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1,897,164

LIQUEFIED GAS DISTRIBUTOR'S SERVICING TRUCK

Filed Nov. 9, 1929

2 Sheets-Sheet 1

FIG. 1.

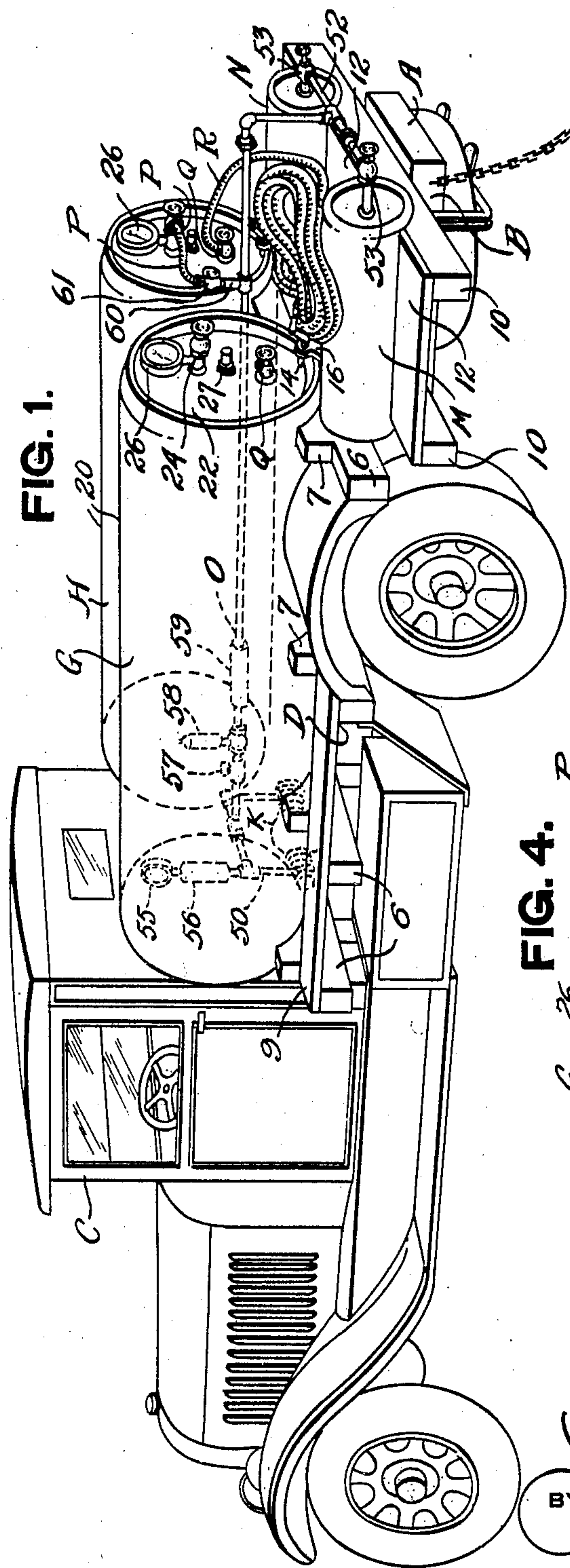
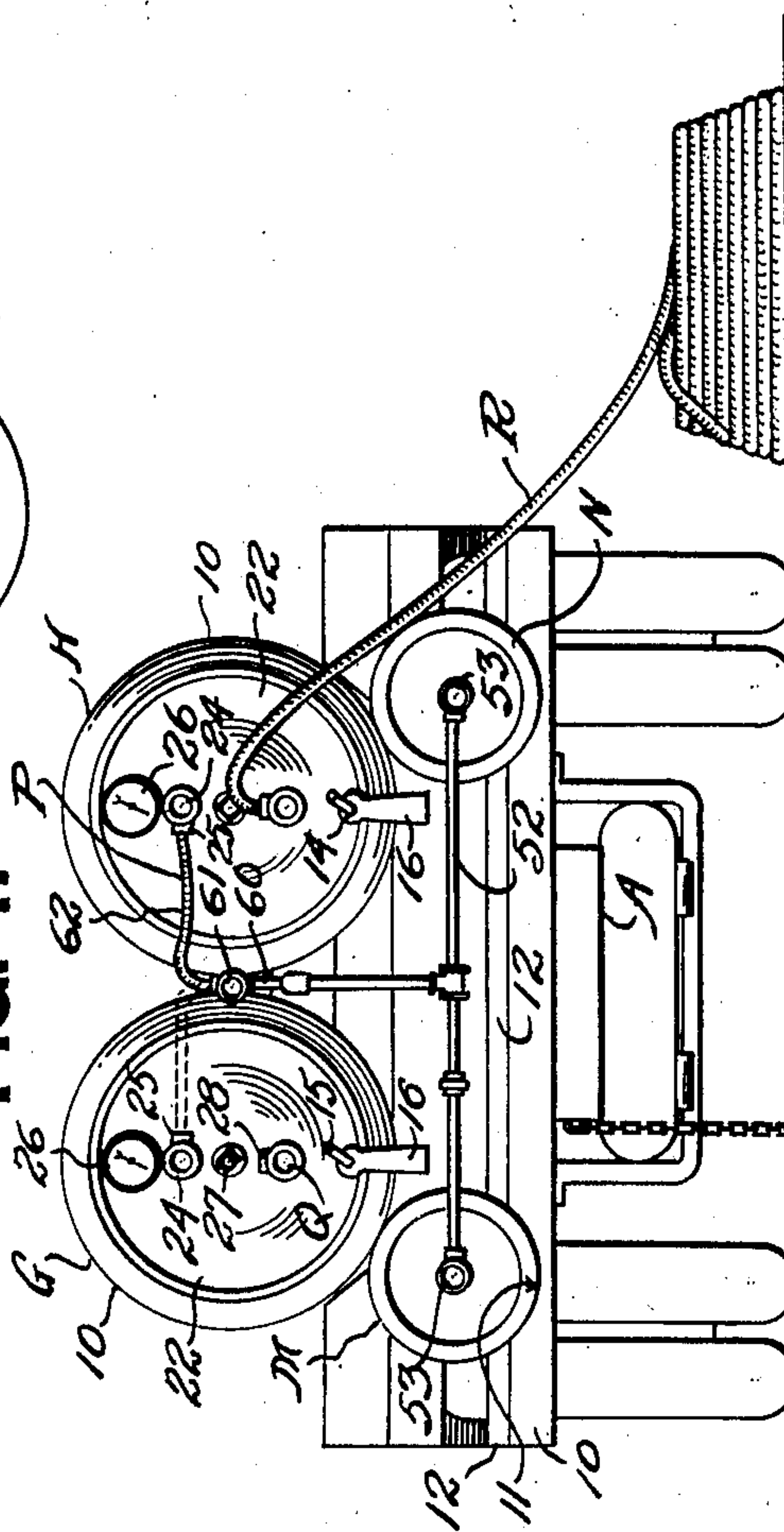


FIG. 4.



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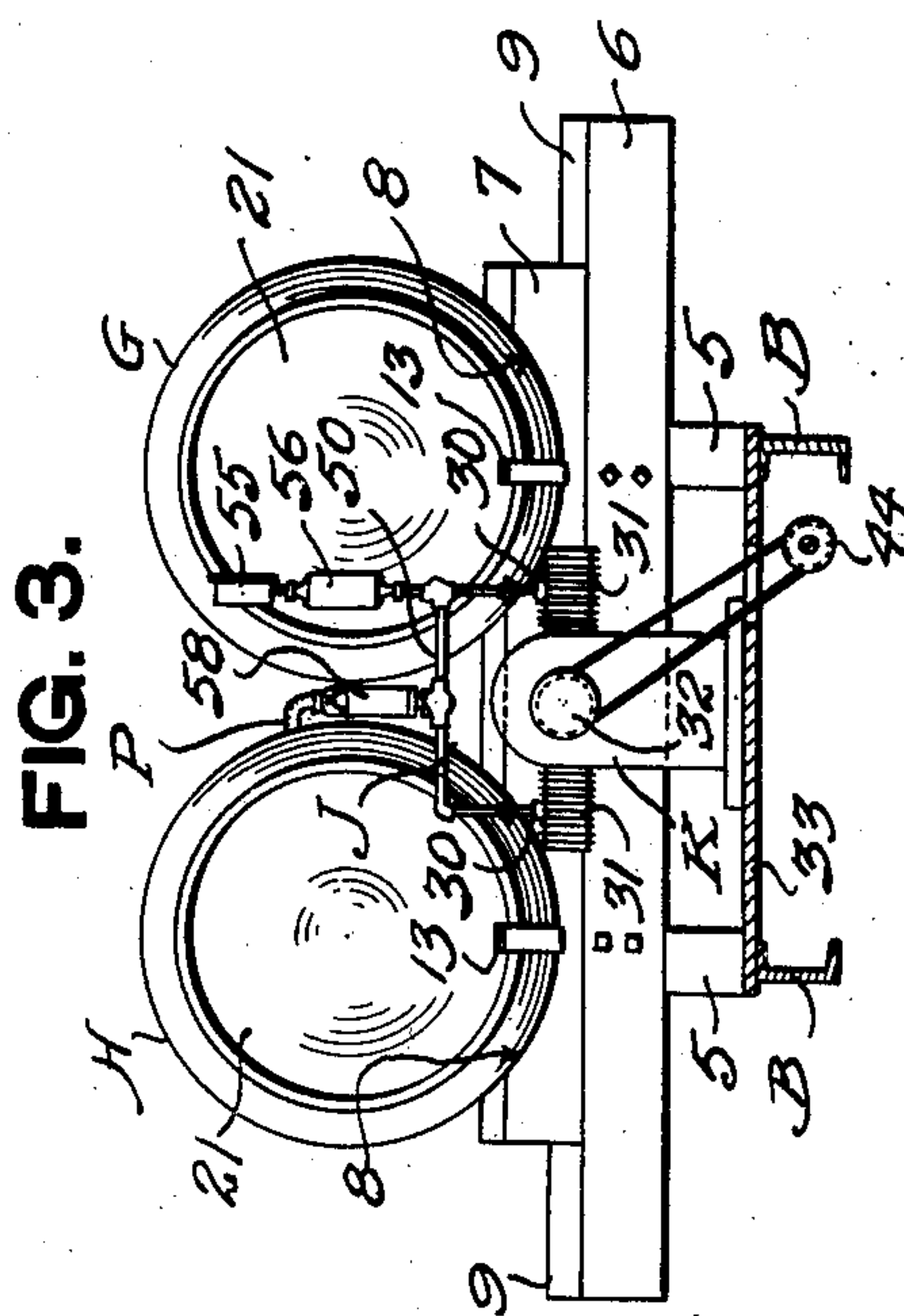
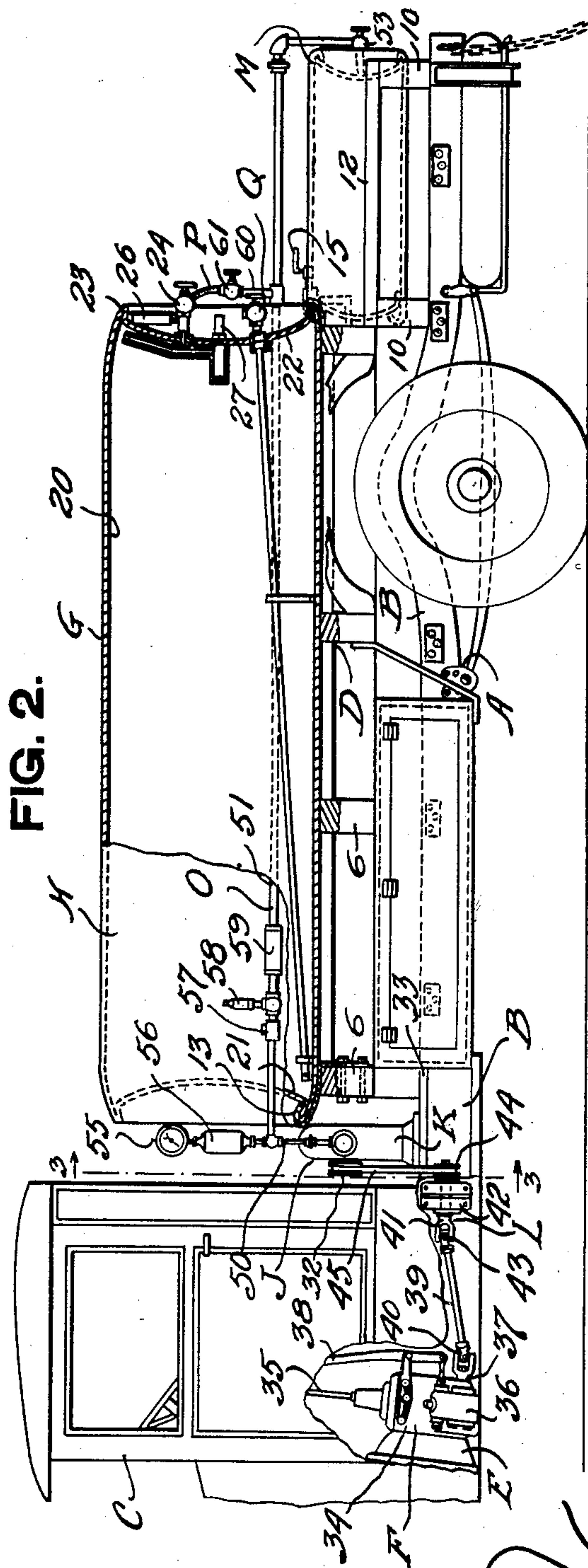
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## LIQUEFIED GAS DISTRIBUTOR'S SERVICING TRUCK

Application filed November 9, 1929. Serial No. 406,148.

This invention relates to equipment for servicing of liquefied gas to customers by the distributor, and more particularly to a truck including a suitable container or containers  
5 for the liquefied gas under superatmospheric pressure with means for controlling, advancing and delivering the liquefied gas under superatmospheric pressure from said containers to the customers' supply tanks, and  
10 for protecting the equipment used in such transfer of the liquefied gas from the truck carried containers to the customers' tanks.

The primary objects of the present invention are, to provide equipment by which  
15 liquefied gas may be transferred from the truck carried container or containers to the customers' tanks by the use of compressed gases when the superatmospheric pressure of the liquefied gas in the truck containers is  
20 only slightly above, substantially equal to or less than that desired in the customers' tanks; and to provide truck carried means whereby such expressing gas may be compressed. This expressing gas may be air, and the term  
25 "air" will be used hereinafter to designate such gas, but it is to be distinctly understood that this is merely by way of example, since it may be desirable to introduce into the truck carried containers a gas other than or  
30 in addition to air, which may have the dual function of an expressing agent and otherwise beneficial to the equipment, the product delivered or both, without departing from the spirit of the invention as described and  
35 claimed.

Another object of the present invention is to provide a plurality of truck carried reservoirs which may receive and hold the compressed air and which air may be conducted  
40 from either or both of the reservoirs to the truck carried container or containers for the compressed liquefied gas at the will of the operator, and whereby it is not necessary to frequently run the air compressing means. These reservoirs also provide relatively large  
45 chambers for air, absorbing to quite some extent the vibration and pulsations of the comparatively inexpensive air compressing means and permits the storage of a reserve  
50 supply of air which may be found useful in

the event of the air compressor or some part associated therewith becoming inoperative.

Other objects and advantages of the invention will appear in the following detailed description of one embodiment of the present  
55 invention, taken in connection with the accompanying drawings, forming a part of this specification, and in which drawings:

Figure 1 is a perspective view of a liquefied gas distributor servicing truck constructed according to the present invention.

Figure 2 is a fragmentary side elevation of the same, parts being broken away and shown in section to disclose details.

Figure 3 is a partial transverse, sectional  
65 view thru the truck body on the line 3—3 of Figure 2 looking in the direction of the arrows.

Figure 4 is a partial end elevation of the truck.

In the drawings, wherein like characters designate similar parts thruout the views, A designates the truck chassis including longitudinal frame members B upon which are mounted a cab C and body D, and which  
75 frame members B also support an engine E and transmission F all of which may be of any usual or approved design and construction.

In the example shown the body D supports  
80 two containers G and H for liquefied gas, but this is to be understood as merely by way of example since the invention is applicable to trucks having one or a plurality of such containers. In co-pending application for patent  
85 filed by me July 27, 1929, Serial Number 381,502 entitled Liquefied gas distributors' servicing trucks is disclosed and claimed suitable body constructions and means for retaining the containers thereon against lateral and longitudinal movement and such  
90 forms no part of the present invention, being shown merely by way of example.

Means J to express the liquefied gas from either containers G or H includes in addition  
95 to a suitable prime mover, such as the truck engine E, a compressor K with suitable motion transmitting means L between the engine E and compressor K which means L may include a portion of the transmission F.  
100



Reservoirs M and N for storage of compressed air from compressor K are mounted on body D, preferably at the rear thereof and while in the present example two are shown, it is to be understood that one may suffice and possibly, with a likely sacrifice to convenience, the reservoirs M and N may be dispensed with and the compressor equipped with some suitable type of vibration or pulsation absorber. Between the compressor K and reservoirs M and N is a conduit O and between conduit O and either container G and H is a conduit P with suitable accessories as hereinafter described.

The containers G and H are provided with outlets Q for connection with a conduit R such as a hose capable of withstanding the pressure to which it may be subjected in the transfer of the liquefied gas from the selected container G or H to the customer's tank, not shown in the drawings, but an example of which may be found in co-pending application for patent filed by me May 26, 1928, Serial Number 280,746, entitled Methods and apparatus for distribution of liquefied gas.

The body D may comprise a pair of longitudinally extending supports 5 upon which are mounted a plurality of transverse major supports 6 which have surmounted thereon a plurality of transverse minor supports 7, recessed as at 8 to receive the containers G and H. The longitudinal supports 5 may rest upon the frame members B of the chassis A, and the major transverse supports 6 may receive at their end portions platforms or walkways 9. The rear portion of the chassis longitudinal frame members B support transverse members 10, recessed as at 11 for support of the reservoirs M and N, these members 10 also supporting platforms or walkways 12 as clearly shown in Figures 1 and 4. The containers G and H may be held on the body D against longitudinal movement and in spaced relation to the rear of cab C by means of brackets or hooks 13 at their front portions, and clamping screws 14 at their rear portions, these clamping screws provided with operating handles 15 and supported by standards 16 secured to one of the minor transverse supports in a manner similar to that disclosed in the aforesaid application Serial Number 381,502.

The containers G and H in which the distributor carries the liquefied gas under pressure, to the customer's equipment, are capable of withstanding high internal pressures and comprise elongated cylindrical body 20 having inwardly bulged front and rear walls 21 and 22, respectively, with tapered flange connections 23 between these walls and the cylindrical body. Each container may be of any approved volumetric capacity, and the rear end wall may be provided with inlet valve 24 having a nipple 25 for detachable

connection with the flexible conduit P. There may be placed adjacent valve 24 a suitable pressure gauge 26, and adjacent the center of the rear end wall, a safety valve 27. The rear end wall is also provided with the valve controlled outlet Q having a nipple 28 for detachable connection with the flexible conduit R.

Referring now to the means J to express liquefied gas from either container G or H, the compressor K may be of any suitable type and in the example shown has two outlets 30 and diametrically opposite cylinders 31, the compressor being driven thru a pulley 32, preferably in a manner hereinafter set forth. The air compressor is mounted on a platform 33 supported on longitudinal frame members B, as shown in Figure 3 and is positioned to the rear of cab C, between the cab and containers G and H, where it is in a protected position, remote from the inlet and outlet of the containers, and the safety valves 27 thereof. The motion transmitting means L, in the example shown, comprises the usual gear set 34 including lever 35, whereby different speed ratios may be obtained, or the gear set placed in neutral; a unit 36 including a driven shaft 37, receiving its power from gear set 34 and controlled by a lever 38 in any suitable manner, so that shaft 37 may be rotated by engine E, when the lever 35 is set for neutral; a rearwardly extending shaft 39 connected to shaft 37 by universal joint 40; a shaft 41 supported by the frame members B, as by bracket 42, having connection with shaft 39 as by universal joint 43; a pulley 44 on shaft 41, and a belt or chain 45 trained about pulleys 32 and 44 as shown in Figures 2 and 3. It is to be observed that the compressor may therefore be operated when the truck is not in motion, by the engine or prime mover E, upon the manipulation of levers 35 and 38. The specific motion transmitting means L in the example shown forms no part of the present invention and is merely shown as suitable means whereby the truck engine may be used to operate the compressor as well as propel the truck.

The conduit O may comprise a manifold 50 having connection with the compressor outlets 30 and a main body portion 51 in connection therewith extending longitudinally of and between the containers G and H, where it is in a protected position, this main body portion 51 having communication with a manifold 52 at the rear end portion of reservoirs M and N, the manifold 52 having connection with the valve controlled ways 53 of the reservoirs. A suitable pressure gauge 55 and shock absorber 56 may have communication with the conduit O adjacent the manifold 50, in front of container G and between said container and the cab C where they are in a protected position. There is also provided a check valve 57, operable to prevent



backflow of fluid from either container G and H or reservoirs M and N to the compressor; a safety valve 58 and a fire check 59, in conduit O, these preferably being disposed adjacent the forward ends of and between the containers G and H, as shown in Figure 2.

The conduit P which branches off conduit O intermediate check valve 57 and the reservoirs M and N comprises a valve controlled section 60, controlled as by valve 61, and a flexible section 62 adapted for connection with the nipple 25 of either valve 24. In the example shown, this flexible section 62 has connection with the valve 24 of container H. The valve controlled section 60 is adjacent the conduit O, and the valve 61 permits shutting off of communication of the compressor and air reservoirs M and N when a change is being made in the connection of flexible sections 62 with the containers G and H.

Natural gas may be compressed and liquefied at locations convenient to the producing well and pumped directly into large containers such as G and H. In practice, these containers are suitably racked and placed on a railway car and thereon delivered to the desired destination. At present there is a special construction of railway car for supporting thirty of the containers. The entire cargo of filled containers of the car may be removed and racked or stored and as needed, placed upon the trucks of which the present invention is an example. Bearing in mind that the liquefied gas is under superatmospheric pressure in the containers G and H, and that, so long as any liquid gas is in the customers' tank, the same is also under superatmospheric pressure, and if the temperatures of both the distributors and the customers' tanks are about the same, the superatmospheric pressure therein will be about equal, it will be seen that some means will be necessary to force the liquefied gas into the customers' tank, altho if found convenient it may be placed therein by gravity flow.

In order to express the liquefied gas from the container H, in the example shown, with the lever 35 in neutral, and lever 38 operated so as to transmit motion of the engine E to the compressor K, compressed air may be introduced into either or both of the reservoirs M and N. At such time the valve controlled inlets and outlets of the containers G and H are closed and the valve controlled ways 53 are open. Valve 61 may also be closed altho such is not absolutely necessary, if the flexible section 62 of conduit P has connection with the valve controlled inlet 24 of container H. With pressure of the air in either reservoir M or N, or both, superior to the superatmospheric pressure in the container H, the prime mover E may be stopped, or the motion transmitting means L disconnected between the prime mover E and compressor K, and the check valve 57 will hold the air pressure in

the reservoirs M and N. With the conduit R connected to the customers' tank, the valve controlled outlet Q of container H may be opened as well as the valve controlled inlet 24 thereof, and if valve 61 is also open, air from either reservoir M or N may be introduced into the upper portion of container H, expressing the liquefied gas therefrom.

While the foregoing is a typical example of operation which may be followed, it is to be understood that other procedures will bring about desired results.

If it is desired to transport but one container for the liquefied gas, the equipment may be simplified to quite some extent. In reduction to practice, it has been found that the form of the invention illustrated in the drawings and referred to in the above description as the preferred embodiment, is efficient and practical where it is desired to transport a large quantity of liquefied gas and to draw first from one container and then from the other, but, realizing that conditions concurrent with the adoption of this equipment will necessarily vary, it is desired to emphasize the fact that various minor changes in details of construction, proportion and arrangement of parts may be resorted to, when required, without sacrificing any of the advantages of the invention, as defined in the appended claims.

I claim:

1. In a truck for transporting and distributing liquefied gas, the combination of a chassis including a cab, a plurality of elongated containers arranged in side by side spaced relation on said chassis to each side of the longitudinal axis thereof, longitudinally thereof and to the rear and spaced from the cab, said containers each having a controlled inlet and a controlled outlet, an air compressor directly to the rear of said cab between the cab and containers, and a conduit operatively connected with said compressor and adapted for connection with said controlled inlets for expressing liquefied gas from said containers thru said controlled outlets, said conduit extending longitudinally from said air compressor between said containers.

2. In apparatus for distributing liquefied gas, the combination of a truck, a plurality of containers, for liquefied gas under superatmospheric pressure, detachably mounted on said truck, each container including a controlled inlet and a controlled outlet, an air compressor carried by the truck, and conduit means operatively connected with said compressor and including a section for detachable connection with the inlet of any one of said containers for expressing the liquefied gas from the outlet thereof.

3. In apparatus for distributing liquefied gas, the combination of a truck, a plurality of containers, for liquefied gas under superatmospheric pressure, detachably mounted on



said truck, each container including a controlled inlet and a controlled outlet, an air compressor carried by the truck, a plurality of air reservoirs carried by said truck each including a valve controlled way, a conduit operatively connecting said air compressor and said reservoirs thru the valve controlled ways thereof for transfer of the compressed air from the compressor to either or both of said reservoirs, and a conduit in communication with said first conduit and adapted for detachable connection with the inlet of either of said containers for expressing the liquefied gas from the outlet thereof.

15 4. In apparatus for distributing liquefied gas, the combination of a container for liquefied gas under superatmospheric pressure including a valve controlled inlet and a valve controlled outlet, an air compressor, a plurality of air reservoirs each including a valve controlled way, a conduit operatively connecting said air compressor and said reservoirs thru said valve controlled ways thereof for transfer of the compressed air from the compressor to either or both of said reservoirs, and a conduit in communication with said first conduit and with said valve controlled inlet of the container for conducting compressed air either directly from said air compressor to the container or from either or both said reservoirs to the container, for expressing liquefied gas from said outlet.

25 5. In apparatus for distributing liquefied gas, the combination of a container for liquefied gas under superatmospheric pressure including a valve controlled inlet and a valve controlled outlet, an air compressor, an air reservoir including a valve controlled way, a conduit operatively connecting said air compressor and said reservoir thru said valve controlled way thereof for transfer of the compressed air from the compressor to the reservoir, and a conduit in communication with said first conduit and with said valve controlled inlet of the container for conducting compressed air either directly from said air compressor to the container or from said reservoir thru the valve controlled way thereof, for expressing liquefied gas from said outlet.

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