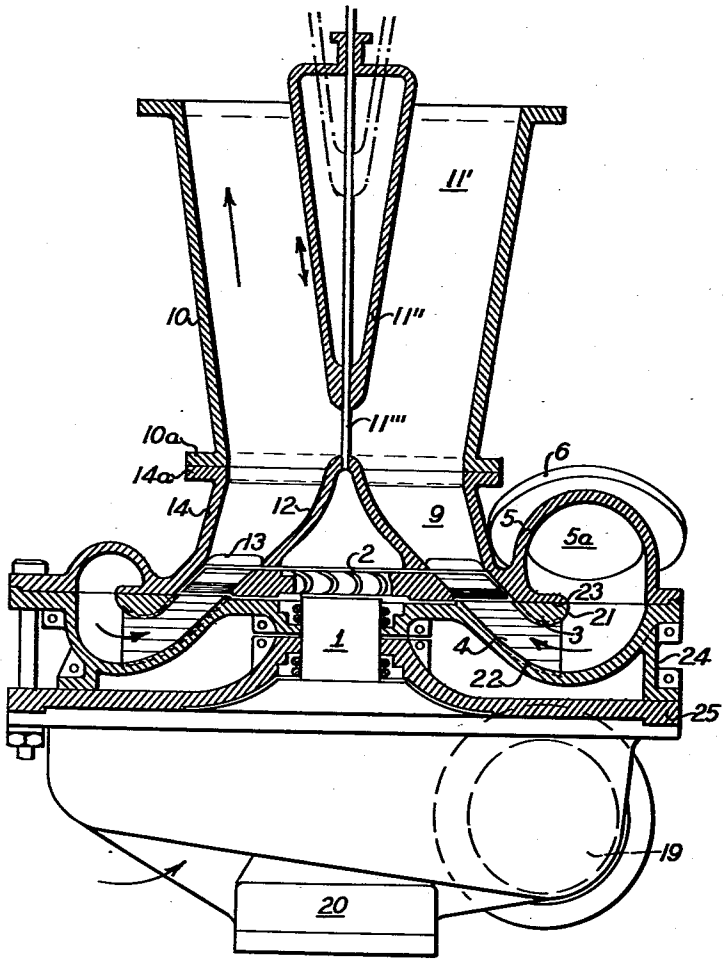
Oct. 22, 1957 A. BUCHI 2,810,545

DIFFUSERS

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INVENTOR

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DIFFUSERS

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2 Claims. (Cl. 253—40)

This invention relates to improvements in diffusers generally, and specifically pertains to outlet diffusers for turbines driven by hot gases. The present application is a division of my application Serial No. 765,217, filed July 31, 1947, now Patent No. 2,635,849, granted April 21, 1953.

The desirability of providing a diffuser downstream of the turbine blading to effect conversion of the gas velocity into pressure has been discussed in my prior U. S. Patent No. 2,486,732, and is further dealt with in my said application Serial No. 765,217, now Patent No. 2,635,849. However, since turbochargers of the type therein illustrated and described, when applied to internal combustion engines devoted, for example, to traction, truck and marine purposes, do not operate under constant conditions of exhaust gas pressures and temperatures, it is not possible to design a fixed outlet diffuser for the turbines in such units to operate efficiently over the entire range of such conditions. The best that can be done with a fixed outlet diffuser is to design it for most efficient conversion of velocity of the gases into pressure at a certain rather limited range which is usually selected upon the basis of the conditions under which maximum efficiency of the turbocharger is most important.

It is an object of my present invention to enable the capacity of the diffuser to be varied so that conversion of velocity into pressure may be carried out at peak efficiency over a wider range of gas temperature and pressure conditions.

It is also an object to enable a single size outlet diffuser to be made for attachment on turbochargers employed in different types of engine installations.

It is also an object to devise a turbine arrangement in which such a diffuser is particularly useful.

These and other objects are accomplished by my novel variable diffuser and the turbine hereinafter described and illustrated in the accompanying drawing representing an elevation, partly in section, of a turbocharger in conjunction with which my variable diffuser may profitably be employed.

In this figure, **1** designates the turbine wheel and **2**, the blading thereon. **3** is a guide casing provided with vanes **4**. **5** is the turbine inlet casing defining a single duct **6**. **5***a* is the gas receiving space in inlet casing **5**. **9** represents a diffuser arranged adjacent the rotor wheel **2** and having inner and outer walls formed by cones **12** and **14** respectively. The axis of symmetry of these cones will be seen to lie in the turbine axis. **13** are support ribs.

The blower delivery is designated by **19**, and **20** represents the bearing housing. **21** and **22** constitute slotting in the duct walls to support guide vane **23**. **24** and **25** are casing sections forming part of the turbine and blower housings.

My novel diffuser **11′** is attached to follow the conical diffuser **9** and comprises the conical outer wall **10**, the flange **10***a* of which is secured to the flange **14***a* of outer wall **14**, the coaxial rod **11‴**, and the conical filling piece **11″**, slidable on said rod. The filling piece **11″** has an apex and a rear end wall. By changing the location of this filling piece, the cross sectional area through which the gases flow may be varied. By this means I succeed in altering the effect of diffuser **11′** and, as a result, I can achieve the most favorable transition of velocity into pressure, depending on the quantity of gases flowing through the turbine under different operating conditions of the internal combustion engine. Such a feature is particularly important in the range of higher velocities of pressure gases.

While I have illustrated and described my present invention as applied to an exhaust gas turbocharger, many applications of the principle here taught will readily occur to any person skilled in the art, and the scope of my protection should not be limited to variable diffusers in turbochargers.

I claim:

1. In combination with an exhaust gas turbine, said turbine comprising guide means for directing the actuating medium through the blading in a direction having a diagonal axial direction and having an inner guide wall consisting of the outer surface of a conical body, said body being coaxial with the rotor, having the periphery of its base substantially fairing with the bases of the rotor blading, and its apex axially spaced from said rotor, and an outer guide wall defined by the inner surface of a frustrum of a hollow conical body defining a conical space coaxial with said rotor, having the periphery of its base substantially fairing with the outer edges of the rotor blades, said latter wall being flared out in axial direction from the rotor blading relative to and overlapping the surface of said conical body thereby forming a passage adapted to continue the actuating medium in approximately the same diagonal axial direction as the direction of entry to the rotor blading, and a variable diffuser secured to the end of said inner guide wall, said diffuser comprising a peripheral wall on the axis of the rotor flaring out towards the outside symmetrical to said axis, a rod located in said hollow conical body coaxial with said rotor, a conical filler piece slidably mounted on said rod, the conical outer surface of said filler piece flaring out towards the outside on the axis of said rotor as symmetry axis, said filler piece comprising an apex coaxial with said rotor and said conical body and directed towards the latter, and a rear end wall, the end of said filler apex being axially spaced from said rear end wall at a distance substantially equal to the axial length of said conical space, and being slidably disposed on said rod for axial displacements in either direction, whereby said filler apex may be moved to various positions in said conical space forming thereby increasing or decreasing through flow areas within said conical space, contingent on the direction of displacement of said conical filler, whereby such through flow areas are changed to provide optimum conditions for conversion of the velocity of the actuating gas quantity into pressure.

2. A hot gas turbine comprising an axially directed diffuser, a rotor from which the actuating medium flows out over said axially directed diffuser, a cone converging from the rotor blading toward the turbine axis, said cone extending beyond the rotor blading and into the entrance

portion of the axially directed diffuser, a displaceable conical filling piece mounted behind said cone diverging outwardly in the axial direction and extending at least approximately as far as the end of said diffuser, and means for the adjustment of said displaceable filling piece, said means being adapted to move the filling piece from substantially within the diffuser to the outside thereof, whereby the through flow areas in said diffuser provide optimum conditions for conversion of the velocity of the actuating medium quantity into pressure.

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