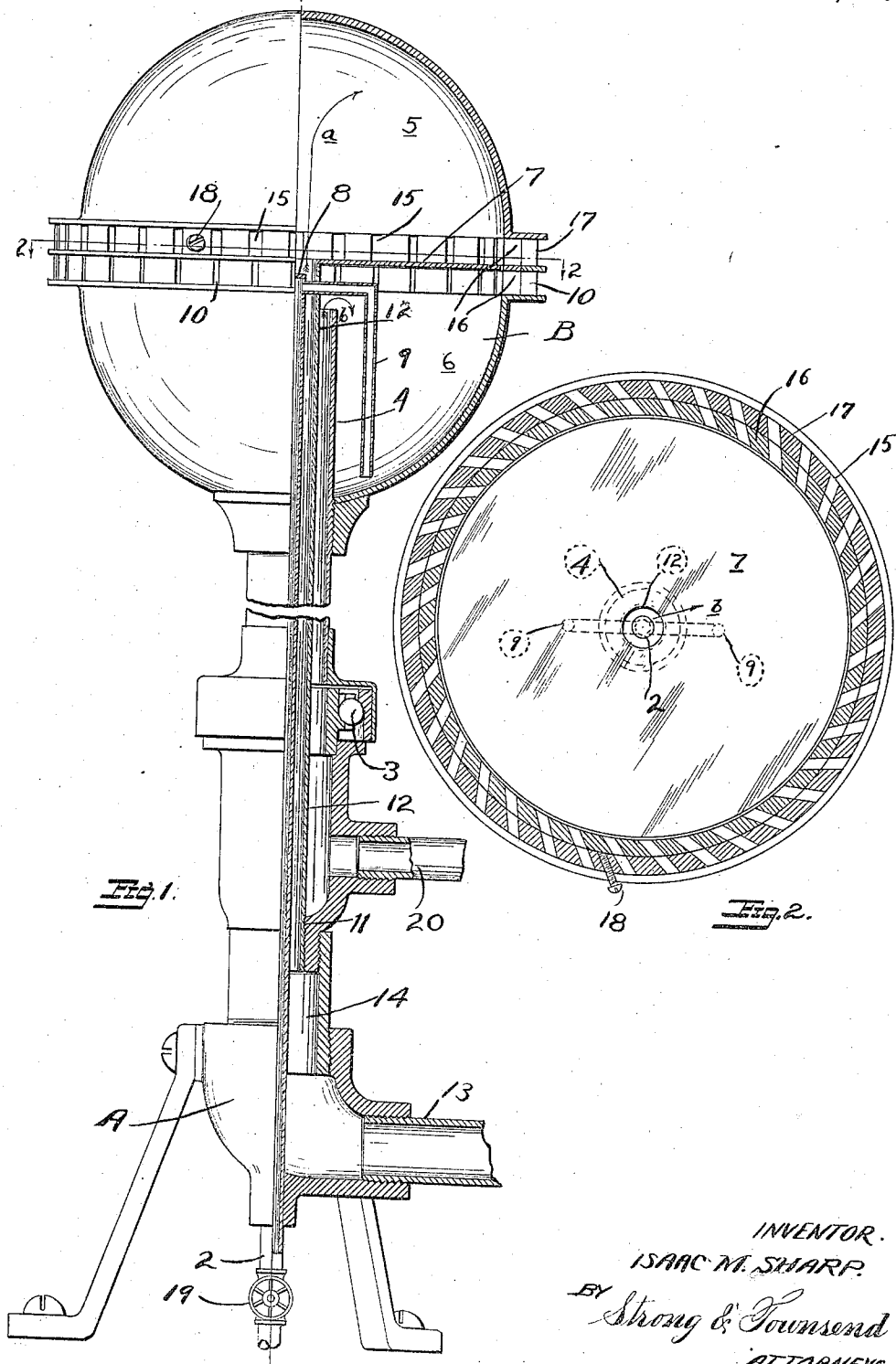


I. M. SHARP.
BURNER.

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ISAAC M. SHARP, OF SAN FRANCISCO, CALIFORNIA.

BURNER.

1,307,320.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ISAAC M. SHARP, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Burners, of which the following is a specification.

This invention relates to a burner, and particularly to a duplex atomizing cup of the rotary centrifugal type.

One of the objects of the present invention is to provide a simple and substantial atomizer of the rotary type by which a liquid fuel and a pulverized fuel may be injected and atomized by the combined action of centrifugal force and an air blast, and particularly to provide a novel form of atomizing cup to which both the liquid and the pulverized fuel may be separately delivered and simultaneously but separately atomized and ejected.

Another object of the invention is to provide means for delivering air to the atomizing cup and to discharge the air in such a manner that it will not only serve as a means for imparting a rotary movement to the cup, but will also serve as a means for atomizing the fuel.

Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings in which—

Figure 1 is a side elevation of the burner, half of which is shown in section.

Fig. 2 is a cross section on line 2—2, Fig. 1.

Referring to the drawings in detail, A indicates a base member of suitable construction through which extends an oil feeding pipe 2. Supported on the upper end of the base member is a ball thrust bearing 3, and supported by said bearing and guided thereby, is a hollow shaft 4, on which is secured a nozzle generally indicated at B. The nozzle is, in this instance, spherical in shape and is divided into two compartments 5 and 6 by means of a central stationary circular plate 7. The upper end of the oil delivering pipe 2 is closed as shown at 8, and it is provided with two distributing arms 9, which deliver the oil to the bottom of the lower half of the atomizer or to the compartment 6. The oil when delivered to the bottom of the cup is thrown outwardly by centrifugal force,

due to rotation of the atomizing cup, as will hereinafter be described, and is finally permitted to escape under the plate 7 through a series of angularly disposed vein openings 10. Also secured within the base member and in the upper portion thereof as shown at 11 is a stationary pipe 12. This pipe has two functions, first, that of supporting the stationary plate 7, and, secondly, that of conveying air and pulverized fuel to the upper compartment 5 of the atomizing cup. The air and pulverized fuel, for instance, coal dust, is delivered to the base from any suitable source through a pipe 13. It then passes upwardly through a central passage 14 formed in the base and the pipe 12, and then enters the upper compartment of the atomizing cup as shown by arrow *a*. The air and dust are here thrown outwardly through a second series of vein openings as shown at 15 on a plane above the vein openings 10 previously described.

The atomizing cup is made in two halves which may be suitably secured together, but turnable with relation to each other to permit circumferential adjustment as will hereinafter be described. The lower half of the cup carries a vein ring such as shown at 16, in the lower half of which is formed the vein openings 10, and in the upper half of which is formed the vein openings 15. The upper half of the cup also carries a vein ring 17, in the upper half of which is formed the openings 15, and in the lower half of which is formed vein openings 10, the vein ring 17 being sufficiently large to telescope or fit exteriorly over the inner ring 16. The vein openings 15 are larger in area than the lower vein openings 10, this being due to the fact that the pulverized fuel is ejected therethrough. The lower vein openings merely serve as a discharge for the liquid fuel and a certain amount of air under pressure, which is delivered to the lower chamber 6. The size of the vein openings may, however, at any time be decreased by merely turning the upper half of the atomizing cup circumferentially. The decrease of the vein openings takes place the moment the vein openings in the outer ring move more or less out of register with the vein openings in the inner ring; practically any size opening can, therefore, be obtained, the atomizing cups when adjusted being secured by means of a set screw 18.

The liquid fuel such as oil and the like

is as previously described delivered to the lower half of the atomizing cup through the oil delivering pipe 2, and is then distributed by means of the arms 9, of which there are two, the oil being delivered to the pipe 2 by means of a pump, or by gravity, if desired, a valve 19 being provided for the purpose of regulating the flow. Air is also delivered to the lower chamber through a pipe 20, the air here delivered being supplied under pressure from any suitable source, as the air thus delivered is more or less relied upon to impart a rotary movement to the atomizing cup. Air under high velocity or low pressure when entering through pipe 20 passes upwardly through the hollow shaft 4 and exteriorly of the pipe 12 in the direction of arrow 6, the air thus delivered to the lower chamber discharges through the narrow vein openings 10, which are angularly disposed as shown in Fig. 2, sufficient velocity is thus obtained to produce a jet action, which is sufficient to rotate the atomizing cup at any speed desired, the speed obtained depending entirely upon the pressure or velocity of the air delivered. A centrifugal action is, in this manner, obtained, and any fuel delivered to the chambers 4 and 5, whether liquid or pulverized, will consequently distribute itself in a thin sheet over the inner walls of the atomizing cup, and will finally discharge through the vein openings 10 and 15. An ideal atomizing action is, in this manner, obtained which is further assisted by the air blast, which is simultaneously discharged.

A perfect atomization and mixture of the fuel with the air is further obtained, and high temperatures and even distribution of heat is the result.

A burner constructed as here shown is capable not only of burning a liquid fuel such as crude oil, gasoline, distillate or the like, but it is also capable of handling any pulverized fuel such as coal, coke, sawdust and the like. For instance, in starting up the furnace when cold it may be desirable to burn a greater quantity of oil and a small quantity of pulverized fuel, while after the furnace has been heated to a certain degree it may be desired to increase the amount of pulverized fuel, and to decrease, and possibly entirely shut off the oil fuel, this being due to the fact that they are handled entirely separately and atomized and injected independent of each other. Waste fuels, particularly of a pulverized nature, may, in this manner, be successfully and economically handled, hence more efficiency and a comparatively great saving in fuel cost. The fuel delivery through the atomizing cup may at all times be regulated by valves or other means, thereby rendering it comparatively easy to regulate the fire from a maximum to a minimum. It is furthermore pos-

sible to more equally distribute the fire over the heating surface of the boiler, thereby not only protecting the same, but further improving the general efficiency of a boiler plant.

While a particular form of atomizing cup is here shown, and while rotation of the cup is obtained by air jet action, I wish it understood that the shape of the cup may be varied to suit varying fuels and conditions, and that a mechanical drive may be employed for rotating the same if desired. Similarly that the materials and finish of the several parts forming the structure may be such as the experience and judgment of the manufacturer may dictate.

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

1. A burner comprising a rotary atomizer, means for simultaneously delivering liquid fuel and a pulverized fuel thereto, and means for atomizing and injecting said fuels separately.

2. In a burner a rotary atomizer divided into two compartments, means for delivering liquid fuel to one compartment, means for delivering a pulverized fuel to the second compartment, and means for ejecting and atomizing said fuels separately.

3. In a burner a rotary atomizer divided into two compartments, means for delivering liquid fuel to one compartment, means for delivering a pulverized fuel to the second compartment, means for ejecting and atomizing said fuels separately, means for delivering air to each compartment, and means for utilizing said air for rotating the cup and for atomizing the fuel.

4. In a burner, an atomizing cup, a hollow shaft supporting said cup, an oil delivering pipe passing through said shaft to deliver oil to the lower half of the cup, a stationary pipe also passing through the hollow shaft, a circular plate secured on the upper end of said pipe dividing the atomizing cup into an upper and lower compartment, means for delivering air and a pulverized fuel to the upper compartment, and means for imparting a rotary movement to the cup to centrifugally eject the oil and the pulverized fuel.

5. In a burner, an atomizing cup, a hollow shaft supporting said cup, an oil delivering pipe passing through said shaft to deliver oil to the lower half of the cup, a stationary pipe also passing through the hollow shaft, a circular plate secured on the upper end of said pipe dividing the atomizing cup into an upper and lower compartment, means for delivering air and a pulverized fuel to the upper compartment, a plurality of angularly disposed vein openings formed in the upper and the lower half of the cup on each side of the stationary plate,

and means for delivering air to the lower compartment, said air when discharging through the angularly disposed vein openings imparting a rotary movement to the cup, and also assisting in atomizing the fuel.

6. A burner comprising a base member, a hollow shaft journaled in said base member, a duplex atomizing cup secured on said shaft, said duplex atomizing cup comprising a spherical shaped hollow cup, means dividing said cup into an upper and a lower compartment, a plurality of angularly disposed vein openings formed in the upper and lower half of the cup, means for delivering air and a liquid fuel to the lower half of the cup, and means for delivering air and a pulverized fuel to the upper half of the cup.

7. A burner comprising a base member, a hollow shaft journaled in said base member, a duplex atomizing cup secured on said shaft, said duplex atomizing cup comprising a spherical shaped hollow cup, a stationary pipe extending through the hollow shaft, a circular plate secured on the upper end of said pipe dividing the atomizing cup into an upper and lower compartment, an oil delivering pipe connecting with the lower compartment, and adapted to deliver oil thereto, means for delivering air under pressure to the lower compartment, means for delivering air and pulverized fuel to an upper compartment, and means carried by the

cup for rotating the same when air under pressure is discharged therethrough. 35

8. A burner comprising a base member, a hollow shaft journaled in said base member, a duplex atomizing cup secured on said shaft, said duplex atomizing cup comprising a spherical shaped hollow cup, a stationary pipe extending through the hollow shaft, a circular plate secured on the upper end of said pipe dividing the atomizing cup into an upper and lower compartment, an oil delivering pipe connecting with the lower compartment, and adapted to deliver oil thereto, means for delivering air under pressure to the lower compartment, means for delivering air and pulverized fuel to an upper compartment, and a plurality of angularly disposed vein openings formed in the cup communicating with the upper compartment and the lower compartment, said vein openings permitting the liquid fuel and the pulverized fuel to be separately discharged, and also permitting the air under pressure when discharging therethrough to impart a rotary movement to the cup and assists in atomizing the fuel. 40 45 50 55

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses. 60

ISAAC M. SHARP.

Witnesses:

W. W. HEALEY,
M. E. EWING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."