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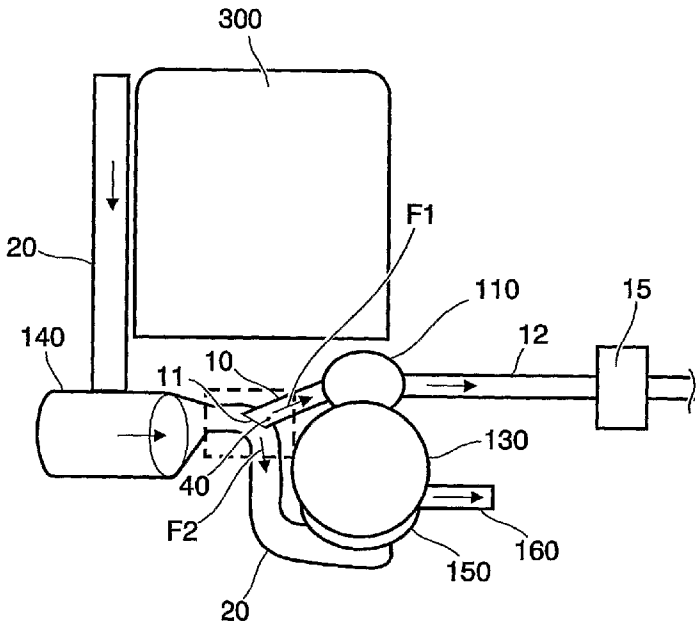
(54) **Title:** AN AIR INLET ARRANGEMENT FOR AN AIR COMPRESSOR



(57) **Abstract:** An air inlet arrangement for an air compressor (110) intended to be arranged on a vehicle. The arrangement comprises an air inlet tube (10) for providing air to an air compressor (110), and an air intake conduit (20) for providing air to an internal combustion engine (130). The air inlet tube (10) is provided with an end portion (40) having an inlet opening (11) and is mounted to the air intake conduit (20). The end portion (40) is inserted in the air intake conduit (20) in such a way that the inlet opening (11) is arranged inside the air intake conduit (20), and the inlet opening (11) is arranged to face towards the main direction (F2) of the intended air flow in the air intake conduit (20).

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An air inlet arrangement for an air compressor

TECHNICAL FIELD

The present invention relates to an air inlet arrangement for an air compressor according to the preamble of claim 1, and to an air compressor system according to the preamble of claim 21.

BACKGROUND OF THE INVENTION

In heavy vehicles, such as trucks and buses, there is a need for compressed air. The compressed air is provided to ensure the function of different pneumatic components and equipments of the vehicle. The air compressor is usually driven by a prime mover of the vehicle, such as an internal combustion engine which is primarily used for driving the vehicle. The compressed air may be delivered to a storage tank from which compressed air is supplied to the pneumatic components and equipments. Turbocharged engines are commonly employed as the prime mover in commercial vehicles and thus also to power the air compressor system. A turbocharger is driven by the exhaust gases of the engine for supplying pressurised air to the engine so as to increase the efficiency of the engine.

In the air compressor air is compressed in one or more compression cylinders by one or more reciprocating pistons. The compressed air is then stored in an air tank and used downstream for different pneumatic equipments, for example the brakes, the suspension system, a power-clutch, and/or other equipment. The compressor pistons have sealants that help to keep the compressed air on one side of the piston and to keep the lubricating oil on the opposite side of the piston, i.e. the sealants help to keep the oil away from the compressed air. However, such sealants are not completely effective which implies that some oil can enter the compressed air in aerosol form. The content of oil in the air due to such leakage is dependent on for

example the temperature and the rotational speed of the compressor. The oil per se as well as other substances into which the oil can be been transformed, particularly at high temperatures, can be harmful to components in the pneumatic system, such as air dryer equipment, sealants, valves or sensors.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an air inlet arrangement for an air compressor of the kind referred to in the introduction, which inlet arrangement can reduce the leakage of oil into the compressed air.

This object is achieved by an air inlet arrangement according to claim 1.

By the provision of an air inlet arrangement where the end portion of the air inlet tube is inserted in an air intake conduit used for providing air to an internal combustion engine, in such a way that the inlet opening of the air inlet tube is arranged inside the air intake conduit, and the inlet opening is arranged to face towards the main direction of the intended air flow in the air intake conduit, the pressure of the air in the air inlet tube can be increased. This in turn will counteract oil leakage to the compressed air.

The invention is based on the insight that if the air flow to the compressor for some reason is restricted, the compressor has to work harder to be able to deliver the requisite compressed air to the vehicle. With such a restricted air flow, the oil leakage from the crankshaft side of the piston to the air side of the piston of the compressor may increase because air from the crankshaft side can more easily pass the sealants and reach the air side of the piston.

The main inventive concept is that the inlet opening of the air inlet tube is exposed to a direct air flow of the air in the air intake conduit. By the arrangement according to

the invention the air inlet tube for providing air to the air compressor is "pre-loaded" by means of the flow in the air intake conduit. This in turn reduces the work that the air compressor has to do and the leakage of any oil/air-mixture from the crankshaft region to the cylinder space where air is compressed is counteracted.

The feature that "the inlet opening is arranged to face towards the main direction of the intended air flow in the air intake conduit" can be achieved in different ways. Basically two parameters are important to expose the inlet opening to the air flow inside the air intake conduit; the direction of the end portion of the inlet tube relative to the main air flow in the air intake conduit at the position where the inlet tube is mounted to the air intake conduit, and the shape of the end portion which is arranged inserted in the air intake conduit.

According to one embodiment of the invention the longitudinal extension of the end portion of the air inlet tube, in the direction away from the air intake conduit, has one extension component which is perpendicular to the main direction of the intended air flow in the air intake conduit and a second component which has the same direction as the main direction of the intended air flow in the air intake conduit. The end portion of the air inlet tube is preferably arranged at an angle α relative to the main direction of the intended air flow in the air intake conduit, where the air inlet tube angle α is in the interval $10°<\alpha<80°$. In many cases the angle α is suitably in the interval $20°<\alpha<70°$, and more preferably in the interval $30°<\alpha<60°$. Hereby the area of the inlet opening can be exposed to the air flow in the intake conduit.

According to a further embodiment of the invention the inlet tube is designed with a bevelled end portion which implies that the end surface of the inlet tube and the longitudinal centre line of the inlet tube form an angle β, where $0<\beta<90°$. In many cases the end portion angle β is suitably in the interval $20°<\beta<70°$, and preferably in the interval $30°<\beta<60°$. Such a bevelled end portion can contribute to expose the inlet opening to the air flow in the air intake conduit.

By suitable selection of one or both above mentioned parameters, represented by α and β, the end portion of the air inlet tube can be arranged and/or designed in such a way that a geometrical plane defined by the inlet opening is arranged at an angle θ relative to the main direction of the intended air flow in the air intake conduit, wherein the inlet opening angle θ is in the interval $10°<\theta<170°$, and preferably in the interval $30°<\theta<150°$, and more preferably in the interval $45°<\theta<135°$. In some cases it is advantageous to use an inlet opening angle θ in the interval $60°<\theta<120°$, and preferably the inlet opening angle θ is substantially 90°. Hereby the flow of air in the air intake conduit can be effectively used for supplying air to the compressor via the air inlet tube.

According to a further embodiment of the invention, the point of the inlet opening of the air inlet tube which is situated closest to the inner surface of the wall of the air intake conduit, is situated at a distance B from the inner surface of the wall of the air intake conduit at the position where the air inlet tube is mounted to the air intake conduit. The distance B is preferably in the interval $D/8<B<7D/8$, and more preferably in the interval $D/4<B<D/2$. Hereby, disturbing phenomenon such as any turbulent flow along the inner wall of the air intake conduit can be avoided, and an appropriate positioning of the inlet opening of the air inlet tube in the air intake conduit can be achieved.

According to a further embodiment of the invention, the air inlet tube is mounted to a curved portion of the air intake conduit. In this way the design of the air intake conduit is used to place the air inlet tube appropriately in the air intake conduit so as to expose the inlet opening of the air inlet tube to the flow of air in the air intake conduit.

According to a further embodiment of the invention, the end portion of said air inlet tube is designed as a funnel. Hereby, the area of said inlet opening faced to the main direction of the intended air flow in the air intake conduit may be increased.

The invention also relates to a heavy vehicle comprising the air inlet arrangement according to the invention. Further advantages and advantageous features of the invention are disclosed in the following description and the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

With reference to the appended drawings, below follows a more detailed description of embodiments of the invention cited as examples.

In the drawings:

- Fig. 1 shows an air inlet arrangement according to prior art,
- Fig. 2 is a schematic view of an air inlet arrangement according to the invention comprised in an air compression-engine system,
- Fig. 3a is a schematic view of an air inlet arrangement according to the invention,
- Fig. 3b is a schematic view of another embodiment of the air inlet arrangement according to the invention,
- Figs. 4a-5c are schematic views of further different embodiments of the air inlet arrangement according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

In Fig. 1 an air inlet arrangement according to prior art is illustrated. An air inlet tube 10' is connected to an air intake conduit 20' so as to branch off a portion of the air which flows in the air intake conduit 20' to the air inlet tube 10'. The air inlet tube 10' having an inlet opening 11' is connected to the air intake conduit 20' at an angle of 90 degrees, i.e. the air intake conduit 20' and the air inlet tube 10' form a tee joint or T-piece. The intention is that a portion of the air flow in the air intake conduit 20'

will be branched off into the air inlet tube 10' to create an air flow in the air inlet tube 10'. The air flow in the air intake conduit 20' is indicated by an arrow F2' and the air flow in the air inlet tube is indicated by an arrow F1' pointing upwards in Fig. 1.

However, the force exerted by such branched off air flow is in many cases not sufficient to achieve an air flow into the inlet tube 10'. As it is indicated by an arrow F3' pointing downwards in Fig. 1, a venturi-effect is present, which in this case forms a counteracting air flow travelling down the air inlet tube 10'. This is due to the fact that the circular cross section of the air inlet tube 10' has a smaller diameter d', i.e. a smaller sectional area, than the air intake conduit 20' which has a diameter D'.

Fig. 2 shows a schematic illustration of an air inlet arrangement according to the invention, and an air compressor system for a vehicle according to the invention. The system comprises an air compressor 110 e.g. driven by an internal combustion engine 130. The air compressor 110 is arranged on a vehicle 300, such as a truck, which air compressor 110 is supplied by air through an air inlet tube 10. The air compressor 110 is arranged to deliver compressed air to the vehicle through a supply line 12 leading to compressed air storage tanks (not shown). An air dryer 15 and other equipment, such as an unloading valve, can be arranged on the supply line 12.

An air intake conduit 20 is supplying an engine 130 with air for the combustion process. The air intake conduit 20 comprises a first part upstream of an air filter 140 and a second part downstream thereof. The air intake conduit 20 proceeds from the air filter 140 to a turbocharger 150 and into the engine 130. Since the air inlet tube 10 is mounted downstream the air filter 140, a separate air compressor filter is not always necessary, which in fact reduces maintenance costs considerably by eliminating the need for inspecting and/or changing a used or clogged separate air filter. Further, the risk of clogging the air filter of the air intake conduit is reduced,

because the engine air filter is dimensioned for much greater air flows and will thus not clog as easy as a standard air compressor filter. An exhaust tube 160 leads from the engine 130 to the exterior. In the embodiment of the air inlet arrangement illustrated in Fig. 2 the air inlet tube 10 is mounted to a curved portion of the air intake conduit 20, see the area inside the square with dashed lines.

It has by the invention been realized, that the force of the existing air flow in said air intake conduit towards the engine for the combustion process therein can be utilized to reduce the amount of oil carryover in the air compressor by configuring the air inlet arrangement for the air compressor appropriately.

The force K with which an air flow is acting may be found by the following equation:

$$K = \rho \cdot A \cdot V^2,$$

where ρ is the density of the air flow, A is the sectional area of the air inlet tube in question and V is the velocity of the air flow. Accordingly, K is a function of the sectional area of the air inlet tube 10 and of the air flow velocity squared at a given point in said tube. Further, these two factors are interrelated in that by increasing said sectional area the velocity is lowered.

Returning to fig. 2, the air inlet tube 10 is provided with an end portion 40 having an inlet opening 11 and is mounted to said air intake conduit 20. Thus, during use, a first air flow F1 towards said air compressor 110 is provided inside the air inlet tube 10, which first flow is branched off by a portion of a second air flow F2 in said air intake conduit 20, which is travelling towards said engine 130. Thus, said inlet opening 11 is supplied with a portion of the second air flow, where the remaining portion of said second air flow proceeds on to the engine 130. By applying the above equation, said outlet opening 11 is configured so as to increase the velocity of said first air flow in

the inlet opening 11 and optimize the sectional area thereof. A force exerted by said first air flow against the air compressor 110 enables a somewhat pressurised air flow at the inlet of the air compressor 110, providing a pre-loading of the air compressor 110, which reduces oil leakage.

Although it is shown in Fig. 2, that said mounting of the air inlet tube 10 to the air intake conduit 20 is provided at a position between the air filter 140 and the turbocharger 150, in a position where said air intake conduit 20 is bent and tapered, said position may also be provided within or after the turbocharger, e.g. in connection with the engine's manifold. It is also possible to integrate said position of the air inlet tube in the air filter 140, e.g. at the outlet thereof.

With reference to Figs. 3a and 3b the air inlet arrangement according to the invention is further illustrated. In figure 3a the air intake conduit 20 for providing air to an internal combustion engine has a diameter D and the air inlet tube 10 for providing air to an air compressor has a diameter d. As previously described the air inlet tube 10 is mounted to the air intake conduit 20. The air inlet tube 10 is provided with the end portion 40 having the inlet opening 11. Furthermore, the end portion 40 is inserted in the air intake conduit 20 in such a way that the inlet opening 11 is arranged inside the air intake conduit 20, and the inlet opening 11 is arranged to face towards the main direction F2 of the intended air flow in the air intake conduit 20.

As appears from Fig. 3b, the longitudinal extension of the end portion 40 of the air inlet tube 10, in the direction E away from the air intake conduit 20, has preferably one extension component E1 which is perpendicular to the main direction F2 of the intended air flow in the air intake conduit 20 and a second component E2 which has the same direction as the main direction F2 of the intended air flow in the air intake conduit 20. This implies the end portion 40 of the air inlet tube 10 is preferably arranged at an angle α relative to the main direction F2 of the intended air flow in the intake air conduit 20, where $0<\alpha<90°$.

In Figs. 3a and 3b two other angles are also indicated. The air inlet tube 10 may preferably be designed with a bevelled end portion 40 in such a way that a main extension direction of the end surface 25 of the air inlet tube 10 and the longitudinal centre line 26 of the air inlet tube 10 form an end portion angle β, where $0<\beta<90°$.

In other words, the end portion 40 can preferably be designed and/or arranged in such a way that a geometrical plane 27 defined by the inlet opening 11 is arranged at an angle θ relative to the main direction F2 of the intended air flow in the air intake conduit 20, wherein the inlet opening angle θ is in the interval $10°<\theta<170°$.

In Fig. 3a it is further illustrated how the end portion 40 of the air inlet tube 10 is inserted into said air intake conduit 20 in such a manner that the point of the inlet opening 11 of the air inlet tube 10 which is situated closest to the wall 28 of the air intake conduit 20, is situated at a distance B from the inner surface of the wall 28 of the air intake conduit 20 at the position where the air inlet tube 10 is mounted to the air intake conduit 20. Since the end portion 40 of the air inlet tube is bevelled there is a largest distance C between the wall and the inlet opening 11, where C>B. It should be stressed that in case the end portion is bevelled the distance B could be zero. However, C has to be larger than zero so as to arrange the end portion inserted in the air intake conduit. In another embodiment the distances can of course be B=C, where B and C are larger than zero.

Although the sectional area of the air intake conduit 20 is the same before and after the position where the air inlet tube 10 is mounted as illustrated in for example Figs. 3a and 3b, alternatively the sectional area can be smaller downstream said position in order to increase the first air flow F1 entering the inlet opening 11 of the air inlet tube 10.

With reference to all embodiments of the invention described herein, depending on the material used for the air intake conduit 20 and the air inlet tube 10 to be

connected to each other, e.g. metal, plastic, etc., the skilled person is aware of different techniques to join these components, such as e.g. welding, using an adhesive, or the like. It is to be noted, that despite the fact that the figures indicate that the air inlet tube 10 and the air intake conduit 20 have a circular cross section, any other suitable cross sectional shape of the current components can be utilized as an alternative. Preferably, the sectional shape of the end portion 40 of the air inlet tube 10 and the sectional shape of the air intake conduit 20 are selected to provide the inlet opening 11 with a suitable form for creating a first air flow of an increased magnitude, i.e. the inlet opening 11 is configured with a shape to enable and facilitate the branching off of air into the air inlet tube.

Figs. 4a to 5c are illustrations of further configurations of the air inlet arrangement according to the invention.

In fig. 4a, the end portion of the air inlet tube 10 is inserted into said air intake conduit 20 in such a manner that the inlet opening 11 is provided at a distance B to the inner surface of said air intake conduit 20. Thus, the risk of having e.g. a turbulent second air flow, i.e. a lower pressure air flow, at the position of the inlet opening 11, is reduced. As may be seen from Fig. 4a, the end portion 40 of the air inlet tube thereof is bevelled, i.e. provided with an angled cut, which lies substantially 45 degrees with the longitudinal axis of the air inlet tube 10, and the inlet opening 11 is placed in such a way that it defines a geometrical plane, which lies perpendicular to the direction F2 of the second air flow inside the air intake conduit 20. This further increases the force of the first air flow into the inlet opening 11 and counteracts the above mentioned Venturi effect.

In fig. 4b, the end portion of the air inlet tube 10 is inserted into said air intake conduit 20 such that one part of the periphery of the inlet opening 11 contacts the inner surface of the air intake conduit 20, i.e. B=0. In the same way as mentioned above, the end portion is bevelled, i.e. provided with an angled cut, which lies

substantially 45 degrees with the longitudinal axis of the air inlet tube 10, and the inlet opening 11 defines a geometrical plane, which is positioned perpendicular to the direction F2 of the second air flow inside the air intake conduit 20, i.e. the angle θ is substantially 90 degrees.

In Fig. 4c, the air inlet tube 10 is mounted as a T-piece with the air intake conduit 20, and the end portion 40 with the inlet opening 11 is provided with an angled cut, which lies substantially 45 degrees with the longitudinal axis of the air inlet tube 10, and the end portion 40 of the air inlet tube is positioned in such a way that the geometrical plane defined by the inlet opening 11 is at an angle θ substantially equal to 45 degrees in relation to the direction F2 of the air flow inside the air intake conduit 20.

In Fig. 5a, the air intake conduit 20 is bent, i.e. forming a curved segment at which the air inlet tube 10 is mounted. The air inlet tube 10 is inserted into the air intake conduit 20 to a position where the air intake conduit 20 is substantially straight. This implies that the point of flow communication, and, thus the inlet opening 11, is positioned at a point before the curved segment. Thus, the force of said first air flow at the inlet opening 11 may be increased, when the air inlet tube 10 is positioned appropriately in relation to the resulting air flow of the air intake conduit 20. The air inlet tube 10 is provided as a straight tubing with the end portion being bevelled or not. Since the longitudinal axis of the air inlet tube 10 is parallel to the air flow in the air intake conduit 20, an angle of the end portion will not make a great difference to the air flow into the air inlet tube, but may be advantageous depending on the turbulence of the air flow in the air intake conduit 20.

In Fig. 5b, an end portion of the air inlet tube 10 is provided with a bend having an angle v of substantially 90 degrees and is positioned within the interior of the air intake conduit 20. By suitable positioning in relation to the air intake conduit 20, the

force of the first air flow into the inlet opening 11 is increased, as the entry area encountered by the second air flow is maximized.

In Fig. 5c, the end portion of said air inlet tube 10 is designed as a funnel 50 in order to achieve an increased area of the inlet opening 11. Furthermore, the end portion of said air inlet tube 10 is provided with a bend, the angle v of which is larger than 90 degrees. In this embodiment the air inlet tube 10 is positioned in such a way that it enables the stresses induced to be reduced, when the second air flow works against the inlet opening 11 and thus against the connection between the air inlet tube 10 and the air intake conduit 20. The velocity of the first air flow in the air inlet tube can be increased, and the installation space required can be reduced.

Further perceivable, but not shown alternatives could comprise fan-like guide blade structures, which guide blades extend in radial direction from e.g. a funnel shaped end portion to the inner surface of the air intake conduit. These guide blades could be into contact with and/or being attached to the inner surface of the air intake conduit. This in turn may increase the velocity of the first air flow into the inlet opening 11.

Other alternatives are perceivable, such as air inlet arrangements comprising air flow scooping devices, such as fans, bellows, flaps, skirts, filters and the like.

In the above, the invention is explained in relation to an internal combustion engine powered air compressor for a truck. However, it has by the invention been realized, that any air compressor, which is provided in combination with an air intake for a combustion process, may be utilized for enabling the arrangement according to the invention by selecting a suitable setup. Different types of suitable air compressors comprise positive displacement compressors, such as reciprocating or piston, rotary screw, or rotary sliding vane compressors, or dynamic compression compressors such as centrifugal compressors and other types of compressors. Different types of suitable prime drivers, which need air for the combustion, are e.g. gaseous fuel

engines or turbines, diesel or petrol fuel engines or the like. The invention is suitable for diesel engines with or without a turbocharger.

It is to be understood that the present invention is not limited to the embodiments described above and illustrated in the drawings; rather, the skilled person will recognize that many changes and modifications may be made within the scope of the appended claims.

CLAIMS

1. An air inlet arrangement for an air compressor (110) intended to be arranged on a vehicle, comprising an air inlet tube (10) for providing air to an air compressor (110), and an air intake conduit (20) for providing air to an internal combustion engine (130), the air inlet tube (10) being provided with an end portion (40) having an inlet opening (11) and being mounted to the air intake conduit (20), **characterized in that** the end portion (40) of the air inlet tube (10) is inserted in the air intake conduit (20) in such a way that the inlet opening (11) is arranged inside the air intake conduit (20), and the inlet opening (11) is arranged to face towards the main direction (F2) of the intended air flow in the air intake conduit (20).

2. An air inlet arrangement according to claim 1, **characterized in that** the longitudinal extension of the end portion (40) of the air inlet tube (10), in the direction away from the air intake conduit (20), has one extension component (E1) which is perpendicular to the main direction (F2) of the intended air flow in the air intake conduit (20) and a second component (E2) which has the same direction as the main direction (F2) of the intended air flow in the air intake conduit (20).

3. An air inlet arrangement according to claim 2, **characterized in that** the end portion (40) of the air inlet tube (10) is arranged at an angle α relative to the main direction (F2) of the intended air flow in the air intake conduit (20), the air inlet tube angle α being in the interval $10°<\alpha<80°$.

4. An air inlet arrangement according to claim 3, **characterized in that** the air inlet tube angle α is in the interval $20°<\alpha<70°$.

5. An air inlet arrangement according to claim 3, **characterized in that** the air inlet tube angle α is in the interval $30°<\alpha<60°$.

6. An air inlet arrangement according to claim 3, **characterized in that** the air inlet tube angle α is substantially 45°.

7. An air inlet arrangement according to any preceding claim, **characterized in that** the inlet tube (10) is designed with a bevelled end portion (40) in such a way that a main extension direction of the end surface (25) of the inlet tube (10) and the longitudinal centre line of the inlet tube form an end portion angle β, where $0<\beta<90°$.

8. An air inlet arrangement according to claim 7, **characterized in that** the end portion angle β is in the interval $20°<\beta<70°$.

9. An air inlet arrangement according to claim 7, **characterized in that** the end portion angle β is in the interval $30°<\beta<60°$.

10. An air inlet arrangement according to claim 7, **characterized in that** the end portion angle β is substantially 45°.

11. An air inlet arrangement according to any preceding claim, **characterized in that** the end portion (40) is designed and/or arranged in such a way that a geometrical plane (27) defined by the inlet opening (11) is arranged at an angle θ relative to the main direction (F2) of the intended air flow in the air intake conduit (20), the inlet opening angle θ being in the interval $10°<\theta<170°$.

12. An air inlet arrangement according to claim 11, **characterized in that** the inlet opening angle θ is in the interval $30°<\theta<150°$.

13. An air inlet arrangement according to claim 11, **characterized in that** the inlet opening angle θ is in the interval $45°<\theta<135°$.

14. An air inlet arrangement according to claim 11, **characterized in that** the inlet opening angle θ is in the interval $60°<\theta<120°$.

15. An air inlet arrangement according to claim 11, **characterized in that** the inlet opening angle θ is substantially 90°.

16. An air inlet arrangement according to any preceding claim, **characterized in that** the point of the inlet opening (11) of the air inlet tube (10) which is situated closest to the wall (28) of the air intake conduit (20), is situated at a distance (B) from the inner surface of the wall (28) of the air intake conduit (20) at the position where the air inlet tube (10) is mounted to the air intake conduit (20).

17. An air inlet arrangement according to claim 16, **characterized in that** the distance (B) between said point of the inlet opening and the intake conduit wall is in the interval $D/8<B<7D/8$, where D is the diameter or corresponding measure of the air intake conduit (20).

18. An air inlet arrangement according to claim 16, **characterized in that** the distance (B) between said point of the inlet opening and the intake conduit wall is in the interval $D/4<B<D/2$, where D is the diameter or corresponding measure of the air intake conduit (20).

19. An air inlet arrangement according to any preceding claim, **characterized in that** the air inlet tube (10) is mounted to a curved portion of the air intake conduit (20).

20. An air inlet arrangement (X) according to any preceding claim, **characterized in that** the end portion (40) of said air inlet tube (10) is designed as a funnel (50).

21. An air compressor system for a vehicle, comprising an engine (130) and air compressor (110) driven by the engine, and an air inlet tube (10) for providing air to the air compressor (110), and an air intake conduit (20) for providing air to the engine (130), the air inlet tube (10) being provided with an end portion (40) having an inlet opening (11) and being mounted to the air intake conduit (20), **characterized in that** the end portion (40) of the air inlet tube (10) is inserted in the air intake conduit (20) in such a way that the inlet opening (11) is arranged inside the air intake conduit (20), and the inlet opening (11) is arranged to face towards the main direction (F2) of the intended air flow in the air intake conduit (20).

22. A heavy vehicle comprising an air inlet arrangement according to any of claims 1-20 or an air compressor system according to claim 21.

23. An air inlet arrangement for an air compressor (110) in a vehicle, said arrangement comprising

an air inlet tube (10) for said air compressor (110), and

an air intake conduit (20) for an internal combustion engine (130),

wherein said air inlet tube (10) is provided with an end portion having an inlet opening (11) and is mounted to said air intake conduit (20),

characterized in that said inlet opening (11) is configured in such a way as to provide a first air flow in said air inlet tube (10) towards said air compressor (110), where this first air flow is created by a second air flow inside said air intake conduit (20) towards said engine (130), and the air inlet tube (10) is inserted in said air intake conduit (20) in such a way that the inlet opening (11) is positioned inside said air intake conduit (20).

Prior Art

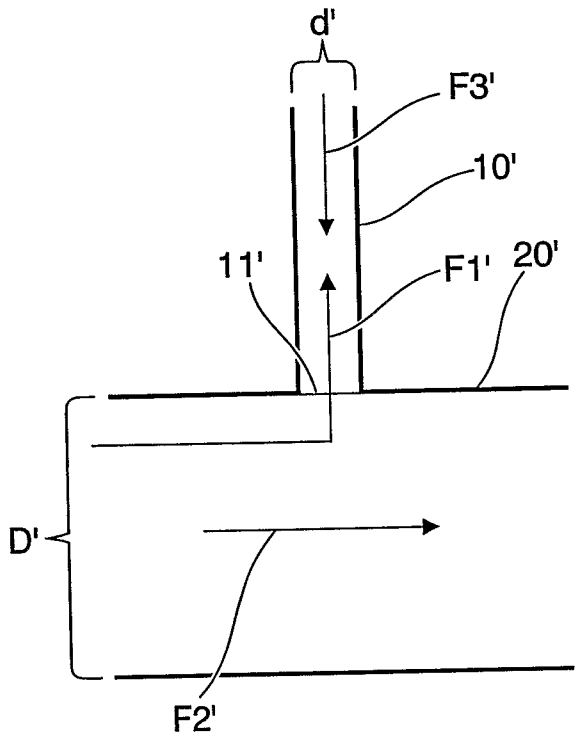

Fig.1

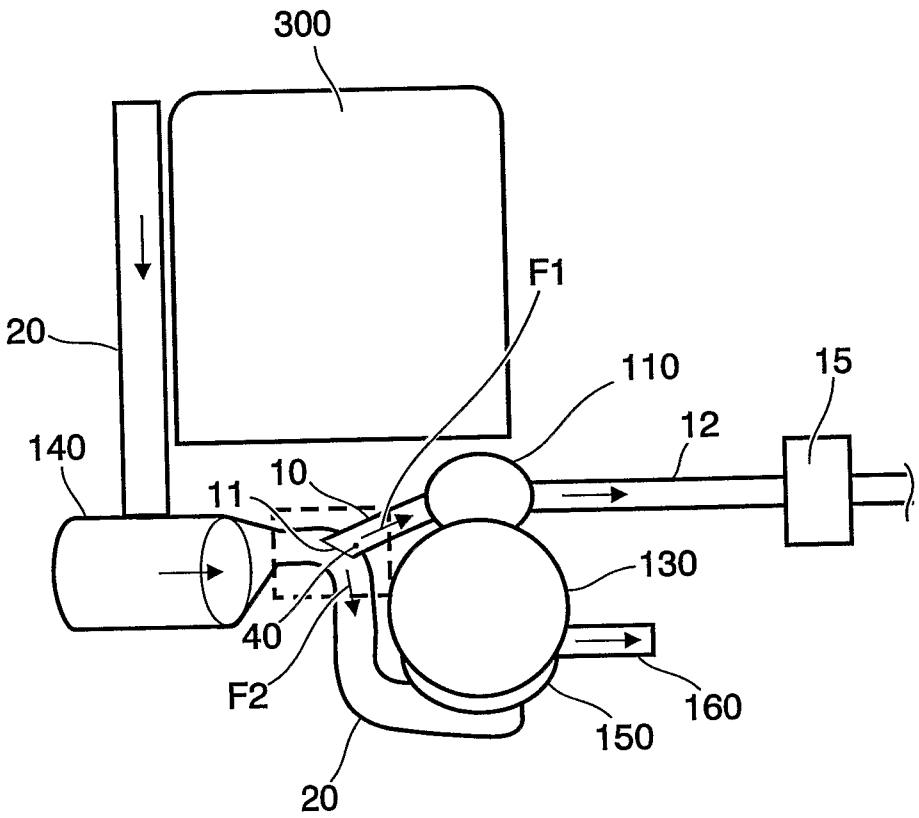

Fig.2

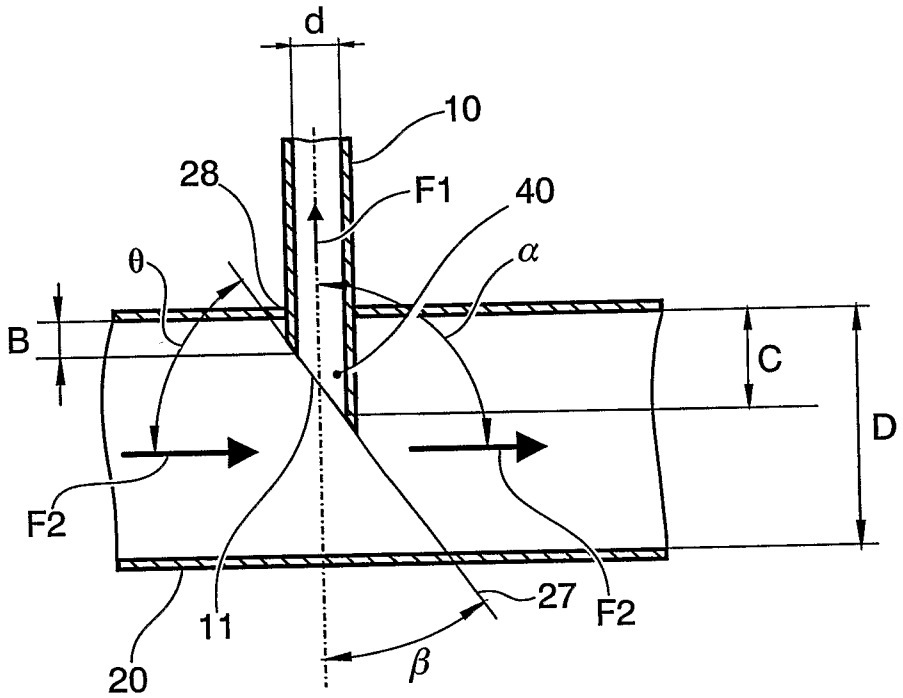

Fig.3a

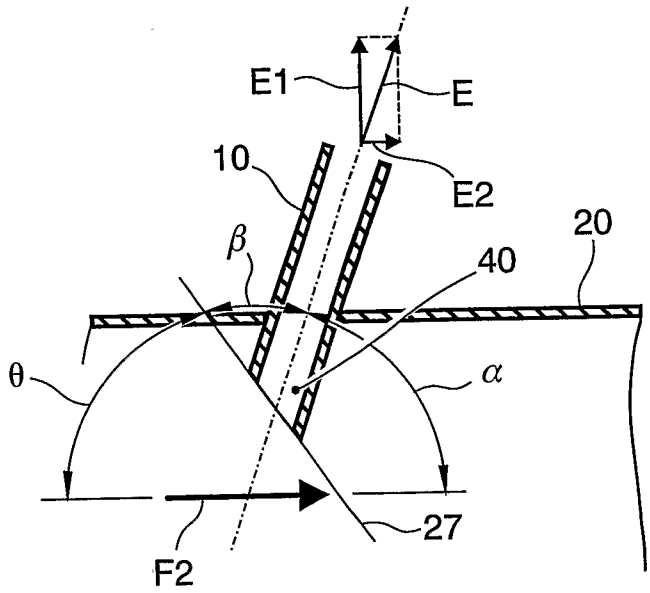

Fig.3b

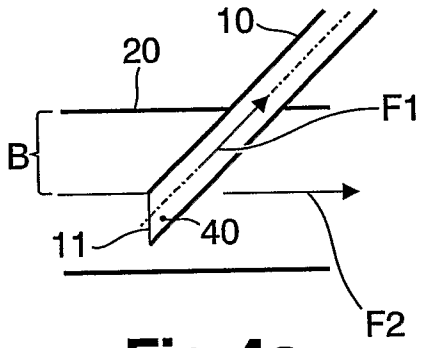

Fig.4a

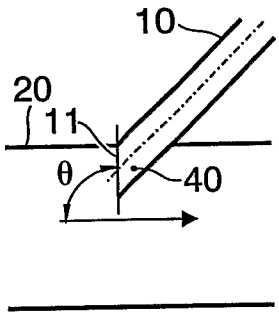

Fig.4b

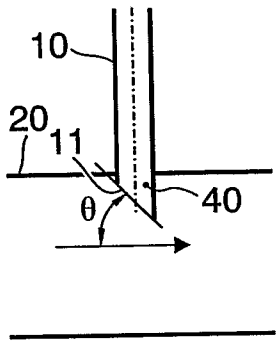

Fig.4c

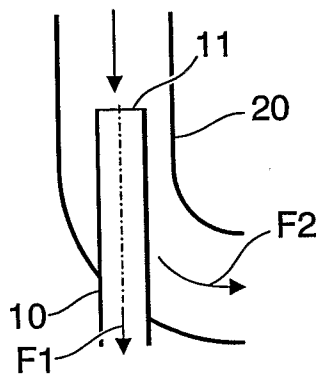

Fig.5a

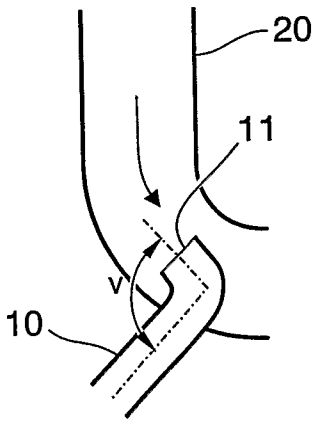

Fig.5b

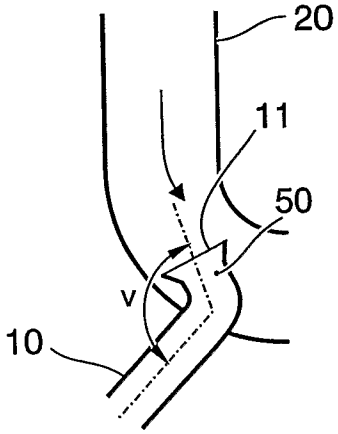

Fig.5c

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2007/000305

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4563132 A (GRIMMER), 7 January 1986 (07.01.1986), figures 1,2, abstract ---	
A	US 4496291 A (GRIMMER), 29 January 1985 (29.01.1985), figures 1,2, abstract ---	
A	US 5154585 A (SPENCER), 13 October 1992 (13.10.1992), figure 1, abstract ---	
A	US 4652216 A (ESLINGER ET AL), 24 March 1987 (24.03.1987), figure 1, abstract --- --------	

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 July 2007	24 -07- 2007
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Dan Ionesco / JA A Telephone No. +46 8 782 25 00

International patent classification (IPC)

F04B 17/05 (2006.01)
F04B 39/04 (2006.01)

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Cited literature, if any, will be enclosed in paper form.

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				SE	0162222	T3	
				JP	1793520	C	14/10/1993
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