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M. DREWES, JR

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MOTOR-DRIVEN COMPRESSOR UNIT

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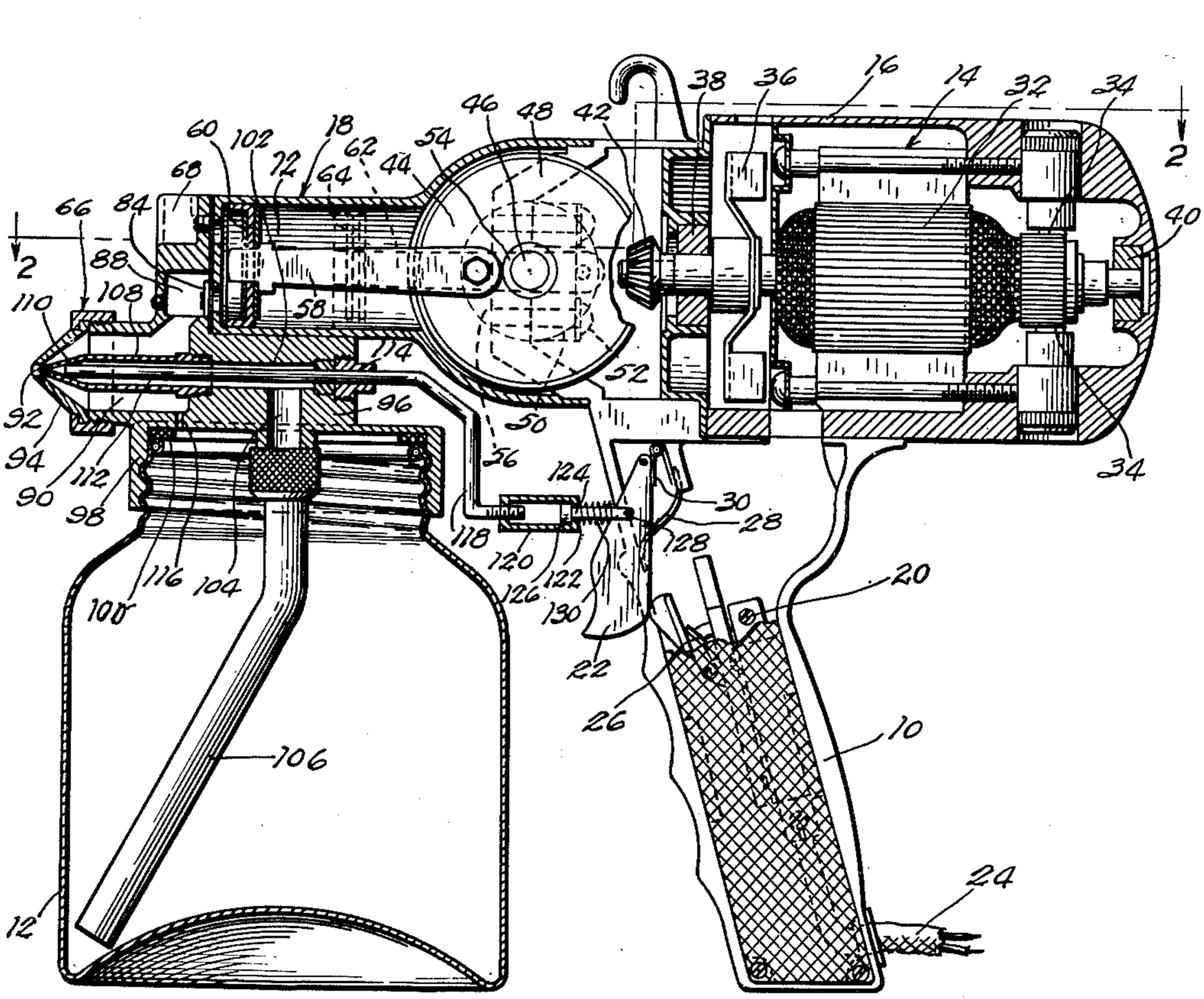

Fig. 1

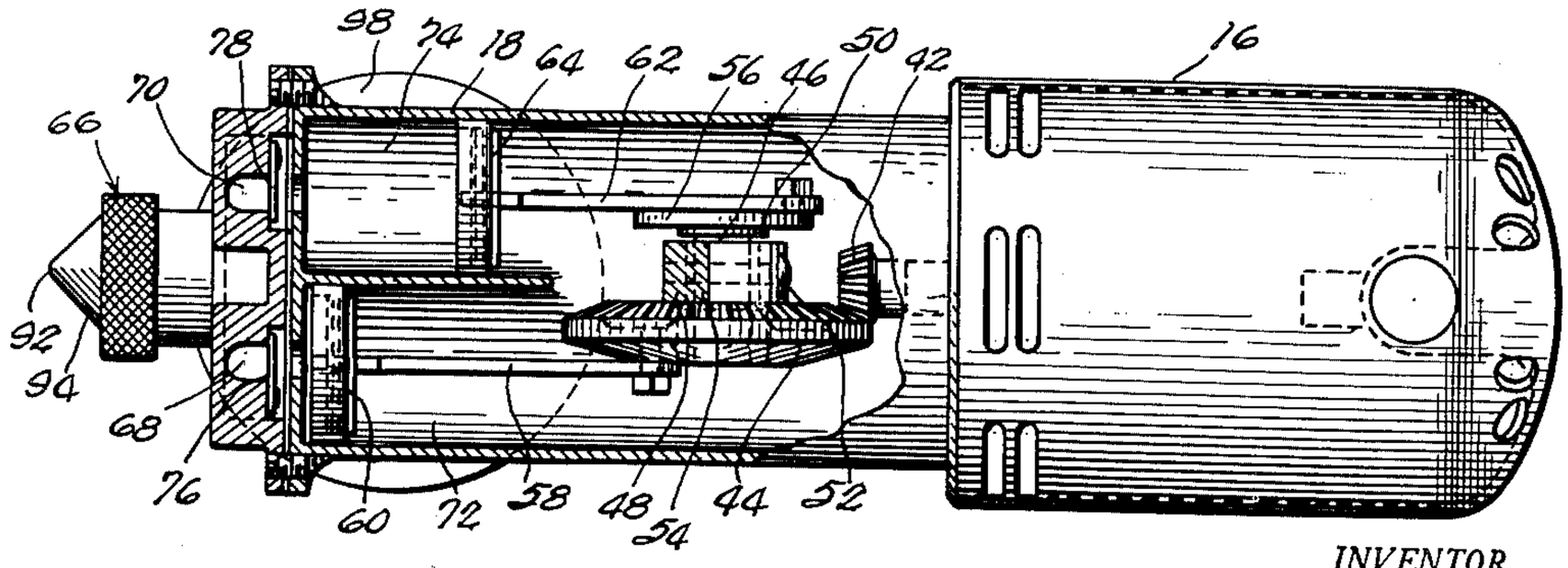

Fig. 2

INVENTOR.

Menke Drewes Jr.

BY

Thies, Olson & Mecklenburger

Attys.

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MOTOR-DRIVEN COMPRESSOR UNIT

Menke Drewes, Jr., Chicago, Ill., assignor to Payswell Products Corporation, Chicago, Ill., a corporation of Illinois

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2 Claims. (Cl. 230—58)

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This invention relates to a motor driven compressor unit and more particularly to a compressor unit for use with a self-contained spray gun.

A further object of this invention is to provide a compact and rugged compressor unit for a spray gun assembly which may be useful for a variety of purposes including the spraying of paints, varnishes, lacquers, insecticides and other chemicals.

An additional object of this invention is the provision of a compressor unit for a spray gun containing two reciprocating pistons driven at high speed by a universal motor under conditions to permit a uniform flow of air to the spray nozzle.

A still further object of this invention is the provision of a pinion and bevel gear arrangement for operating a double piston compressor at high speeds by an electric motor.

Further and additional objects will appear from the following description and the appended claims.

In accordance with one embodiment of this invention there is provided a motor-driven compressor unit comprising a motor having a rotor, a pinion on the forward end of the rotor, a drive shaft support bracket positioned forwardly of the pinion and in substantial alignment with the rotor, a drive shaft mounted for rotation within said bracket extending substantially perpendicular to the longitudinal axis of the rotor, a drive wheel secured to one end of the drive shaft, a combination drive wheel and bevel gear secured to the other end of the drive shaft, and a double piston compressor mounted in spaced relationship to the drive shaft including one connecting rod and piston driven by the drive wheel and a second connecting rod and piston driven by the combination drive wheel and bevel gear. The support bracket is preferably cast integrally with the handle of the spray gun. This arrangement for driving the compressor unit by the electric motor is particularly rugged and permits the compressor to be operated at high speeds in a manner to provide the desired flow of air to the spray nozzle of the gun with which it is used.

For a more complete understanding of this invention reference will now be had to the accompanying drawing, wherein:

Fig. 1 is a sectional elevational view of a spray gun constructed with the compressor unit of this invention; and

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1.

Referring now more particularly to the drawing, there is provided a self-contained spray gun having a handle 10, a liquid container 12, an

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electric motor 14 contained within a housing 16, a double piston compressor 18 driven through a suitable gear mechanism contained within a housing forwardly of the motor 14. The handle 10 depends from the motor housing 16 and contains an ordinary electric switch 20 that may be operated by a depressing trigger 22 pivotally mounted within the handle 10 adjacent the front portion thereof. The switch is connected to a suitable source of electricity (not shown) through an electric cord 24 and suitable leads (not shown) extend from switch 20 to the electric motor 14 to cause the latter to operate when the trigger 22 is depressed in a direction toward the switch 20. The switch is constructed so that the motor will be turned on when the trigger is depressed by finger pressure or otherwise but will be turned off when the finger pressure on the trigger 22 is released. Spring 26 in association with the switch mechanism and springs 28 and 30 in association with the trigger cause the trigger to return to a forward position when finger pressure thereon is released. It will be understood that upon the release of the trigger the motor will continue to operate until the trigger has returned almost to the limit of its forward position with respect to the forward surface of the handle 10.

The motor 14 mounted within the housing 16 is of the usual construction and need not be further described in detail. Suffice it to say that it comprises the usual rotor 32, brushes 34 and cooling fan 36 and the necessary electrical leads (not shown) extending from the switch 20. The rotor 32 is mounted in the housing within bearings 38 and 40.

The rotor 32 is provided with a pinion 42 which is keyed or otherwise secured to the forward end thereof for rotation therewith. As shown most clearly in Fig. 2, the pinion 42 meshes with teeth cut into the surface of a combined bevel gear and drive wheel 44. The combination bevel gear and drive wheel 44 is keyed to a drive shaft 46 which extends substantially perpendicularly to the longitudinal axis of the rotor 32, said drive shaft being supported on a support bracket 48 by means of a clip 50 secured to the support bracket by machine screws 52. Between the support bracket 48 and the clip 50 there is clamped a bearing 54 through which the drive shaft 46 extends for rotation with respect thereto. Thus the drive shaft 46 is centrally bearinged within the bearing 54 supported on the support bracket 48 and one end of the drive shaft has the combination bevel gear and drive wheel 44 keyed thereto. As shown in Fig. 2, a drive wheel 56 is keyed or otherwise se-

cured to the other end of the drive shaft 46. It will be noted that the drive wheel 56 and the combination drive wheel and bevel gear 44 are on opposite sides of and embrace the support bracket 48 which serves as a central support for the drive shaft. It will also be noted from Fig. 1 that the support bracket 48 is cast integrally with the handle 10 of the spray gun, thus providing a rigid mounting for the drive shaft 46.

The combination bevel gear and drive wheel 44 is connected in the usual manner to connecting rod 58 and piston 60 and the drive wheel 56 is likewise attached to the connecting rod 62 and corresponding piston 64. Thus it will be apparent that rotation of the rotor 32 will drive the combination bevel gear and drive wheel 44 to reciprocate the pistons 60 and 64 which serve as the compressor elements for the compressor 18. It is preferred that these pistons be reciprocated alternately so that compressed air at all times will be forced into a spray nozzle assembly 66. The compressor head of the compressor 18 is provided with air intake ports 68 and 70 for each of the cylinders 72 and 74 and the intake ports are provided with the usual one way flap valves 76 and 78. Each of the cylinders 72 and 74 is also provided with exhaust ports covered with the usual one way flap valves 84 to permit flow of compressed air from each of the cylinders into a compression chamber 88 in the forward end of the compressor.

The nozzle assembly 66 is of a usual type comprising a compressed air passageway 90 communicating with the compression chamber 88 and terminating in a forward portion in an aperture 92 formed in the apex of a conically shaped nozzle tip 94. Thus air within the compression chamber 88 during the operation of the motor 14 continually passes through the passageway 90 at high velocity out of the aperture 92. It is preferred that motor 14 be operated at high speed and, since the total volume of the compression chamber 88 and the passageway 90 is sufficiently large to function as a surge chamber, a substantially uniform stream of high velocity air is delivered through the nozzle 66 of the device.

Beneath the compressor 18 and extending generally in the direction of the handle 10 there is mounted the container 12 which contains the liquid to be sprayed. The container 12 is secured to a nozzle block 96 by a suitable screw thread connector 98 provided with an airtight gasket 100. The nozzle block 96 is provided with a horizontal liquid passageway 102 which communicates with a vertical liquid passageway 104 which latter communicates through a removable dip pipe 106 with the bottom of the container 12. The horizontal passageway 102 is threadably secured in its forward end to a diffuser pipe 108 having a forwardly extending apertured reduced end portion 110 which latter serves as a valve seat for a needle valve 112 extending through the diffuser pipe 108 and the passageway 102. The needle valve 112 is reciprocable within the diffuser pipe and the passageway 102 and extends rearwardly from the passageway 102 through a packing plug 114 secured in the rear end of the passageway. A small aperture 116 is provided in the base of the nozzle block 96 to provide communication between the compressed air passageway 90 and the interior of the container 12 thus providing air pressure within the container for assisting the flow of liquid upwardly through the pipe 106, the passageways 104 and 102 and the diffuser pipe 108.

In the modification shown the needle valve 112 is provided with an extension 118 which extends rearwardly toward the handle 10 and the trigger 22. The rear end of the extension 118 is threaded to a turnbuckle 120 and the opposite end of the turnbuckle is provided with an aperture 122 through which a pin 124 having an enlarged head 126 is slidably mounted. The head 126 prevents complete withdrawal of the pin 124 from the turnbuckle 120. The rearward end of the pin 124 is pivotally secured to the trigger 22 at point 128 and a compression spring 130 is provided on the pin 124 which abuts against the trigger 22 and the turnbuckle 120, thus tending constantly to hold the turnbuckle and the pin in the relationship shown in Fig. 1. However, the tension of spring 130 is overcome by the conjoint action of springs 26, 28 and 30 so that when the trigger is completely relieved of finger pressure (a condition not shown in the drawing) then, after the needle valve 112 seats in the valve seat of the diffuser pipe 108, the resistance of spring 130 will be overcome, pushing the enlarged head 126 into the turnbuckle 120. Thereby the trigger is permitted to return beyond a position which corresponds to the seating of the needle valve 112 which is desirable since, in a preferred form of operation of the spray gun, it is desired to have the needle valve seated prior to the time that the switch 20 turns off the motor 14.

The operation of the device is believed to be clear from the foregoing description of the several operating parts. Thus it will be seen that when the container 12 is at least partially filled with the liquid to be sprayed and the trigger is pulled, the motor will be turned on, causing a substantially constant flow of air through the orifice 92 of the nozzle 66. When the trigger is pulled to its full limit, the pin 124, the turnbuckle 120, the extension 118 and the needle valve 112 are moved rearwardly to at least partially withdraw the needle valve from the reduced end of the diffuser pipe 108. When this has occurred, the combination of the suction produced at the end of the diffuser pipe 108 by the air flowing through passageway 90 out of the orifice 92 and the pressure against the surface of the liquid in container 12 exerted through passageway 116 will cause the liquid to pass upwardly through the dip pipe 106 through the diffuser pipe 108. The liquid is thus atomized at the tip of the diffuser pipe and is sprayed from the nozzle 66. When it is desired to discontinue the spray the trigger is released by the operator. Springs 26, 28 and 30 cause the trigger to return toward its forward position. Spring 130 on the pin 124 holds the head 126 against the rear end of the turnbuckle 120 whereby the turnbuckle, extension 118 and the needle valve 112 are moved to the valve seat in the reduced portion 110 of the diffuser pipe 108. The diffuser pipe is then closed, shutting off the flow of liquid to the nozzle. After the needle valve 112 is in its seat, then the trigger continues to move forward by virtue of the springs 26, 28 and 30 to the switch opening position. This further movement is permitted by compression of the spring 130, causing the pin 124 to slide forwardly within the turnbuckle 120. Thus it will be observed that the diffuser pipe is closed before the compressed air supply is shut off, whereby the nozzle is automatically cleaned and dripping is prevented when the device is stopped.

It will be apparent from the foregoing that a rugged, compact and easily constructed self-contained spray gun unit has been provided. It is easily handled and may be readily taken apart

for cleaning purposes. It is convenient to operate and provides a steady but controllable flow of spray at all times during operation and does not have a tendency to drip after the motor has been turned off. Means have been provided for mounting the motor, compressor and associated gear mechanism in such a manner that long life of the device will be insured.

In the foregoing, reference has been made to the combination bevel gear and drive wheel 44 and the drawings show the teeth on the gear extending in directions inclined to the plane thereof. However, the term "bevel gear" as herein employed is intended to include also a face gear having teeth extending within the plane of or parallel to the plane of the gear.

While one particular embodiment of this invention is disclosed above, it will be understood, of course, that the invention is not to be limited thereto, since many modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. A motor driven compressor unit comprising a housing, an electric motor including a rotor therefor mounted within said housing, a pinion disposed within said housing and mounted on one end of said rotor and rotatable therewith, a support bracket disposed within said housing and positioned in spaced relation with respect to said pinion, said bracket and the axis of said rotor being disposed in substantially coplanar relation, a drive shaft rotatably mounted on said bracket and disposed in substantially perpendicular relation with respect to the plane formed by said bracket and the axis of said rotor, the ends of said drive shaft projecting from opposite sides of said bracket, the axes of said shaft and rotor being in substantially coplanar relation, a first drive wheel disposed within said housing and on one side of said bracket and keyed to one end of said shaft, a second drive wheel and bevel gear combination disposed within said housing and on the opposite side of said bracket and keyed to the opposite end of said shaft, said bevel gear and pinion being in meshing relation, and a double piston compressor unit mounted within said housing and disposed in spaced relation with respect to said bracket and in substantial alignment with the axis of said rotor; said compressor unit comprising a

first piston rod operatively connected to said first drive wheel at a point spaced from the axis of said wheel, and a second piston rod operatively connected to said second drive wheel and bevel gear combination and at a point spaced from the axis of said second drive wheel.

2. A motor driven compressor unit comprising an elongated housing, an electric motor including a rotor therefor mounted within and at the rear portion of said housing, a pinion disposed within said housing and mounted on the forward end of said rotor and rotatable therewith, an elongated support bracket disposed within said housing and having the opposite ends thereof mounted on said housing, said bracket being positioned forwardly of said pinion and in coplanar relation with respect to the axis of said rotor, a drive shaft rotatably mounted on said bracket and disposed in substantially perpendicular relation with respect to the plane formed by said bracket and the axis of said rotor, the axis of said drive shaft being in substantially coplanar relation with respect to the axis of said rotor, a first drive wheel disposed within said housing and on one side of said bracket and keyed to said shaft, a second drive wheel disposed within said housing and on the opposite side of said bracket and keyed to said shaft, said second drive wheel having bevel gear teeth formed on the periphery thereof and in meshing relation with said pinion, and a double piston compressor unit operatively connected to said drive wheels and disposed within said housing forwardly of said bracket and in substantial alignment with the axis of said rotor.

MENKE DREWES, JR.

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