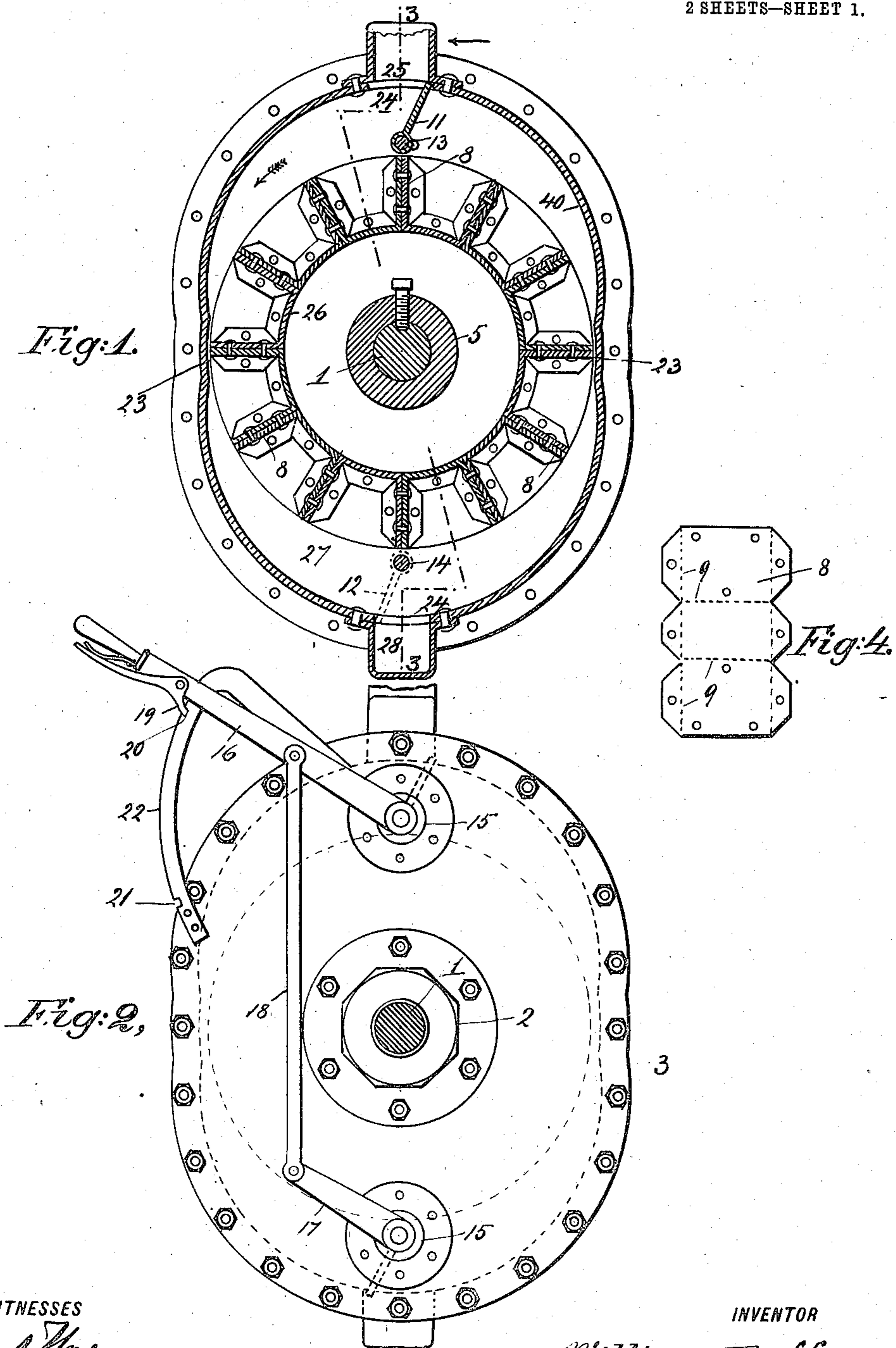
No. 848,127.

PATENTED MAR. 26, 1907.

W. RUFF.
COMBINATION TURBINE MOTOR AND MUFFLER.

APPLICATION FILED SEPT. 14, 1906.

2 SHEETS—SHEET 1.



WITNESSES
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BY

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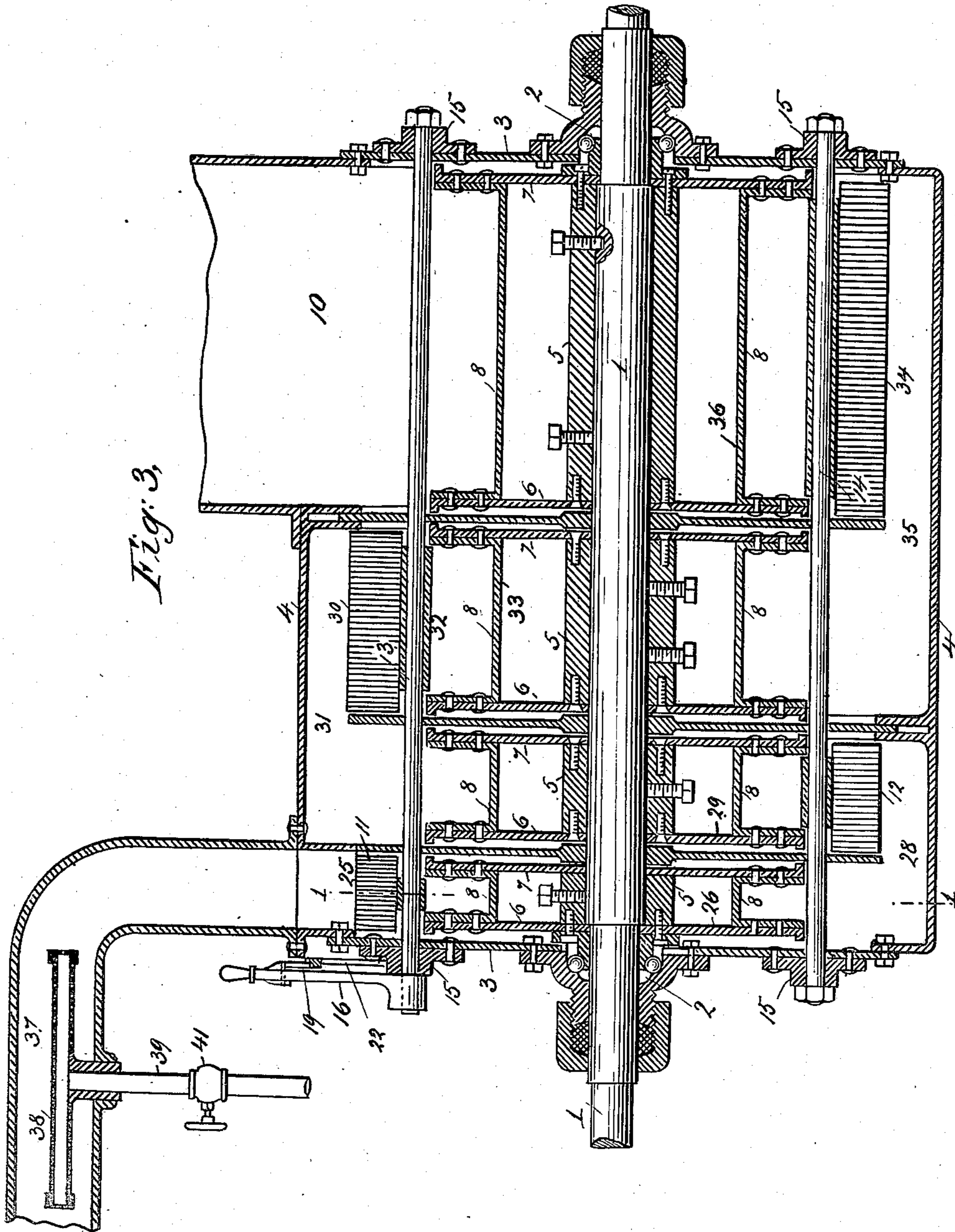
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UNITED STATES PATENT OFFICE.

WILLIAM RUFF, OF NEW YORK, N. Y.

COMBINATION TURBINE MOTOR AND MUFFLER.

No. 848,127.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed September 14, 1906. Serial No. 334,571.

To all whom it may concern:

Be it known that I, WILLIAM RUFF, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in a Combination Turbine Motor and Muffler, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to pressure-fluid engines, and particularly to an improvement in mufflers, which form a part thereof and which are applied to the exhaust-pipe of such pressure-fluid engines; and the object of my invention is to utilize a certain percentage of heat units contained in the exhaust-gases for motive purposes, another object being to employ part of the heat conducted by the exhaust-pipe for the purpose of raising steam and apply a mixture of such steam and exhaust-gases as a pressure fluid on a reversible expansion turbine-motor, which is inclosed within the muffler-casing, a further object being to provide in combination herewith an efficient muffler for the exhaust-gases of a pressure-fluid engine to which my invention is applied; and with these and other objects in view the invention consists in a combined turbine motor and muffler constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a vertical transverse section on the line 1 1 of Fig. 3. Fig. 2 is an outside end view of my device, illustrating the reversing-gear. Fig. 3 is a vertical longitudinal sectional view on the line 3 3 of Fig. 1, and Fig. 4 a detail view of one of the buckets attached to my device.

In my invention I unite the muffling features with a turbine set in motion by the combined action of steam and gas under pressure. The steam as an auxiliary motive power is generated within the exhaust-pipe of the pressure-fluid engine to which my device is attached and prior to entering a series of turbine-motors, which latter are placed within the casing of the muffling device.

The heat necessary to generate the steam is taken from the exhaust-gases of the main

engine, and the steam thus generated mingles with the exhaust-gases prior to entering the muffling device, and the mingled steam and gases are made to impinge against the blades of a turbine-motor, which latter is provided with a shaft running in bearings placed in the muffler-casing. The pressure fluid thus provided is conducted circumferentially to the blades of the turbine-motor in such manner so as to gradually expand into larger volumes, and in order to obtain a maximum of force-impelling power from the same gradually-enlarged conduits or passages and also gradually-enlarged impinging blade-surfaces are provided in order to properly attain as nearly as possible a complete transformation of heat units into power units from the gases prior to its atmospheric discharge.

As illustrated in the drawings, 1 is the auxiliary shaft mounted in ball, roller, or solid bearings 2, placed in the end plates 3 of the muffler-casing 4. Four sets of blades are shown keyed or otherwise fastened to the shaft 1, all of which travel in unison therewith. Each of these sets of blades are preferably composed of a central sleeve 5, circular side plates 6 and 7, and buckets 8, riveted to the side plates 6 and 7.

In Fig. 4 a detail view in detached form is shown of the bucket construction, which consists of a plate suitable to be bent at the dotted lines 9 into the form shown in Fig. 1 of the drawings and provided with rivet-holes for attachments thereto.

Each succeeding set of buckets is of double the width of the preceding one, but retains the same diametrical dimensions, whereby and in connection with the later-on described conduits leading from one set of buckets to the next adjoining one and at each one-half circuit revolution means are provided for a gradual expansion of the gases, which latter after leaving the last bucket-wheel can exhaust into the atmosphere at 10.

The turbine-motor, as shown in the drawings, is reversible, and the direction of the impinging gases is manipulated by means of the vanes 11 and 12, which are pivoted at 13 and 14, with their pivotal shafts extending longitudinally throughout the casing and running in bearings 15, placed on the outer end plates 3 of the muffler-casing. These vanes can be moved in unison with each other by means of the lever 16, fastened to the upper vane-shaft 13. A lever 17 is fas-

tened to the lower vane-shaft 14, and a connecting-rod 18 is pivoted both to the levers 16 and 17. A spring-pawl, 19 engages in notches 20 21 in the guide-rack 22, with the notches at each ultimate end at the stroke of the lever 16, whereby the vanes are secured and held in the desired position.

The different circular bucket-wheels rotate within an elliptical casing 40, the shorter diameter of this casing coinciding with the diameter of the bucket-wheel, as seen at 23 while the larger diameter of this casing provides the necessary spaces for the insertion of the vanes, as seen at 24.

The gases which are designed to enter the upper wheel-compartment at 25, as seen in Fig. 1, impinge against the buckets 8 of wheel 26, propel the same in the direction of the arrow, pass into the lower compartment 27 and partially expand therein, are deflected by the lower vane 12 from the conduit 28, enter the lower compartment of the wheel 29, pass upwardly into the upper compartment of this wheel-casing and are deflected by the vane 30 from the conduit 31 into the upper compartment 32 of wheel 33. The lower vane 34 with corresponding passage 35 leads the gases into the wheel 36 and outwardly into the atmosphere at 10. A reversal of this direction and a consequent reversal of the motor is effected by the above-described reversing-gear lever 16.

At any convenient place within the exhaust-pipe leading from the main pressure-fluid engine, as at 37, is introduced a water-spray tube 38, to which water is fed by means of pipe 39, provided with the usual water-gate 41. The hot gases introduced into the pipe 37 will effectively turn the water into steam, thereby enabling this device to make use at this point of part of the heat units to be supplied to the turbine-motor, as well as adding considerably to the volume of the gases to be entered therein. The watery gases thus obtained will also tend to lubricate the mechanism to some extent, as well as to guard against a burning out of the material of the turbine-motor. In order to utilize as much as possible all available heat units, I prefer to supply the spray-tube 38 with hot water taken at any convenient place from the water-jacket of the cooling apparatus usually employed in internal-combustion engines, to which my device is applicable. The power thus obtained by means of my combined motor and muffler and transferred to its power-shaft 1 can be made use of in any desired form, such as by connecting the same to the main power-shaft, and thereby increas-

ing its capacity and efficiency, or by an individual use of the same in attaching thereto a fly-wheel and pulley with belt connection, or by transferring the power by direct gearing connected with the auxiliary shaft 1.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A combined reversible expansion turbine motor and muffling device for pressure-fluid engines and operated by the exhaust from the same, having a steam-generating device placed within the exhaust-pipe of the pressure-fluid engine and whereby the combined gases thus generated can be introduced into a turbine-motor placed within the muffling-casing.

2. A combined reversible expansion turbine motor and muffling device for pressure-fluid engines, operated by means of the exhaust fluid entering the same from the exhaust-pipe of said pressure-fluid engine and having a turbine-motor set in motion by means of the direct impact obtained from the introduced exhaust fluid, the latter being a mixture composed of steam generated by means of the heat inherent in the exhaust fluid and the remaining exhaust fluid.

3. In a reversible expansion turbine motor and muffling device, a series of turbine-wheels fastened to one common shaft and provided with conduits or passages within the turbine-casing whereby the impelling fluid taken from the exhaust of a pressure-fluid engine is successively brought to bear against the blades of each of the turbine-wheels and acting expansively and successively in each one of the series of wheels.

4. In a reversible expansion turbine motor and muffling device, a series of circular turbine-wheels fastened to one common shaft and operating within an elliptical casing and provided with passages whereby the impelling forces from the exhaust of a pressure-fluid engine is actuated successively and expansively against the blades of each turbine-wheel and transferred from one wheel to the next adjoining wheel by means of said passages after the completion of a one-half circumferential circuit of the impelling-gases in each wheel.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 12th day of September, 1906.

WILLIAM RUFF.

Witnesses:

F. A. STEWART,
C. E. MULREANY.