

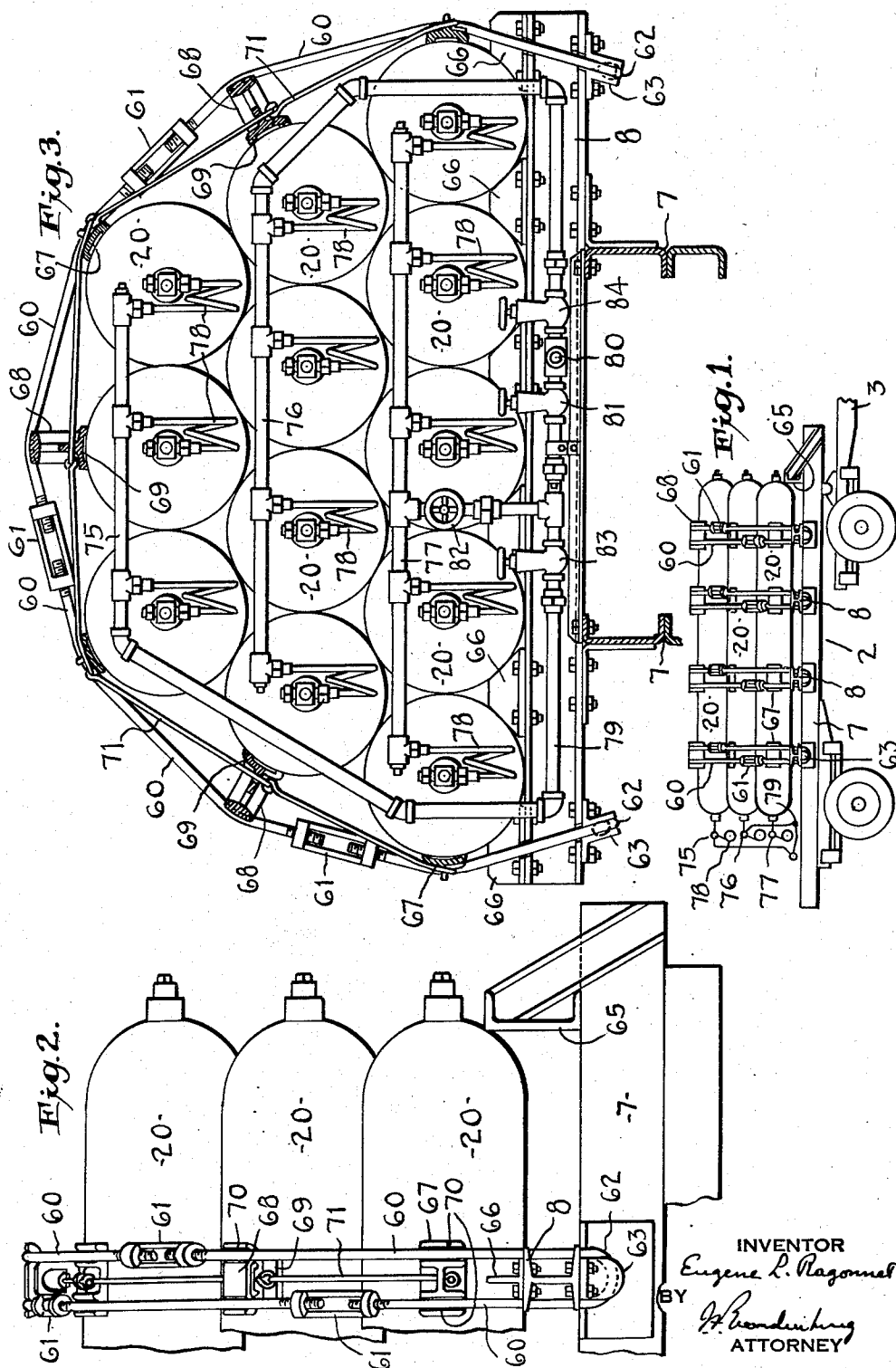
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VEHICULAR GAS CYLINDER APPARATUS

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VEHICULAR GAS CYLINDER APPARATUS

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ary 1, 1935, Serial No. 4,488

5 Claims. (Cl. 280—5)

As in my copending application Serial No. 676,146, filed June 16, 1933 (now Patent No. 2,011,347, dated August 13, 1935), of which this is a division, the object of the invention is to provide an economical, secure, safe and durable means for making deliveries in large quantity of compressed gas, more especially oxygen. The instant invention is an alternative construction and organization of a solid, unitary, vehicular, gas cylinder battery, well adapted for road travel and so constituted as to be readily connectible with the piping system of a consumer's plant or with a charging pipe at a gas plant, and notwithstanding its strength and security, having a large gas carrying capacity in relation to the dead load, that is to say the containers themselves and the means for holding them together and to the vehicle in solid mass.

In the accompanying drawing, forming part hereof:

Fig. 1 is a side elevation of a preferred embodiment of the instant invention mounted on a semi-trailer to be drawn by a motor-truck tractor, a portion of which is shown;

Fig. 2 is a fragmentary side elevation on a larger scale, showing the forward portion of the unit; and

Fig. 3 is a rear elevation, with parts in section.

The vehicle that carries the portable gas cylinder battery is preferably a semi-trailer 2, which may be drawn by a tractor, a part of which, marked 3, is shown in Fig. 1. The frame of the vehicle 2 comprises longitudinal sills 7, to which cross-beams 8 are fastened.

Numerous large and lengthy gas cylinders 20 are disposed lengthwise of the vehicle in a system in which each upper cylinder rests with two lines or series of contacts on two cylinders beneath, and the bottom cylinders rest on the underlying support, more specifically the vehicle frame. The number of cylinders, and their size, may be varied. In the most practical embodiment a bottom layer of gas cylinders 20 rests on the cross-beams 8, a second layer of cylinders rests on the bottom layer, and a third layer rests on the middle layer, the second layer having one less cylinder than the bottom layer, and the top layer one less than the middle layer. Each upper cylinder with its contents rests on two cylinders of the row beneath, and the weight of the entire mass of cylinders and compressed gas is supported on the under-frame. In consequence, the weight of the gas cylinders and the friction between them and the under support resist projectile action.

With no more than a few cylinders on the inside of the nest, the battery is held solidly on the under-frame by tensional means strained over the top and sides of the pyramid. The preferred form of such tensional means is a metal strap 60 made up of rods connected at intervals in the strap by turnbuckles 61. Several of these straps are applied at different regions along the length of the cylinder battery.

The rods of each strap are double, and at the ends of the strap the rods pass at opposite sides of the ends of one of the beams 8 and continue in U-bends 62 which are caught in grooved anchorage blocks 63 bolted to the under sides of said beams. By means of the turnbuckles, a strong binding action is exerted to hold the gas cylinders together and against the under-frame, and this, combined with the weight of the cylinders and the friction between them and between the bottom cylinders and the beams, is effectual in preventing displacement of the elements of the battery. However, for further security, it is advisable to provide an abutment opposed to the front end of the battery, to insure against forward movement of the cylinders if the movement of the vehicle is abruptly arrested. For this purpose a cross-beam 65 is fixed and braced to the forward part of the vehicle frame in position to resist thrust from the front ends of the lower layer of cylinders.

Blocks 66 are also bolted to the tops of the beams 8, these blocks being so formed that they touch or are adjacent the lower lateral portions of the bottom cylinders, or a certain number of them. When the battery of cylinders is clamped together by the tension straps, these blocks positively prevent any lateral displacement of the battery as a whole.

If the tension straps 60 bore directly against the gas cylinders, their holding action would not be completely satisfactory because the tension would have to be transmitted in an unfavorable course determined by the contour of the nest of cylinders, and the straight run of the straps across the end cylinders of the middle layer would exert little or no pressure against these end cylinders to prevent them from being spread apart by the pressure of the cylinders above them. The difficulty is overcome in the following manner: Wherever the strap would bear against a cylinder a bearing shoe 67 or 68 is interposed. These shoes have broad, recessed bases 69 for good frictional purchase on the cylinders, and are provided on the outside with grooves 70 in which the double rods of the strap bear. The

shoes 67 are low and the shoes 68 are high. The low shoes are applied against the lower outside cylinders and the upper outside cylinders of the nest, while, alternately, the high shoes bear against the outer cylinders of the middle layer and the center cylinder of the top layer. In this way, each tension strap is drawn substantially in an arch, without bad corners, and in a manner to distribute the binding pressure on the cylinders most effectively, so that all of the layers of cylinders are held against spreading and the middle cylinder of the top layer loaded to increase its friction with the cylinders below it.

The shoes 67 and 68 are loosely connected together in a string by linked rods 71, this being a matter of considerable convenience.

In this form of the invention three manifolds 75, 76 and 77 are connected with the cylinders of the three layers by pigtails 78, and are also connected with a common header 79 having an outlet and charging terminal 80. There is a main valve 81 in this terminal, and other valves 82, 83 and 84 are provided for opening or closing the communication between any of the sets of cylinders and the outlet and discharge terminal.

I claim:

1. A battery of cylinders for the transportation of gas, said cylinders being disposed in several layers with each cylinder above the bottom layer supported by two cylinders of the layer below, a tension strap passing over the cylinders, and shoes held against the end cylinders of an intermediate layer to prevent that layer from being spread by the pressure of the cylinders above it.

2. A cylinder battery for the transportation of compressed gas including an underlying support, gas storage cylinders disposed in several layers, the bottom one of which rests on said support, means holding the cylinders together in a solid mass and securing the mass of cylinders to said underlying support, said means comprising a plurality of rods, adjustable connecting means joining the ends of the rods into a continuous tension member which is strained over the mass of cylinders and anchored at both ends, and shoes located between certain of the cylinders and the tension member in position to displace the tension member and prevent straight runs of said member between non-adjacent outside cylinders.

3. A cylinder battery for the transportation of compressed gas including an underlying support, gas storage cylinders disposed in several layers,

the bottom one of which rests on said support, a strap anchored at both ends to said support and passing over the cylinders to hold them on the support in a solid mass, a shoe between the strap and each end cylinder of an intermediate layer for holding the strap displaced from a straight run so that the strap exerts a pressure against the end cylinders to hold the cylinders of the intermediate layer together, and means for regulating the tension of the strap.

4. A cylinder battery for the transportation of compressed gas including an underlying support, a bottom layer of gas storage cylinders resting on said support, an upper layer of cylinders supported by the cylinders below it, said upper layer including at least three cylinders, a strap anchored at both ends to the support and passing around the cylinders to hold the end cylinders of the upper layer against the cylinders below them and against the intermediate cylinder or cylinders of the upper layer, a shoe resting on an intermediate cylinder of the upper layer and holding the strap out of a straight run across the upper layer of cylinders so that the strap exerts a downward pressure on said intermediate cylinder, and means for changing the tension of the strap to adjust the force with which the cylinders are held together.

5. A vehicular compressed gas cylinder battery comprising a supporting frame, a pyramid of cylinders including a bottom layer of cylinders resting on the supporting frame, an intermediate layer of cylinders with each cylinder thereof supported by two cylinders of the bottom layer, a top layer of cylinders similarly supported from the intermediate layer beneath it, blocks on said frame coacting with the cylinders of the bottom layer to prevent lateral displacement, tensional retaining means anchored at both ends to said supporting frame and strained over the pyramid of cylinders to hold the cylinders together in a battery and secure the battery to the supporting frame, said tensional retaining means including rods connected by turnbuckles, shoes held against the end cylinders of each row by said rods, the shoes in contact with each of the end cylinders of the intermediate layer of cylinders being high enough to form a truss structure with the rod where it is strained between the shoes in contact with the corresponding ends of the top and bottom layers of cylinders, one of said turnbuckles being located in each truss structure, and links connecting the shoes.

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