

Sept. 5, 1944.

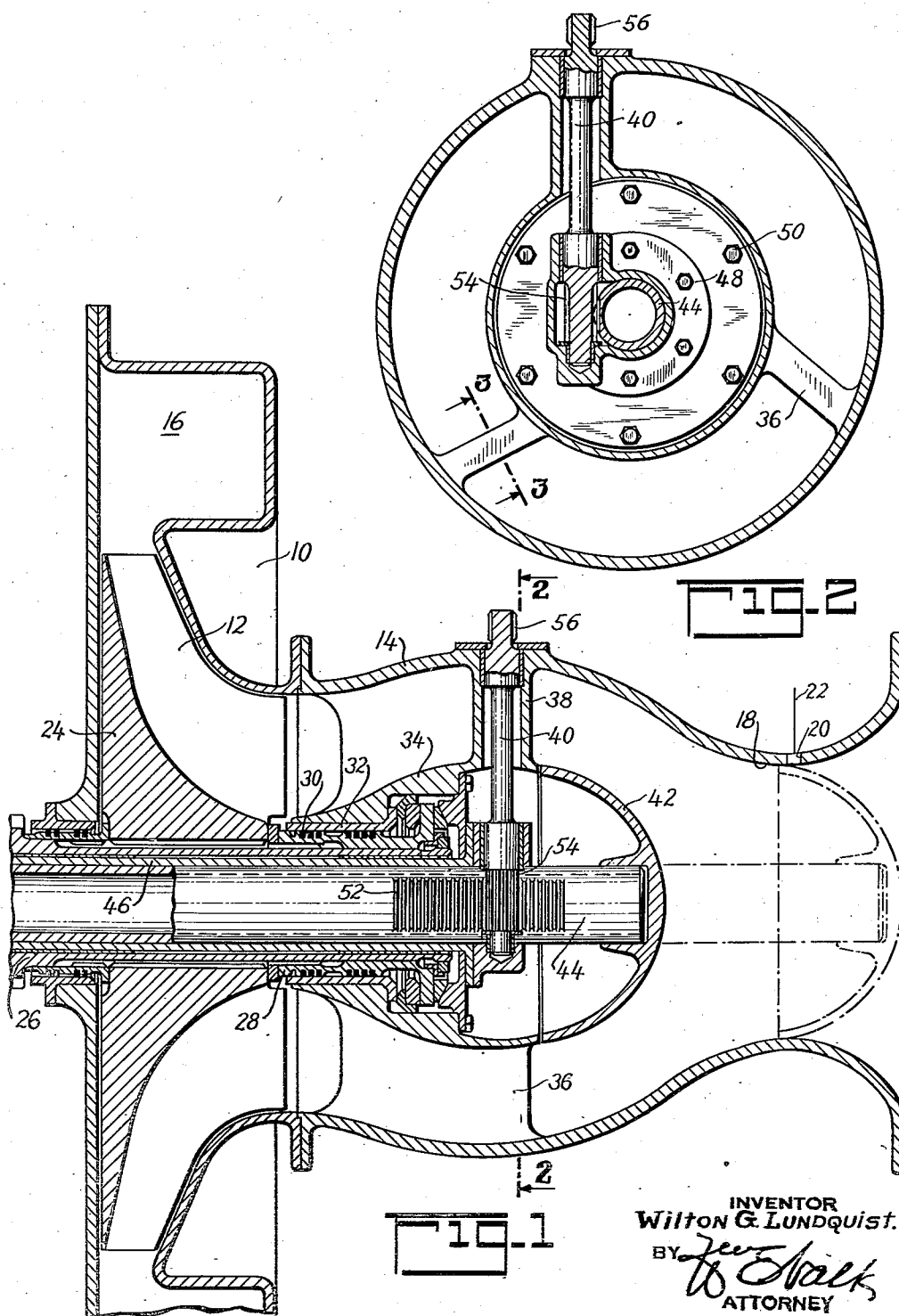
W. G. LUNDQUIST

2,357,527

IMPELLER THROTTLE

Filed Jan. 14, 1943

2 Sheets-Sheet 1



Sept. 5, 1944.

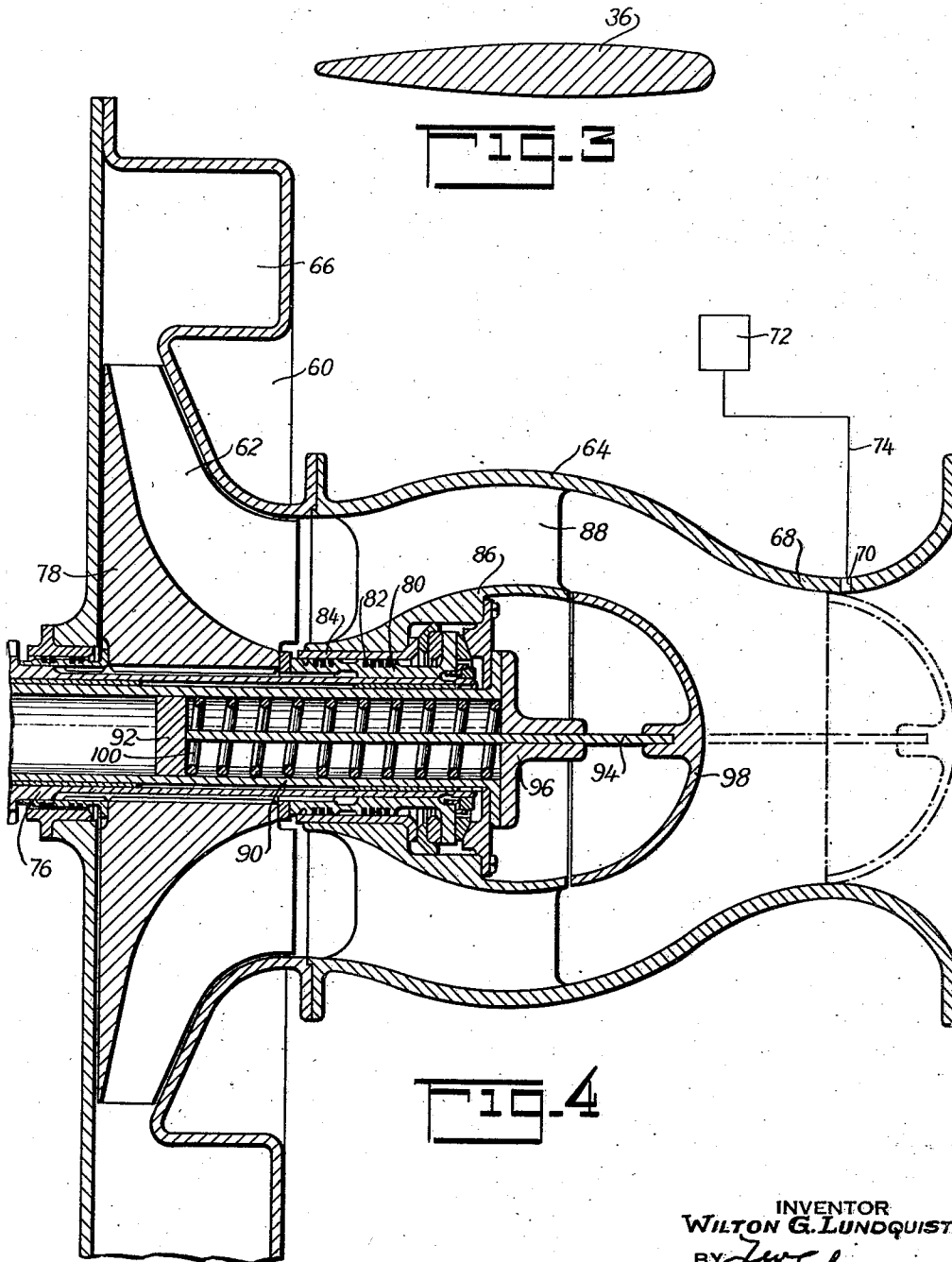
W. G. LUNDQUIST

2,357,527

IMPELLER THROTTLE

Filed Jan. 14, 1943

2 Sheets-Sheet 2



INVENTOR
WILTON G. LUNDQUIST.
BY *W. E. Shack*
ATTORNEY

UNITED STATES PATENT OFFICE

2,357,527

IMPELLER THROTTLE

Wilton G. Lundquist, Hohokus, N. J., assignor to
Wright Aeronautical Corporation, a corporation
of New York

Application January 14, 1943, Serial No. 472,415

7 Claims. (Cl. 230—114)

This invention relates to the throttle valve construction for an internal combustion engine and particularly relates to the combination of the throttle valve with a supercharger for such an engine.

In the prior practice a conventional butterfly throttle valve is used to throttle the air flow. However, such a valve is not very efficient as regards air flow. It is an object of this invention to provide a throttle valve which has maximum efficiency as regards air flow in its full open position and which is adapted to cooperate with a Venturi throat as a valve seat. It is a further object of this invention to so locate and construct the valve that it provides a streamlined structure extending from the hub of the supercharger impeller thereby providing a streamlined intake eye for the impeller.

Specifically, this invention comprises a supercharger impeller having a streamlined structure extending upstream from the impeller hub and in which the nose portion of said structure is movable relative to a venturi formed in the impeller intake duct to provide a throttle valve for said duct.

Other objects of the invention will become apparent in reading the annexed detailed description in connection with the drawings, in which:

Fig. 1 is a longitudinal sectional view of the invention combined with a supercharger;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2; and

Fig. 4 is a longitudinal sectional view of a modification.

Referring to Figs. 1 to 3 of the drawings, a conventional supercharger 10 is provided with an impeller 12 which receives air from an intake duct 14 and discharges the air to the supercharger diffuser chamber 16. From the chamber 16 the air is delivered to an intake manifold or manifolds for delivery to the cylinders of the internal combustion engine. The intake duct 14 is provided with a Venturi throat 18 for metering the air flow therethrough so that the Venturi suction may be used to proportion the fuel to the air flow. Accordingly, the Venturi throat pressure at 20 is connected by a line, shown diagrammatically at 22, to a conventional fuel-air proportional device (not shown).

The hub 24 of the impeller 12 is drivably connected to the impeller shaft 26. An oil seal sleeve 28 is carried by the shaft 26 and is provided with

seal rings 30 cooperating with a bushing member 32. The bushing member 32 is carried by a streamlined structure 34 forming a continuation of the impeller hub 24. The hub continuation 34 is integrally supported from the intake duct 14 by streamlined webs 36. One of these webs is provided with a hollow portion 38 to permit the passage of an adjusting shaft 40 therethrough for the purpose hereinafter described. The streamlined structure 34 is provided with a movable nose portion 42 carried by a shaft 44. Shaft 44 is slidably fitted within a hollow sleeve 46 about which the impeller shaft is journaled. The sleeve 46 is secured to the structure 34 by bolts 48 and 50. A rack 52 is formed on one side of the shaft 44 for cooperation with a pinion 54 carried on one end of the adjusting shaft 40. The other end of the shaft 40 is provided with a pinion 56 on the outside of the duct 14 thereby permitting manual adjustment of the nose portion 42 through the rack 52 and pinion 54.

As described above, the structure 34 and the nose portion 42 provide a streamlined continuation of the impeller hub 24. In the full throttle position illustrated in the drawings, the nose portion is completely withdrawn from the Venturi throat 18 against structure 34 to provide a smooth air flow path into the impeller. When it is desired to throttle the air flow, the shaft 40 is operated to move the nose 42 toward the Venturi throat 18, as indicated in dotted lines in Fig. 1.

Fig. 4 illustrates a modification similar to Fig. 1, except for the manner of operating the throttle nose portion. In this modification a supercharger 60 is provided with an impeller 62, an intake duct structure 64, and a diffuser chamber 66. The intake duct 64 is provided with a Venturi throat 68 for metering the air flow. As in the previous modification, the Venturi throat pressure at 70 is connected to a conventional device 72 by a line 74 for proportioning the fuel flow to the air flow. An impeller shaft 76 is drivably connected to the impeller hub 78. An oil seal sleeve 80 carried by impeller shaft 76 is provided with seal rings 82 for cooperation with a bushing member 84. This bushing member is supported by streamlined structure 86 forming a continuation of the impeller hub 78. The structure 86 is supported from the intake duct 64 by symmetrically disposed web elements 88.

The impeller shaft 76 is journaled about a hollow sleeve 90 secured to the structure 86. The hollow sleeve forms a cylinder for a piston 92

having a piston rod or stem 94. The piston rod extends through a guide 96 and is secured to the streamlined nose portion 98. A spring 100 biases the piston and connected nose portion to its full open position. As illustrated in the drawings, fluid pressure may be applied against the head end of the piston (by means not shown) to move the piston and nose portion to the right thereby throttling the air supply. Except for the substitution of this fluid pressure means for controlling the throttle valve, the modification of Fig. 4 is similar to Fig. 1.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding my invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

I claim as my invention:

1. In combination with a vaned fluid impeller having a hub and an annular impeller intake opening thereabout, a fluid intake duct for said impeller having a restricted throat portion upstream from the impeller, a movable valve member for said intake duct, said valve member having a full open position in which it forms a streamlined upstream-extending continuation of said impeller hub and being axially movable upstream therefrom toward said throat to throttle the fluid flow through said duct.

2. In combination with a supercharger for an internal combustion engine, said supercharger having an annular impeller, an intake duct for said impeller having a Venturi throat, and a streamlined structure extending from the impeller hub, the nose portion of said structure being axially movable for cooperation with said Venturi throat.

3. In combination with a supercharger for an internal combustion engine, said supercharger having an annular impeller, an intake duct for said impeller having a Venturi throat, a streamlined structure extending from the impeller hub and supported from said intake duct, the nose portion of said structure being axially movable relative to said Venturi throat to provide a variable throttle for said duct, and means extending

through the support for said streamlined structure for adjusting said nose portion.

4. In combination with a supercharger for an internal combustion engine, said supercharger having an annular impeller, an intake duct for said impeller having a Venturi throat, said impeller being drivably connected to a hollow impeller shaft, a streamlined structure extending from the impeller hub, the nose portion of said structure being axially movable relative to said Venturi throat to provide a variable throttle for said duct, and means extending from said nose portion into said hollow shaft for supporting said nose portion.

5. In combination with a supercharger for an internal combustion engine, said supercharger having an annular impeller, an intake duct for said impeller having a Venturi throat, a streamlined structure extending from the impeller hub, the nose portion of said structure being axially movable relative to said Venturi throat to provide a variable throttle for said duct, and fluid pressure means for adjusting said nose portion.

6. In combination with a vaned fluid impeller having a hollow hub and an annular impeller intake opening about said hub, a fluid intake duct for said impeller having a restricted throat portion upstream from the impeller, and a movable valve member having a portion extending into said hollow hub for slidably disposing said valve member adjacent the intake end of said impeller hub, said valve member being axially movable relative to said throat portion for throttling the fluid flow therethrough.

7. In combination with a vaned fluid impeller having an annular hub and an annular impeller intake opening about said hub, a hollow shaft extending into said annular hub and drivably connected thereto, a fluid intake duct for said impeller having a restricted throat portion upstream from the impeller, and a movable valve member having a portion extending into said hollow shaft for slidably disposing said valve member adjacent the intake end of said impeller hub, said valve member being axially movable relative to said throat portion for throttling the fluid flow therethrough.

WILTON G. LUNDQUIST.