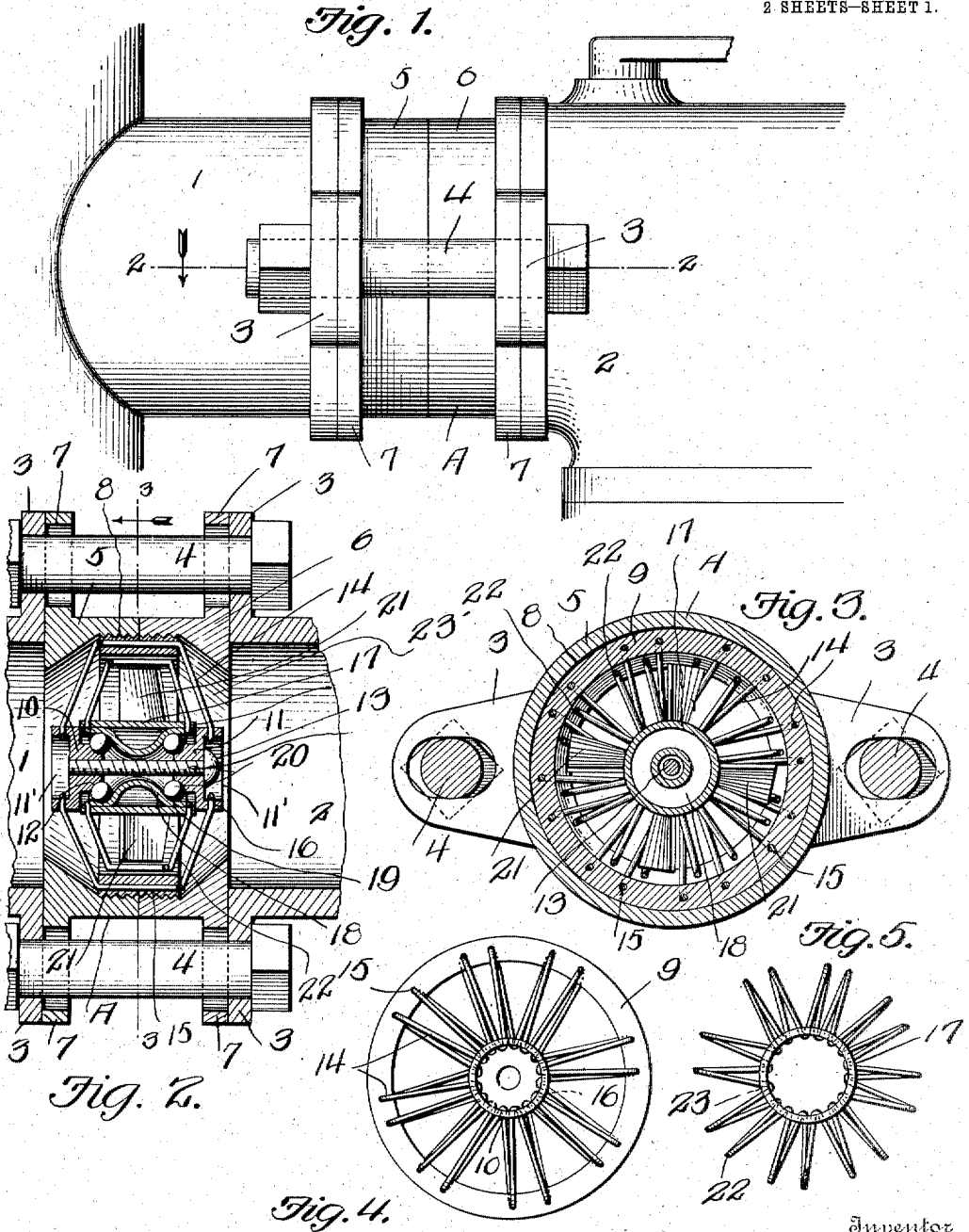


C. F. ERICKSON.
 AIR AND GAS MIXER FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED MAY 24, 1910.

986,151.

Patented Mar. 7, 1911.

2 SHEETS—SHEET 1.



Witnesses

Chas. C. Richardson.

C. C. Hines

Inventor
 Charles F. Erickson,

By *Victor J. Evans*

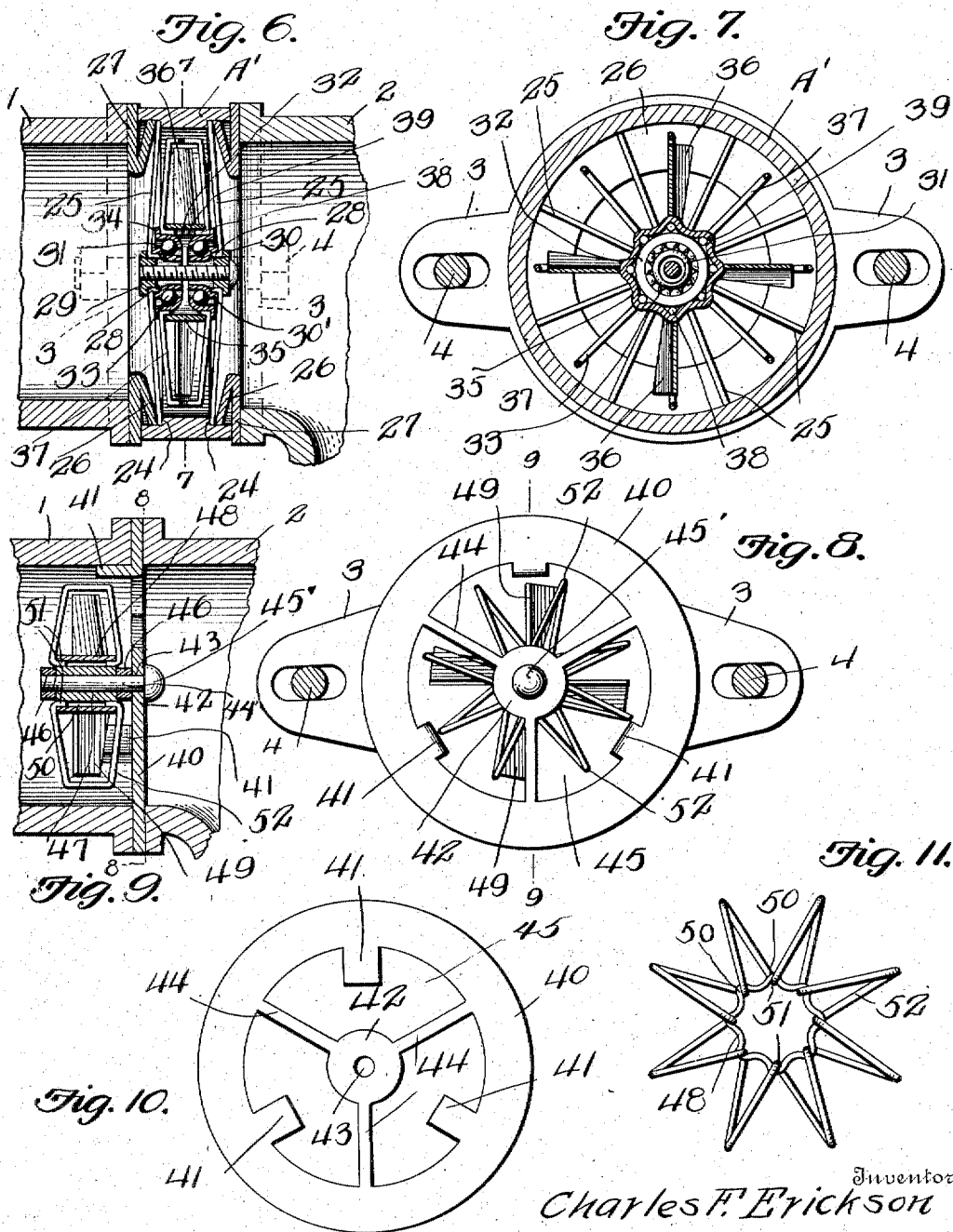
Attorney

C. F. ERICKSON.
AIR AND GAS MIXER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED MAY 24, 1910.

986,151.

Patented Mar. 7, 1911.

2 SHEETS—SHEET 2.



Witnesses

C. C. Richardson

C. C. Hines

Inventor
Charles F. Erickson

By Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

CHARLES F. ERICKSON, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO
WILLIAM H. HOOPLE, OF BROOKLYN, NEW YORK.

AIR AND GAS MIXER FOR INTERNAL-COMBUSTION ENGINES.

986,151.

Specification of Letters Patent. Patented Mar. 7, 1911.

Application filed May 24, 1910. Serial No. 563,118.

To all whom it may concern:

Be it known that I, CHARLES F. ERICKSON, a subject of the King of Sweden, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Air and Gas Mixers for Internal-Combustion Engines, of which the following is a specification.

This invention relates to air and gas mixers for internal combustion engines, the object being to provide a simple and effective construction of mixing device which may be inserted between the outlet of the carbureter and intake of the engine or at any suitable point in the charge feed pipe, and which will operate to thoroughly admix the air and gas without choking the feed or imposing any resistance to the free flow of the charge to the engine.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side view, showing my improved mixer inserted for use between a carbureter and engine. Fig. 2 is a horizontal transverse section on the line 2—2 of Fig. 1. Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 2. Fig. 4 is a side view of the spider or fan supporting frame detached. Fig. 5 is a similar view of the body of the fan, omitting the blades and bearing ring. Fig. 6 is a view similar to Fig. 2, showing a modified form of mixer. Fig. 7 is a section on the line 7—7 of Fig. 6. Fig. 8 is a section taken substantially on the line 8—8 of Fig. 9, showing another modified form of mixer. Fig. 9 is a section on the line 9—9 of Fig. 8. Fig. 10 is a side view of the spider shown in Figs. 8 and 9 prior to application. Fig. 11 is a detail view of the frame of the fan shown in Figs. 8 and 9, omitting the blades.

Referring to the drawings, 1 designates the intake of an internal combustion engine, and 2 the outlet of a carbureter, which parts are provided with the usual perforated bolting flanges 3 for the passage of bolts 4 to couple them together, thereby forming a feed pipe or conductor for the passage of the charge mixture from the carbureter to the engine.

The improved mixer embodying my invention is designed to be interposed in said

conductor between said intake and outlet, and comprises a casing A formed of two sections 5 and 6 of substantially the same size and shape externally and provided with perforated flanges 7 for the passage of the bolts 4 to secure said casing in position. The inner portions of the casing sections are internally threaded, as at 8, for coupling engagement with the externally threaded outer or frame ring 9 of a spider or skeleton support arranged within the casing, whereby said sections are detachably united. In addition to said ring the spider includes a central axle or bearing member formed of two spaced sections 10 and 11 having annular flanges 11' at their outer ends and cone surfaces 12 at their inner ends, said axle sections being connected with each other by a bolt or screw 13 and with the ring 9 by a series of radial spokes or arms 14.

The spokes or arms 14 are bail or loop-shaped and arranged obliquely transversely of the hub and ring. They are preferably formed of wire and serve as fixed beaters or cutters each embodying a pair of filaments or slender strands to subdivide or break up the charge mixture into a plurality of streams on its passage through the casing. In the present instance, I have shown the series of beaters formed from a single piece of wire threaded through transverse openings 15 in the ring 9 and openings 16 in the flanges 11' of the axle sections, but they may be independently formed and fixed at their ends to the axle sections in any preferred manner.

A revoluble beater or fan is mounted for movement upon the spider, and comprises a hub 17 surrounding the cone portions of the axle sections 10 and 11 and retained thereby against lateral displacement. Suitably secured within said hub is a bearing ring 18 having cups 19 cooperating with the cones to form raceways for antifriction balls or rollers 20. To the hub is attached a series of blades 21 and a series of beaters 22 which are inclosed by and revolve within the space bounded by the frame ring and opposite sets of filaments of the beaters of the spider. As shown, the blades 21 are preferably imperforate and both the blades and beaters 22 are arranged obliquely transversely of the hub. The beaters 22, like the beaters 14, are bail or loop-shaped and are also prefer-

ably formed of a single piece of wire bent into shape and threaded through openings 23 in the hub, and each beater 22 provides a pair of oppositely arranged slender strands 5 or filaments to agitate and break up the mixture. The fan constructed and mounted as described is adapted to freely revolve and to act in conjunction with the spider to thoroughly agitate and mix the air and 10 gas of the charge without retarding or throttling the feed. The bores or openings of the sections of the casing are beveled or flared inwardly toward the spider and fan, as at 23', to concentrate the charge during 15 the process of agitation.

It will be understood from the foregoing description that the charge mixture on its flow to the engine will pass through the spider and revolve the fan, by which said 20 mixture will be given a gyratory motion and its components thoroughly agitated and admixed. In this operation the fan blades will act to sweep the mixture in a circular path and against the filaments of the stationary beaters, while the filaments of the fan will assist in such operation and coact 25 with the stationary beating filaments to cut up and agitate the charge into a mass of diversely flowing streams, whereby the air and gas will be uniformly and thoroughly commingled and any particles of uncommingled vapor combined with the air. As a result, a richer charge will be secured which will insure more perfect combustion and less 30 liability of the failure of explosion of the charge, while at the same time the feed of the mixture to the engine will be facilitated rather than retarded, thus increasing the efficiency of motors in which the feed of the charge mixture from the carbureter is sometimes retarded. 40

In the form of my invention shown in Figs. 6 and 7, the casing A' is composed of a single ring having an internal central rib 45 forming annular shoulders 24. This ring is provided with the flanges 7 like the ring A whereby it may be secured in position between the intake of the engine and outlet of the carbureter. The spider in this embodiment is composed of oppositely arranged annular series of radial strands or filaments 50 25 of wire clamped at their outer ends against the respective shoulders 24 by annular resilient flanges 26 entering the sides of the casing and formed upon washers 27 55 clamped respectively between the intake and one side of the casing and the opposite side of the casing and the carbureter inlet. The inner ends of said filaments have angular bent portions 28 which are clamped between 60 the axle sections 29 and 30 and the offset or fluted outer edges 30' of a pair of bearing tubes 31 held from outward movement by said axle sections and forming the hollow 65 body or axle, the said fluted or offset por-

tions of the tubes providing keepers in which said angularly bent ends of the filaments are tightly held by the axle sections, which are flanged to prevent their lateral displacement. The tubes 28 are provided 70 with cone surfaces between which and similar surfaces on bearing tubes 32 are interposed antifriction balls or rollers 33, the said tubes 32 forming in conjunction a separable bearing ring having annular end flanges 34, 75 between which fits the hub 35 of the fan, which is provided with the blades 36 and bail-shaped beaters 37. These blades and beaters are arranged as in the structure shown in Figs. 1 to 5, inclusive, but are independently formed, each consisting of a 80 looped portion of wire having angularly bent ends 38 fitting within keeper offsets or flutes 39 formed upon and extending transversely of the hub 32, and clamped between the same 85 and the faces and flanges of the bearing ring, which thus forms a complementary member of the hub and rotates with the body of the fan on the sectional axle of the spider. The strands or filaments of the respective beaters 90 are arranged obliquely by bending them at an angle around the surface of the hub, the bent end of one filament being fitted within the end of one keeper at one side of the hub and its opposite end being fitted in 95 the end of the next adjacent keeper at the opposite side of the hub, as illustrated in detail in Fig. 11. This construction of mixer is designed particularly for use where sufficient space is not afforded through the intake 1 and outlet 2 for the interposition of 100 a wider casing of the form shown in Figs. 1 to 5, inclusive, and operates in the same manner to agitate and thoroughly admix the elements of the charge. 105

In Figs. 8, 9, 10 and 11, I have shown still another embodiment of the invention, in which the mixer is particularly adapted to be arranged between an engine intake and carbureter outlet where but slight space is 110 afforded for its reception. As shown in this instance, the casing is dispensed with and a support for the fan is provided comprising a washer 40 adapted to be clamped between the intake and outlet and provided 115 with integral lugs or fingers 41 designed to be bent at right angles thereto and in engagement with the wall of the intake to assist in supporting it firmly in position. The washer carries a central portion or spider 120 consisting of a hub 42 having an opening 43 formed therein and connected with the inner periphery of the washer by radial arms 44 spaced to provide openings or passages 45 for the flow of the charged mixture. 125 Extending through the opening 43 in the hub is an axle pin 44' having a head 45' bearing against the side of the hub facing the outlet 2 and provided beyond the opposite face of the hub with spaced collars 46 se-

cured in any suitable manner thereto. The fan in this construction is mounted to revolve upon the axle pin between said collars and comprises a hub or inner bearing ring 47 and an outer bearing ring 48, the latter being provided with the fan blades 49. The ring 48 conforms in construction with the ring 35 shown in Figs. 6 and 7, having an annular series of transversely arranged fluted keepers 50 to receive the angularly bent ends 51 of the bail-shaped beaters 52, which are constructed and applied in the manner heretofore described with respect to the beaters 37, being clamped between the inner and outer rings of the hub. The mixture flows through the openings 45 in the spider and rotates the fan, the blades of which agitate the mixture, the component elements of which are thoroughly commingled by the cutting action of the filaments of the beaters, as hereinbefore explained.

Having thus described the invention, I claim:—

1. In an air and gas mixer for internal combustion engines, a support, and a rotary member carried by said support and provided with an annular series of fan blades and transverse bail-shaped wires forming annular series of spaced beating filaments on the opposite sides of said blades.

2. In an air and gas mixer for internal combustion engines, a casing, a spider arranged therein and embodying an annular series of stationary filaments, and a fan carried by the spider and provided with blades and cooperating beating filaments.

3. In an air and gas mixer for internal combustion engines, a support, an open frame or spider carried by the support, and a rotary member carried by the spider, said member being provided with an annular se-

ries of fan blades, and transversely arranged bail-shaped wires forming annular series of spaced beating filaments on the opposite sides of said blades.

4. In an air and gas mixer for internal combustion engines, a support, a spider carried by the support, a plurality of stationary filaments carried by the spider, and a fan mounted to revolve upon the spider and provided with blades and with a plurality of beating filaments.

5. In an air and gas mixer for internal combustion engines, a support, a spider carried by the support and provided with an annular series of looped elements, and a rotary member mounted upon the spider and provided with fan blades and an annular series of looped beaters.

6. In an air and gas mixer for internal combustion engines, a spider embodying an open work frame formed of spaced filaments, and a fan mounted to revolve upon the spider and provided with fan blades and a cooperating series of openwork beating filaments.

7. In an air and gas mixer for internal combustion engines, a casing, a spider arranged within the casing and embodying an outer ring, an axle, and radial arms connected with said ring and axle, said arms consisting of an annular series of bail-shaped wires, and a fan mounted to revolve upon said axle between the side strands of said wires and provided with fan blades, and a cooperating annular series of looped-shaped beating wires.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. ERICKSON.

Witnesses:

WILL. H. HOUGHTON,
OLIVER CONDON.