

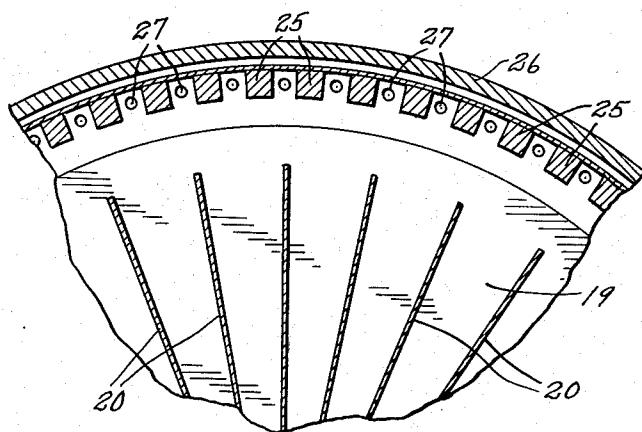
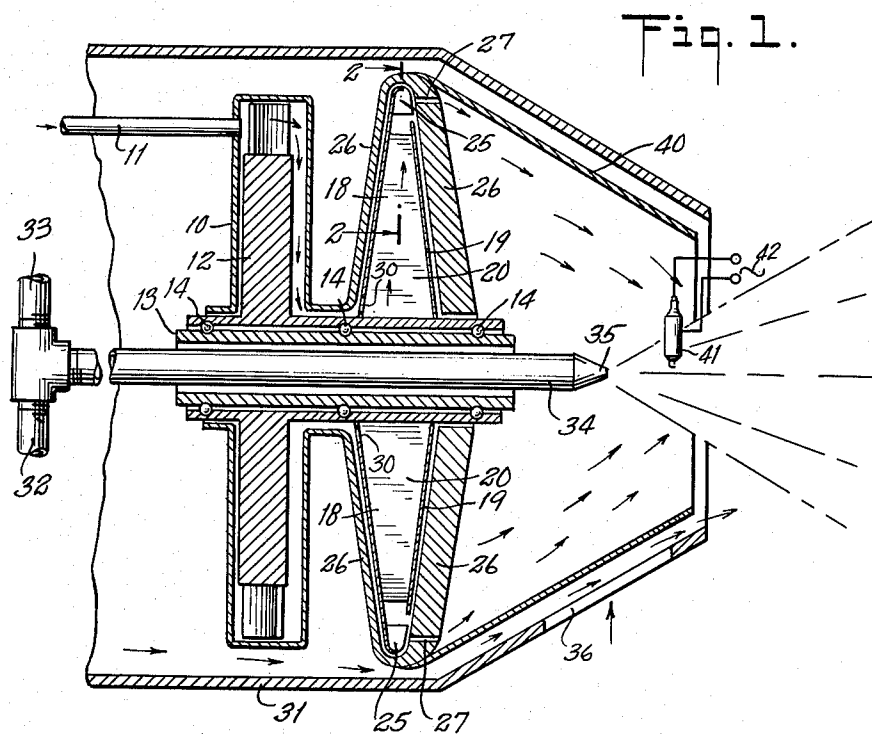
May 11, 1965

W. W. MOUNT

3,182,710

TURBINE DRIVEN SUPERSONIC INDUSTRIAL OIL BURNER

Filed Jan. 7, 1963



INVENTOR
WADSWORTH W. MOUNT
BY
ATTORNEY

1

2

3,182,710 TURBINE DRIVEN SUPERSONIC INDUSTRIAL OIL BURNER

Wadsworth W. Mount, Mountain Ave.,
Warren Township, Somerset County, N.J.
Filed Jan. 7, 1963, Ser. No. 249,727
2 Claims. (Cl. 158-77)

This invention relates to the production and utilization of high-frequency sound waves and has for one of its objects to provide an industrial oil burner in which the liquid fuel will be divided into extremely minute particles by the application of supersonic sound waves produced in an inaudible frequency range.

Another object of my invention is to utilize gas under pressure to operate a turbine motor which is used as a prime mover for turning the rotor of a supersonic generator at high speed and directing the high-frequency sound waves from the generator to the nozzle of a burner which is continuously supplied with liquid fuel such as oil.

Another object of my invention is to provide a supersonic generator having a rotor and a stator, a turbine motor for driving the rotor of the generator, means for supplying gas under high pressure to actuate the turbine motor, an exhaust connection to deliver exhaust gas from the turbine motor at comparatively high pressure to the supersonic generator, and means for directing the supersonic waves from the generator to the point of utilization.

The source of high pressure gas may be superheated steam or high pressure steam, but the inlet pressure must be such that the exhaust gas or steam is at pressure sufficient to actuate the supersonic generator.

Another object is to provide a supersonic generator which incorporates fan blades and acts like a centrifugal gas compressor whereby exhaust gas from the driving motor is compressed before it escapes through the small openings in the stator.

Other objects and advantages of the invention will be better understood by referring to the accompanying drawings and the following description of the best embodiment of the invention now known to me:

FIGURE 1 is a partially sectional elevation of an oil burner which embodies a supersonic generator and utilizes high-frequency sound waves to mistify the fuel at the nozzle of the burner.

FIGURE 2 is a partial end elevation of the supersonic generator of FIGURE 1 in which the outer casing is broken away to show the interior formation of the rotor of the generator.

Referring to the drawings, a turbine motor having a housing 10 and a rotor 12 is supplied with steam under suitable pressure through steam pipe 11. A rotor 12 of the turbine motor is mounted on a hollow shaft 13 preferably having ball bearings 14 or other low-friction bearings.

A supersonic rotor 18 is mounted on the same hollow shaft 13 and is securely fastened to the rotor 12 of the turbine motor. This rotor, as clearly shown in FIGURE 1, has a closing casing 19 and a plurality of radial fan blades 20, as clearly shown in FIGURE 2. The rotor 18 has a greater width along the shaft and tapers to a comparatively narrow width at the outer circumference. A plurality of inwardly extending teeth or blocks 25 are formed integrally with or attached to the casing 19 at the circumference.

The rotor 18 is surrounded by a stationary outer casing or housing 26 which, as indicated in FIGURE 1, is much thicker on the side in which small axial holes 27 are located.

The inner end of these holes is directly opposite the

teeth 25 of the rotor 18, the arrangement being such that when the rotor operates at high speed, the teeth or blocks 25 close and then suddenly open the holes 27. The clearance between the blocks and the housing is close, and the blocks are of sufficient size to cover the holes 27.

The thickness of the wall of the housing 26 through which the holes 27 penetrate is sufficiently great that the holes 27 have substantial length which is designed so that they act as small organ pipes in producing the sound waves of the desired characteristics.

A nozzle 34 of oil burner 31 extends through the hollow shaft 13 on which the rotor of the turbine motor and the supersonic rotor are mounted.

Oil is supplied through line 32 and steam is supplied through line 33. The steam supplied through line 33 is usually under high pressure, and the fuel oil and steam are discharged from the nozzle 34 at its outer end at the point designated 35. The supersonic rotor with its teeth or blocks 25 and the perforated housing cooperate, as the rotor is driven at high speed, to create supersonic sound waves. These waves are directed by frusto-conical housing 40 so that the waves are delivered at the point 35 where the oil and steam mixture emerges from the end of the nozzle. Thus the very high-frequency sound waves successfully break up the oil particles into such minute forms that the fuel oil and steam emerge in what may be described as a mist and combustion is initiated by an electric spark at spark plug 41 supplied with electric current from source 42.

It is not essential that the turbine be driven by steam under pressure as above described, and it may in fact be driven at high speed by compressed air or other gas. In this case the air or gas is introduced through the supply pipe 11 instead of steam.

In either case the exhaust from the turbine flows inwardly, as shown by the arrows, and enters the supersonic rotor through holes 30, where it is compressed so that a very high-frequency sound in the inaudible range is produced as the gaseous material is discharged through the holes 27 in the housing 26.

The fact that the rotor 18 is driven at extremely high speed, such as for example 20,000 r.p.m., makes the rotor with its blades 20 a very effective centrifugal pump which forces the steam, air or other gas under high compression into the spaces between the teeth or blocks 25, and as the teeth or blocks 25 uncover the inner ends of the holes 27, the air rushes out but because of the rotation of the teeth or blocks the flow is almost immediately chopped off, and it is this sudden opening and closing of the holes 27 which causes the very high-frequency sound waves to be produced.

As shown in FIGURE 2, the teeth or blocks 25 are equal in number to the holes 27, and they are circumferentially distributed equally in order that all of the holes 27 may be opened in one instant and all closed at the next instant, and so on, as the rotor continues to spin.

The pressure of the steam, air or gas at the outer end of the inner casing 19 is greatly enhanced by reason of the fact that this casing in cross section is tapered and is substantially smaller at its outer end than at its inner end.

The outer housing 26 fits closely over the inner casing with small clearances to avoid interference.

It will be understood that the mixture of steam and oil or of gas and oil as it emerges in the usual manner through the small discharge opening in the nozzle of the burner tends to break up into small particles, but these are very large in comparison with the particles which result from the application at the nozzle of the sound waves of supersonic frequency.

3

Air to support combustion near the burner nozzle may be introduced through the main housing 31 or through hole 36.

While the best known embodiment of the invention is illustrated and described herein, various modifications may be made without departing from the spirit of the invention, and only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A liquid fuel burner comprising a fuel nozzle, a rotor mounted coaxially of said fuel nozzle, a stationary annular plate having perforations about the periphery thereof and mounted coaxially of and adjacent to the rotor, means for rotating the rotor at high speed, means operably associated with the periphery of the rotor for discharging gas under pressure at predetermined intervals through the perforations in the perforated member to provide an annular source of sound waves of supersonic frequency, means for directing and concentrating the sound waves toward the axis of the fuel nozzle of the liquid fuel burner whereby the liquid fuel is broken up into minute particles.

2. A supersonic liquid fuel burner comprising a hollow shaft, a turbine motor comprising a first rotor and a first housing encasing said rotor mounted coaxial with the hollow shaft, means for supplying fluid under pressure to drive said turbine motor, a supersonic sound generator comprising a second rotor with radial blades thereon and a second housing encasing said second rotor, said rotor of the supersonic generator mounted coaxial with the hollow shaft adjacent to the rotor of the turbine motor, pas-

4

sage means to conduct the fluid from the first housing to a radially inner portion of the second housing, a fuel burner nozzle projecting axially through the hollow shaft adapted to discharge liquid fuel, holes in the second housing near a radially outer portion on the side furthest from the first housing, means on said second rotor to open and substantially close said holes when said second rotor is rotating, means for deflecting and concentrating the supersonic sound waves from the generator toward the burner nozzle whereby the liquid fuel is subdivided into a fine mist as it is discharged from the nozzle by the action of the supersonic sound waves, and means for igniting the fuel at the exit of the fuel nozzle.

References Cited by the Examiner

UNITED STATES PATENTS

2,514,129	7/50	Horsley et al.	116—137
2,715,384	8/55	Meng	116—137
2,730,067	1/56	Schauffler	116—137
3,023,802	3/62	Wilhelmsson et al.	158—77
3,090,422	5/63	Ducharme	158—77

FOREIGN PATENTS

1,155,524 12/57 France.

OTHER REFERENCES

Boucher: Chemical Engineering, McGraw-Hill, article from October 2, 1961 issue, pp. 83—100.

JAMES W. WESTHAVER, *Primary Examiner*.

MEYER PERLIN, CHARLES SUKALO, *Examiners*.