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MOBILE AIR COMPRESSOR UNIT

Filed June 19, 1951

2 Sheets-Sheet 1

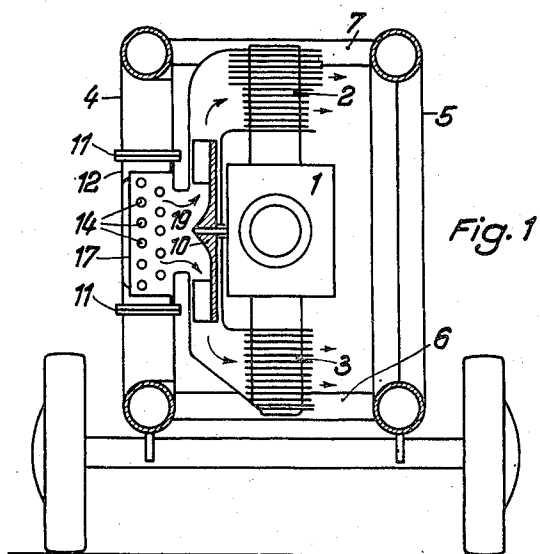


Fig. 1

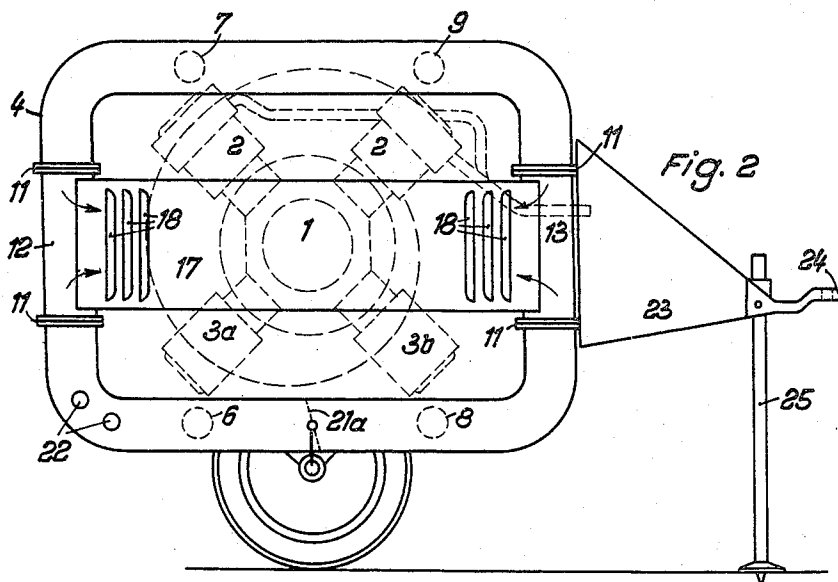


Fig. 2

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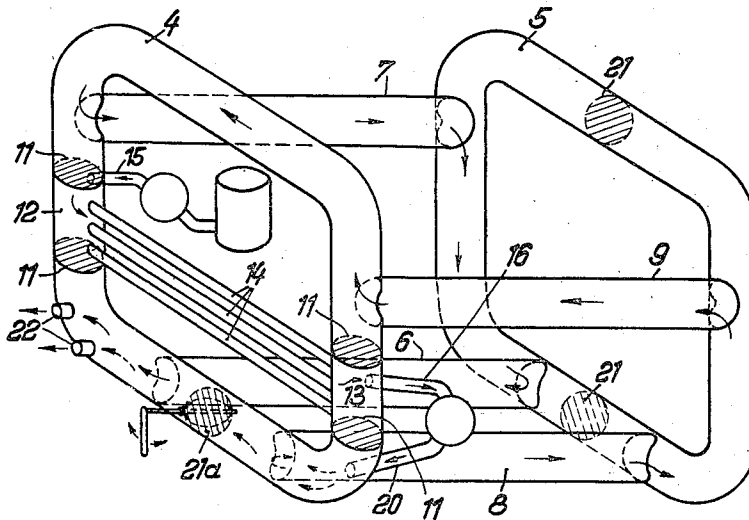
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Fig. 3



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MOBILE AIR COMPRESSOR UNIT

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8 Claims. (Cl. 230—56)

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The invention relates to a mobile set of machines for the production of compressed air which consists of an air compressor, a driving motor and a container for compressed air formed as a tubular frame. The driving motor forming part of the set of machines may be an internal combustion engine or an electric motor. The compressor may be provided with one or with two pressure stages. The invention is not dependent upon a certain manner of cooling; the motor as well as the compressor may be equipped with air cooling as well as with water cooling. By a mobile set of machines is to be understood a set of machines which does not form a unit permanently connected to a foundation, but that it is portable, slidable or movable on wheels.

It is the object of the invention to design a mobile set of machines for the production of compressed air of the type specified in such a manner that it is particularly well adapted to satisfy practical requirements.

The invention is characterised in the first place in that the tubular frame which serves as compressed air container comprises two parallel tubular rings perpendicularly arranged which are connected together by means of horizontal tubes and surround the air compressor as well as the motor. If a compression in two stages is used, it is advisable, according to a further development of the invention, that a separated part of the tubular frame forms an intermediate air container between the two compressor stages. This can be done according to the invention in a particularly suitable manner by employing as the intermediate air container two oppositely disposed tube sections of one of the tubular rings and connecting these tube sections by a number of tubes, the connecting tubes serving as an intermediate cooler. It is advisable to surround the intermediate cooler with a sheet metal casing and to dispose the inlet and the outlet openings in such a manner that the cooling air is caused to pass over the whole length of the intermediate cooler. If air cooling is provided for the compressor and the driving motor, then it is advisable to utilize the cooling air for the intermediate cooler also for the cooling of the compressor and the driving motor by arranging these two machines in the path of the cooling air behind the intermediate cooler.

According to a further development of the invention it is suggested to subdivide the tubular frame into sections connected in series which are passed in succession by the compressed air on its way to the outlet opening. Such a subdivision of

the tubular frame ensures a very efficient cooling of the compressed air. It is advisable to subdivide the tubular frame by means of adjustable regulating members so that they allow for a shortening of the path through which the compressed air is caused to flow. In this way it is e. g. possible to shorten the path of the air within the tubular frame to such an extent, that the compressed air can be discharged while still hot, which is often desirable in winter.

The tubular frame surrounding the compressor and the driving motor is composed advantageously from detachably connected sections. In this way it is made possible to take to pieces the whole unit for transportation into any number of individual parts so that particularly transportation by cable way or over mountainous regions is possible without difficulties.

Further features of the invention will become apparent from the following description of a set of machines represented by way of example in the drawings.

The importance of the invention lies in the realisation of a number of advantageous conditions; one of them is the possibility to reduce considerably the weight of the set of machines. The tubular frame, which serves as a compressed air container, offers an effective protection for the more delicate parts of the unit, i. e. the motor and the compressor, so that there is practically no danger of damage during operation or during the transportation by rail or sea. The design of the tubular frame in the shape of a cage ensures moreover favorable cooling conditions.

In the drawings Fig. 1 represents a cross section through the set of machines according to the invention, Fig. 2 is a side view of the set of machines, Fig. 3 shows a schematic and perspective view of the cage-like tube frame surrounding the set of machines.

The set of machines comprises four cylinders connected to a common crankcase, the cylinders 2 belonging to the driving motor, whilst the cylinder 3a forms the low pressure stage and the cylinder 3b the high-pressure stage of the compressor; the motor and the compressor are surrounded by a tubular frame which consists of two parallel and vertically disposed tubular rings 4 and 5 and of transverse tubes 6, 7, 8 and 9. The set of machines is supported by the transverse tubes 6, 8 and it is equipped with a ventilator 10 which supplies cooling air to the cylinders 2 and 3.

Two vertical tube sections 12 and 13 are separated from the tubular ring 4 by means of blind flanges 11 and are connected together through a

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group of horizontal tubes 14. The tube section 12 is connected through the tube 15 to the pressure side of the low-pressure stage, whilst the tube section 13 is in connection with the suction side of the high-pressure stage through the tube 16. The tube sections 12 and 13 form together with the group of tubes 14 an intermediate air container, the group of tubes 14 serving at the same time as an intermediate cooler. For this purpose the group of tubes 14 is provided with a sheet metal casing 17, the inlet slots 18 and the outlet slots 19 of which are so arranged that the cooling air is caused to pass over the whole length of the tubes 14. The cooling air discharged through the openings 19 is utilised for the cooling of the motor and the compressor and it is supplied to the cylinders 2 and 3 by means of a ventilator 10.

The tubular ring 4, with the exception of the tube sections 12 and 13, forms together with the tubular ring 5 and the transverse tubes 6 to 9 the container intended to receive the air when finally compressed which is discharged from the high pressure stage through the tube 20. This compressed air container can be subdivided by means of adjustable flap valves 21 into several sections, through which the compressed air passes in succession on its way to the outlet openings 22, as it is represented in Fig. 3. By the opening of individual control valves 21 the path of the flow of the compressed air can be shortened; accordingly at the same time the cooling effect of the tubular frame is reduced. Particularly hot compressed air can be made available, e. g. in winter, by opening of the flap valve 21a; in this manner the compressed air discharged from the high pressure stage reaches the outlet openings 22 on a very short path.

The tubes forming the tubular frame may be formed of detachably connected sections in order to facilitate the dismantling for transportation. Instead of the tubes 15, 16 and 20 flexible tubes may be used.

As can be seen from Figs. 1 and 2, the tubular frame is constructed as a wheeled carriage. Naturally it can be also formed as a sliding carriage. To the tubular frame a centre pole is connected which has the shape of a sheet plate hood 23 forming a sound silencer and serving to lead away the waste gases from the motor, and it is provided at its end with a coupling eye 24 as well as with a supporting post 25 adjustable in its height.

What I claim is:

1. An air compressor unit comprising an air compressor, a motor driving the compressor, a pair of tubular continuous frames disposed vertically at opposite sides of the compressor and motor and extending beyond the compressor and motor in all directions in the plane of each frame, a plurality of horizontal tubes interconnecting the tubular frames of the pair at portions thereof extending beyond the compressor and motor, the compressor and motor being supported by at least some of the horizontal tubes, a connection from the output side of the compressor to one frame of the pair, and an air outlet in one of the frames of the pair at a region thereof relatively remote in the direction of air flow from the last mentioned connection.

2. Portable compressor unit comprising a two-stage air compressor, a driving motor integral with the compressor and in substantially balanced radial relation thereto, a first tubular frame disposed vertically adjacent one side of

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the compressor and motor, a second tubular frame disposed vertically adjacent the side of the compressor and motor opposite the one side, each of the tubular frames having portions extending beyond the compressor and motor, a plurality of spaced stops in the first tubular frame dividing the first frame into an upper, an intermediate, and a lower section, a plurality of substantially horizontal tubes extending across the compressor and motor interconnecting the second frame with the upper and lower sections of the first frame, a connection from the output side of the first stage of the compressor to an end region of the intermediate section of the first tubular frame, a connection from the opposite end region of the intermediate section of the first frame to the input side of the second stage of the compressor, a connection from the output side of the second stage of the compressor to the interconnected upper and lower sections of the first frame and the second frame, and an air outlet in the interconnected second frame and the upper and lower sections of the first frame relatively remote in the direction of air flow from the connection of the second stage output side.

3. Portable compressor according to claim 2 in which the intermediate section includes a plurality of spaced tubes substantially horizontal in the plane of the first frame, and means are provided for drawing cooling air from the external atmosphere about the plurality of spaced tubes.

4. Portable compressor according to claim 2 in which the intermediate section includes a plurality of spaced tubes substantially horizontal in the plane of the first frame, a casing positioned about the plurality of spaced tubes, a plurality of inlet openings being provided in the face of the casing remote from the compressor and the motor, a single outlet opening being provided substantially centrally in the face of the casing adjacent the compressor and motor, and a suction fan is disposed in the outlet opening for drawing atmospheric air through the inlet openings and over the spaced tubes.

5. Portable compressor unit according to claim 2 in which the intermediate section includes a plurality of spaced tubes substantially horizontal in the plane of the first frame, a casing spacedly positioned about the plurality of spaced tubes, a pair of inlet openings in the casing face most remote from the compressor and motor, each of the inlet openings being substantially at an end region of the casing, a single outlet opening positioned substantially centrally the face of the casing adjacent the compressor and motor, and a suction fan within the outlet opening adapted to draw atmospheric air into the inlet openings and over the spaced tubes of the plurality.

6. Portable compressor unit according to claim 2 in which the compressor and motor have finned cylinders, the intermediate section of the first frame includes a plurality of spaced tubes substantially within the width of the frame, a casing spacedly positioned about the plurality of spaced tubes, a pair of inlet openings in the casing face most remote from the casing and motor, each inlet opening being substantially at an end region of the casing, an outlet opening positioned substantially centrally the casing face adjacent the compressor and motor, a suction fan in the outlet opening, and a plurality of conduits one for each finned cylinder adapted to eject cooling air across the finned cylinders.

7. Portable compressor unit comprising an air

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compressor, a motor driving the compressor, a pair of tubular frames disposed substantially vertically to opposite sides of the compressor and motor and spaced therefrom, the dimensions of the frame exceeding the height and length dimensions of the compressor and motor, a plurality of substantially horizontal cross tubes interconnecting the tubular frames at portions thereof extending beyond the compressor and motor, a connection from the output side of the compressor to one tubular frame of the pair, an air outlet in one of the frames of the pair, and a plurality of stops within each frame of the pair of which the individual stops are so positioned relative each other as to make the air outlet relatively remote in the direction of air flow within the frames and cross tubes from the connection to the output side of the compressor.

8. Portable compressor unit according to claim 7 in which one of the stops of the plurality is adjustable so as to effectively permit of its removal

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from the air flow path between the air outlet path and the connection to the output side of the compressor and thus to unblock a direct relatively short path between the output side of the compressor and the air outlet.

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