

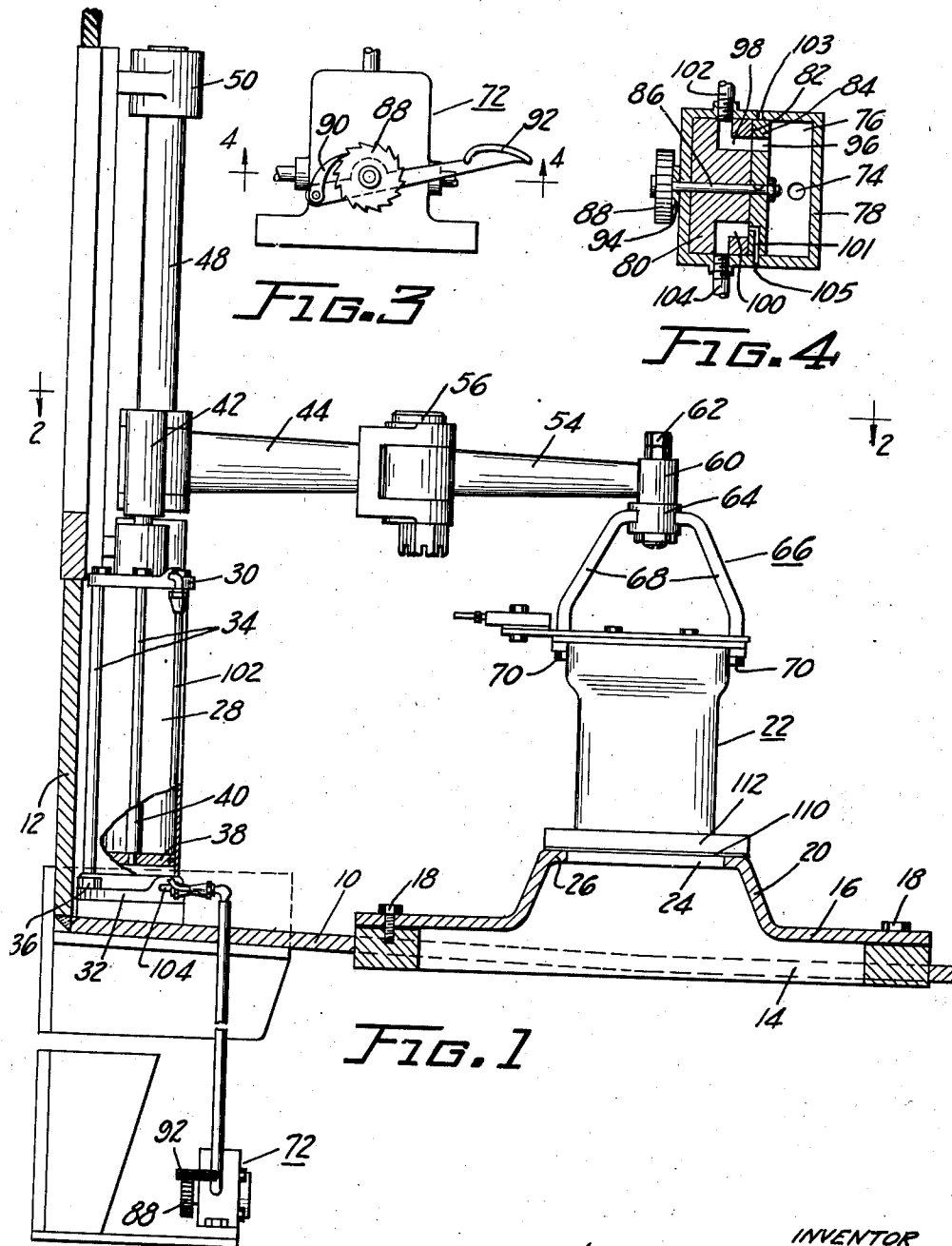
May 20, 1947.

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TRANSFER APPARATUS

2,420,867

Filed Feb. 21, 1945

3 Sheets-Sheet 1



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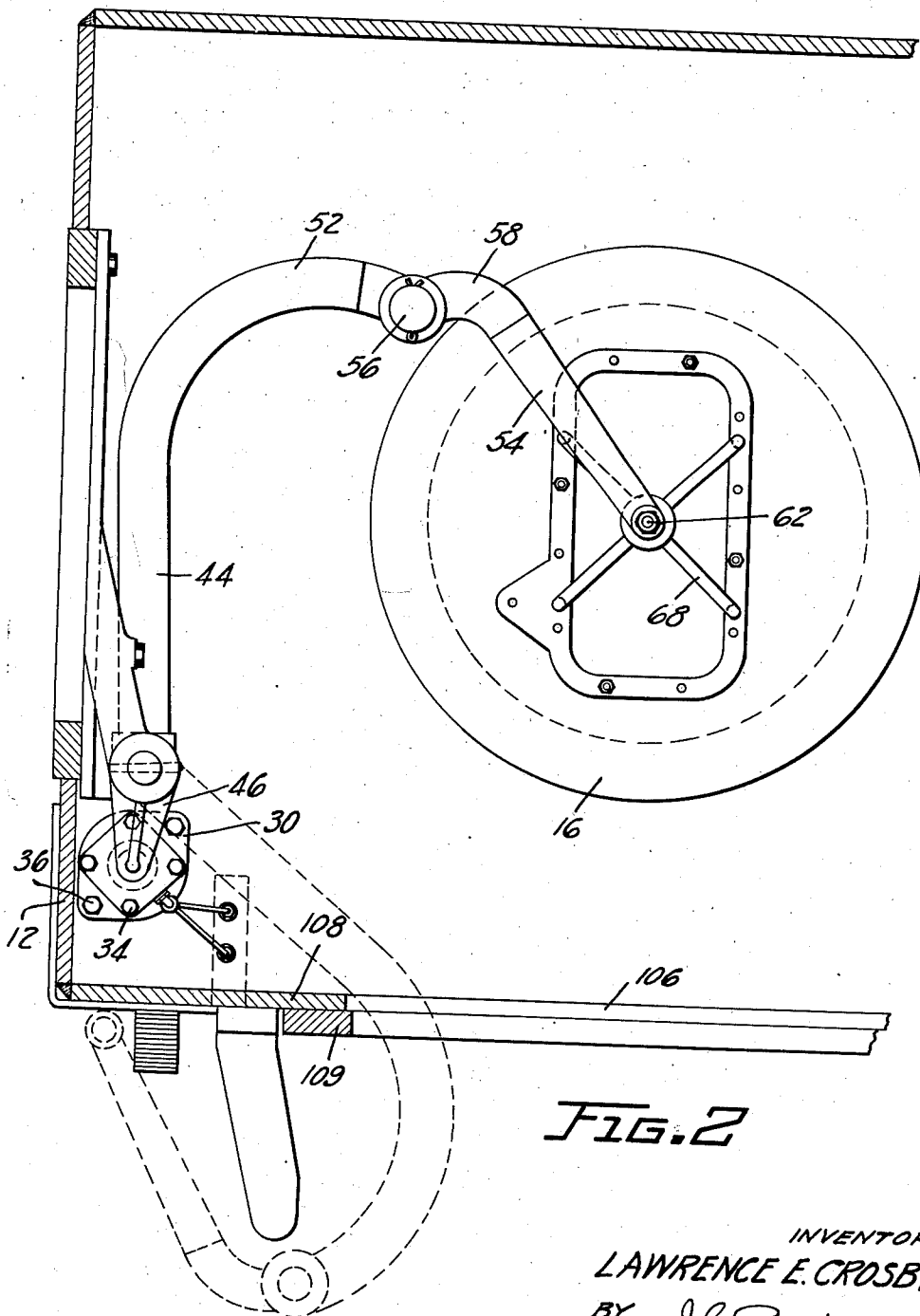


FIG. 2

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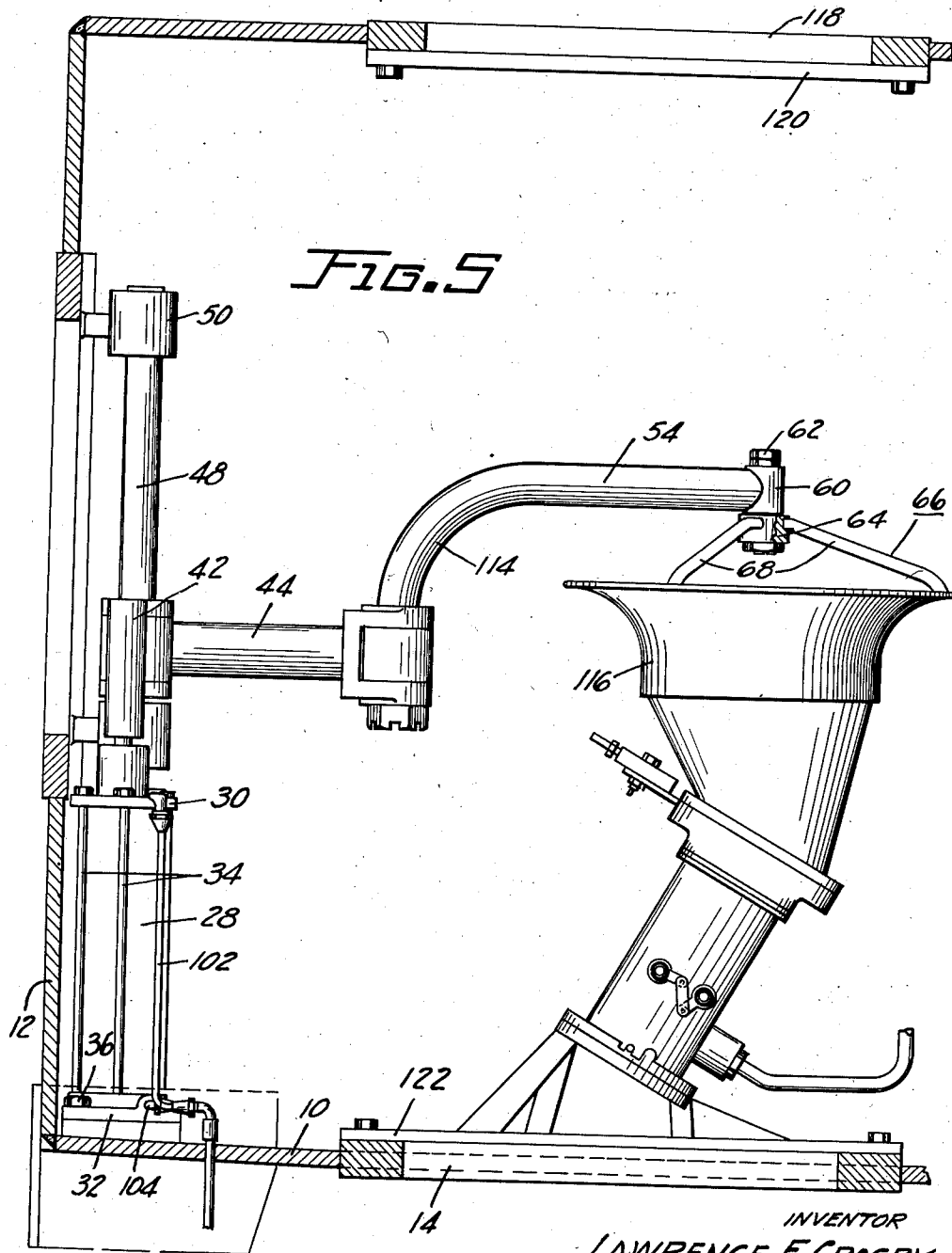
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Filed Feb. 21, 1945

3 Sheets-Sheet 3



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2,420,867

TRANSFER APPARATUS

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Application February 21, 1945, Serial No. 579,012

3 Claims. (Cl. 214-17)

1

This device relates generally to transfer apparatus and particularly to loading devices for air boxes for testing carburetors.

With present air boxes considerable difficulty has been encountered in loading carburetors into same and removing them therefrom and considerable time is consumed securing the carburetors in position in the box as well as in releasing them. This is particularly true with the heavier types of carburetors such as are used on aircraft and the like, and it is therefore an important object of the present invention to provide means for overcoming the foregoing difficulties.

Another object of the invention is to provide a device of this character whereby carburetors may be quickly loaded into the air box, secured in position for testing, and quickly and easily removed after tests have been completed.

Still another object of the invention is to provide a device of this character that is relatively inexpensive and that is simple in construction and reliable in operation.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Figure 1 is a partial diagrammatic sectional view of an air box embodying the present invention;

Figure 2 is a view taken on line 2-2 of Figure 1;

Figure 3 is a diagrammatic side view of a pneumatic control valve;

Figure 4 is a sectional view taken on line 4-4 of Figure 3; and

Figure 5 is a partial diagrammatic sectional view of an air box embodying a modification of the present invention.

Throughout the specification similar reference characters represent similar parts although where such parts are modified in structure and operation they are given a further different reference character.

Referring more particularly to Figure 1, reference characters 10 and 12 refer to the bottom and side walls respectively of the air box. This box may be of any well known character, the construction and arrangement of which is well known in the art, and only such parts as relate directly to the present invention will be shown and described here. For example, there is an opening 14 in the bottom 10 which has a connection with a source of suction or vacuum and the opening is covered by a plate 16 which is marginally secured by bolts 18 to said bottom

2

10. The plate 16 has an upraised portion 20 to which a carburetor, generally indicated at 22 may be attached for test purposes, there being an air opening 24 in the upper wall 26 of the upraised portion 20 of the plate 16, through which fluid, including air, from the carburetor is drawn during a test. Heretofore the carburetor has been bolted to the plate but in the present arrangement such bolting of the carburetor is unnecessary as will be apparent from the description below.

The present invention is shown herein as comprising a pneumatic cylinder 28 closed at its top and bottom ends by plates 30 and 32 respectively and secured together by bolts 34. As shown herein, the cylinder is positioned vertically, preferably in a corner of the box, and is secured to the bottom 10 by bolts 36. Within the cylinder there is a piston 38 having a rod 40 which extends upwardly through an orifice provided therefor in plate 30, and is attached to a sleeve 42 of an arm 44, said rod 40 being connected to the sleeve 42 by a laterally extending portion 46, and said sleeve is slidable and rotatable on a guide member 48 secured adjacent its ends by collars 50 which are attached by any suitable means such as bolts, not shown, to the adjacent wall of the air box. Preferably the arm 44 is provided with a curved portion 52 adjacent its free end for a purpose to be hereinafter described. A second arm 54 is pivoted at 56 to said free end of arm 44 and is adapted to swing horizontally, as shown in the drawings. The arm 54 is also provided with a portion 58 adjacent the pivoted end which is curved similar to portion 52 of arm 44. The arm 54 is provided with an enlarged boss 60 adjacent its free end, said boss being provided with a bore which receives a bolt 62 adapted to secure the hub portion 64 of a spider, indicated generally at 66 to arm 54. The spider includes arms 68 which, as shown, extend downwardly from the hub 64 and the ends of said arms 68 are so arranged as to be received in the usual bolt openings in the body of the carburetor 22, said ends of the arms 68 being threaded for receiving retaining nuts 70. In the embodiment of the invention herein disclosed the force for actuating the piston 38 is compressed air, that is, air under superatmospheric pressure, although some other suitable force may be employed. The air is supplied from any suitable source such as a tank or pump, not shown, and said air is adapted to be delivered below or above the piston 38 as desired, there being a control valve, indicated generally at 72

3 which receives the air through a port 74 in a chamber 76 within the valve casing 78. A fixed member 89 is provided in the casing and is provided with a flat surface 82 against which a rotatable valve plate 84 is received. The valve plate is secured to a shaft 86 which extends outwardly of the casing 78 and carries, adjacent its outer end, a ratchet 88 which is actuated by a pawl 90 carried by a foot actuated lever 92 mounted on a bearing 94 which extends outwardly of the casing 78 of the valve and separates the ratchet 88 from the adjacent wall of said casing. The pawl and ratchet arrangement is so constructed and arranged that each time the lever 92 is actuated the valve plate 84 is rotated 180 degrees. The valve plate 84 is provided with an opening 96 which is adapted to register alternately with the respective outlet passages 98 and 100 located in the member 89 and on diametrically opposite sides thereof. The passage 98 is connected by a conduit 102 with the upper end of the cylinder 28 and the passage 100 is connected by a conduit 104 with the lower end of the cylinder. Thus each time the pedal lever 92 is actuated the port 96 will register with either the passage 98 or 100 to provide air to the upper or lower end respectively of the cylinder 28 to thereby effect a downward or upward movement of the piston 38 in accordance with the registration of the port 96 with one or the other of said passages 98 and 100.

In order to relieve the pressure on the side of the piston opposite that into which compressed air is admitted for operation thereof the valve plate 84 is provided with a pressure relief duct 101, one end of which communicates with passage 98 or 100 respectively when the port 96 communicates with the other of said passages. The other end of duct 101 communicates with atmosphere through respective adjacent ports 103 and 105. It is to be noted that the duct will also provide atmospheric communication for either passage 98 or 100 every time the plate 84 is rotated 180 degrees.

Referring to Figure 2, it will be noted that the arms 44 and 54 are so formed that when they are swung outwardly through the door opening 106 in the front wall 108 of the air box when door 109 is open, the free end of arm 54 may be positioned toward one side of the air box. The carburetor to be tested may be placed on a table or other support, not shown, located closely adjacent the air box and the table should be of the proper height so that arms 68 of the spider 66 may be readily secured to the carburetor when the piston is in the lowered position. It may be noted here that the curvature of the arms 44 and 54 is such that the free end of the latter arm may be swung to a position closely adjacent the outer wall of the box where the above mentioned table may be located for the sake of convenience as well as for conservation of space in the testing room. The lever 92 is then actuated to provide air under pressure beneath the piston 38 for raising same and effecting raising of the arms 44 and 54 together with the carburetor 22. The carburetor supported by the arms, is then swung into the air box and aligned with the opening 24 in the plate 16. The pedal lever 92 is then actuated to reverse the supply of air to the cylinder 28 and effect downward movement of the piston 38 thereby lowering the carburetor onto the plate 16. By maintaining the pressure of air in the upper portion of the cylinder 28 sufficient force is provided on the arms 44 and 54 to

hold the carburetor in position on the plate. If desired a gasket 110 may be provided between the carburetor flange 112 and the plate 16 to prevent leakage of air between said flange and plate. After a test has been made the valve 72 is actuated to raise the carburetor which may then be swung out of the box and upon again actuating the valve 72 the carburetor will be lowered onto the above mentioned support and may be readily detached from the spider arms 68.

In the arrangement shown in Figure 5, it is to be noted that the arm 54 is provided with an upwardly curved portion 114 so that the horizontal portion of arm 54 is in a plane above the plane of the arm 44. This arrangement may be used for certain types of carburetors such, for example, as those adapted to be mounted at an angle, as shown in said Figure 5. With carburetors of this type, it is common practice to interpose a funnel like device 116 between the spider and the carburetor, air being adapted to flow through said funnel into said carburetor.

It is to be noted that the air box also has an opening in the top wall, indicated at 118 which is closed by a plate 120 when the carburetor being tested is of the downdraft type and is secured to the lower plate 16. Should it be desired to test a carburetor of the updraft type the lower opening 14 is closed by an imperforate plate, such as that shown at 120, and a plate 122, having a suitable opening therein, is substituted for said plate 120 which closes the opening 118. With such an arrangement the arms 44 and 54 are lowered and swung outwardly of the air box and the carburetor is then mounted on the spider, the latter now being attached to the arm 54 in an inverted position. The carburetor is then swung into the air box and the arms 44 and 54 raised by pneumatic pressure to urge the carburetor into sealing association with the upper plate in which position said carburetor is held throughout the test by said pneumatic pressure. To remove the carburetor the arms 44 and 54 are lowered and swung out of the box whereupon the carburetor may be detached from said arms.

From the foregoing description it is thought that it will be apparent that the invention may be otherwise constructed and arranged without departing from the spirit and scope of the invention or sacrificing all of the material advantages thereof, the form illustrated and described herein being merely a preferred embodiment.

I claim:

1. In transfer apparatus for the purpose specified: an air box having a large opening therein; a vertical guide positioned adjacent one side of the opening; an arm pivoted on the guide and adapted to move longitudinally thereon, said arm having its free end adapted to be swung through the opening in the box, said free end being curved outwardly relative to the box; a second arm having one end pivoted to the first arm adjacent the free end thereof, the second arm being curved adjacent its pivoted end similarly to the curvature of the first arm; a spider attached to the free end of the second arm and adapted to be attached to a device to be tested; a pneumatic cylinder adjacent a corner of the box and located adjacent the guide; a piston within the cylinder; means connecting the piston and the first mentioned arm whereby the arm may be moved from a position adjacent one end of the guide to a position adjacent the other end of the guide; means connecting each end of the cylinder with a source of compressed air; and

5

control means adapted to so control the compressed air as to provide said air for one end of the cylinder or the other.

2. In apparatus for transferring relatively heavy devices such as carburetors into and from an enclosure such as an air box having an opening therein through which the carburetor is moved, vertical guide means anchored in the box adjacent said opening, an arm mounted for vertical movement on the guide and also rotational movement thereon in a horizontal plane, power means for moving said arm vertically on said guide, a second arm pivotally connected to the free end of the first named arm, each of said arms being similarly curved in the region of the pivotally connected ends thereof, and means for supporting a carburetor from the outer free end of the second-named arm.

3. In transfer apparatus particularly adapted for moving relatively heavy objects such as carburetors into and removing them from an enclosure such as an air box having an opening therein through which the carburetors are moved, a vertical guide anchored in the box adjacent said opening, an arm mounted for vertical sliding movement on the guide, power means for imparting vertical movement to said arm, said arm being also swingable in a horizontal plane about said guide and having a free end curved in a manner such that when the arm is swung outwardly relative to said opening its free extremity will extend through said opening with the curved portion thereof remote from said

6

opening, a second arm pivoted to the free end of said first-named arm, said latter arm having its pivotally connected extremity curved in the same direction as the first-named arm so that when the arms are swung out of the box opening their outer free ends describe a reversely-turned hook-shaped boom member, and a spider-shaped member attached to the free end of the second-named arm and arranged to engage a carburetor or similar object.

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