L. E. & R. B. HOOKER.

APPARATUS FOR TESTING TUBES.

APPLICATION FILED OCT. 3, 1912.

1,101,932.

Patented June 30, 1914.

2 SHEETS—SHEET 1.

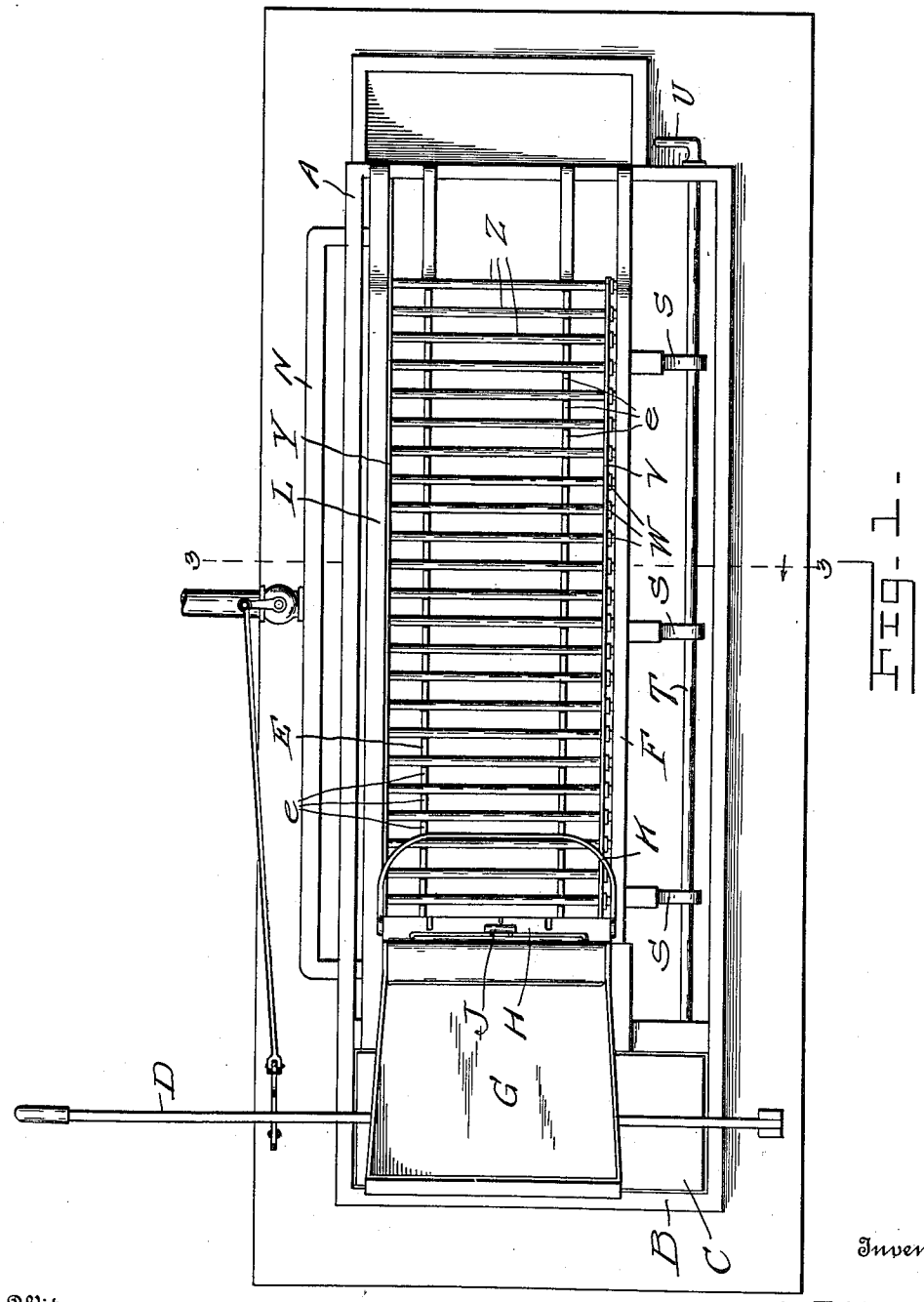


FIG. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

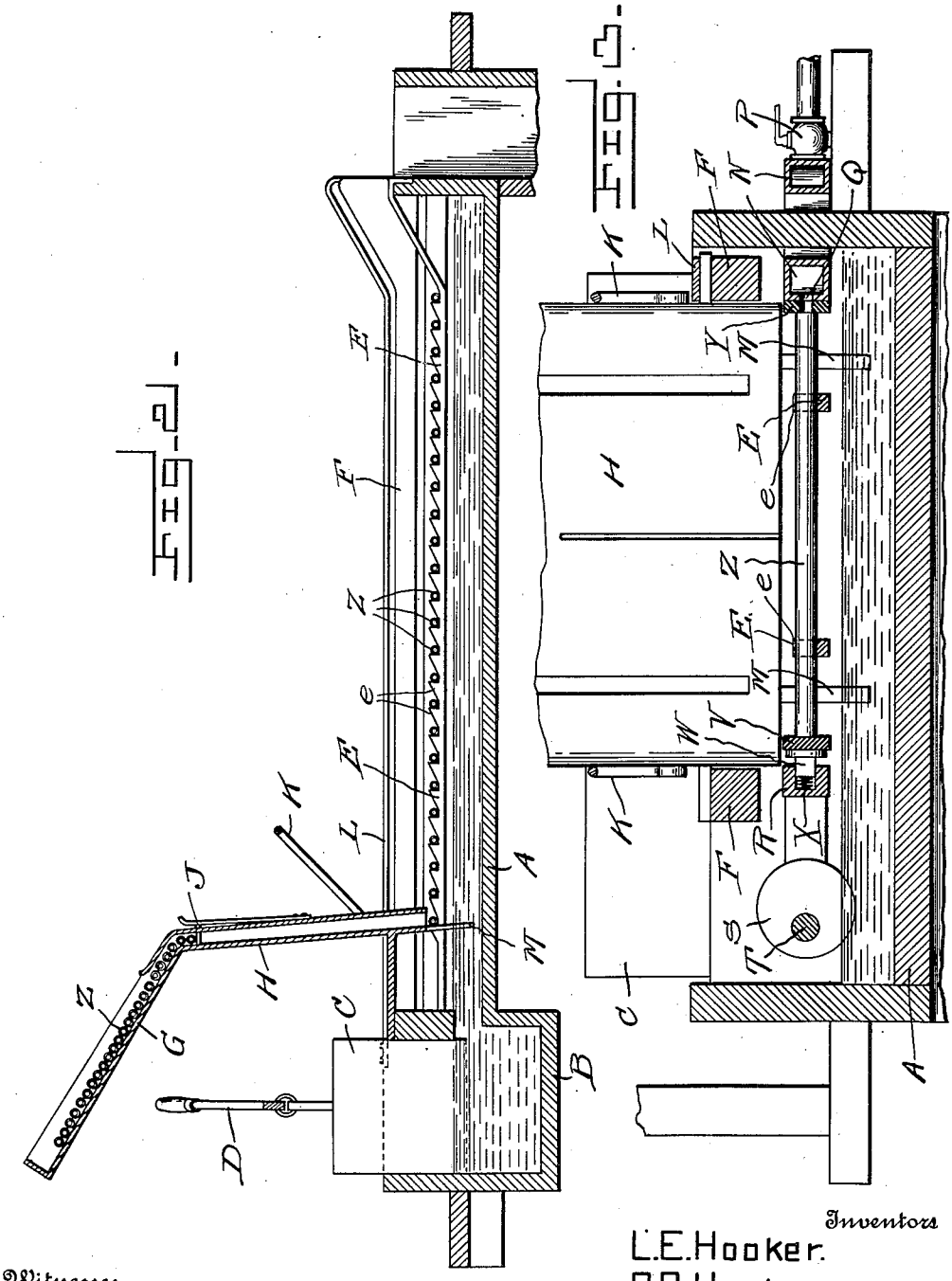


Fig. 1.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TESTING TUBES.

1,101,932. Specification of Letters Patent. Patented June 30, 1914.

Application filed October 3, 1912. Serial No. 723,691.

To all whom it may concern:

Be it known that we, LESLIE E. HOOKER and Ross B. HOOKER, citizens of the United States, residing, respectively, at Barrington, in the county of Bristol, and at East Providence, in the county of Providence, both in the State of Rhode Island, have invented new and useful Improvements in Apparatus for Testing Tubes, of which the following is a specification.

Our invention consists in an apparatus by means of which small metal tubes can be expeditiously and conveniently tested for possible leaks. Its construction and mode of operation will be more particularly disclosed in what follows.

In the manufacture of seamless copper tubes with very thin walls, such as are used in automobile radiators, for example, it is necessary to test the tubes to see that they are water-tight before assembling them to form a radiator. This is done by immersing the tubes in water, closing one end and introducing compressed air into the other end and it is the object of the present invention to reduce the time and labor required in doing this.

While the apparatus which we have developed for the said purpose is not automatic, in the sense of being power-driven, yet a part of its operation may properly be termed automatic, since the tubes are laid in position for testing, are tested, and are subsequently removed without the necessity of the operator touching them with his hands.

Our invention is illustrated by way of example, in the accompanying drawing, in which,

Figure 1 is a plan view, Fig. 2 a longitudinal section, and Fig. 3 a transverse section on the line 3—3 of Fig. 2.

The apparatus illustrated, which comprises the features of novelty of our invention although these may be embodied in apparatus somewhat variously designed, consists of a tank A, connected to a water receptacle B, containing a float C, which can be depressed by a lever D, whereby the level of the water in the tank is raised, so as to immerse a set of tubes which are in position to be tested.

On the bottom of the tank are mounted two parallel tube-supporting racks E, E, provided with saw-tooth notches or recesses *e*, in which the tubes Z lie while being tested. On each side of the tank is a rail or guide F, on which is slidably mounted a hopper or magazine, consisting of a vertical chute H, open at top and bottom, and an inclined tray G, a spring stop J being provided at the lower end of said tray. This hopper carries a handle K, by which it is manually reciprocated along the guides F. A guard rail L is provided on one or both sides, above the guide or guides F, to prevent the hopper from being lifted off said guides when it is reciprocated by the operator. The rails and racks are inclined upwardly at one end, so that the tubes can be removed from the tank by the movement of the hopper in one direction, as will be further explained. For this purpose, there are provided two fingers M, M, projecting downwardly from the chute H.

Inside the tank, adjacent to one side thereof, is placed an air-conduit N, with a flat side facing inwardly. This conduit is connected to a source of air under pressure, the admission of which to said conduit is controlled by a gate or valve P, which is actuated by the same lever D that operates the float C. The front side of the conduit N is perforated with holes Q, spaced opposite the notches in the racks E, E.

Adjacent the side of the tank, opposite the conduit N, is a bar R, which is movable bodily toward and away from the rack on that side. Its said movement is imparted by cams S, S, carried by a shaft T, which can be turned by the handle or crank U. The function of the said bar is to engage one end of the tubes in the racks and force their other end up against the perforated side of the conduit N. Since, however, the tubes are not always all of exactly the same length, it is necessary to provide some yielding means on said bar, adapted to accommodate itself to the varying lengths of tube. Such means may consist of a flexible packing strip V, secured to the heads of studs or plungers W, mounted in sockets in the bar R, opposite the notches in the racks, and pressed outwardly by springs X. The front side of the conduit N is also provided with a packing strip Y of rubber or the like, perforated, of course, in front of the holes in said conduit.

The mode of operation of the apparatus described above is as follows, it being understood that we do not wish to limit ourselves

to the exact construction shown, the details of which may obviously be considerably modified without changing the general function of the apparatus. The operator fills the tray G with tubes, the hopper then being at the end of the tank where the rails and racks are inclined upwardly. He then retracts the spring stop J, letting the tubes fall into the chute H, the bottom one resting on the racks E, E. The hopper being now run along the rails F, each pair of saw-tooth notches *e* in the racks catches and retains one tube. The shaft T is now turned to bring the yielding strip V on the bar R into engagement with the adjacent end of the tubes now lying in the racks, and thereby to force their other end against the packing strip on the conduit N, the tubes being in communication with the inside of said conduit through the said openings in its face. The lever D is now depressed, the first effect of which is to raise the water in the tank so as to cover the tubes, and the second effect of which is to open the gate or valve P, admitting air under pressure to the conduit N and thence to the tubes to be tested. If any one of them is not air-tight, bubbles will be observed rising from it and it can be removed and discarded. Now the hopper is run back along the rails and, in doing so, its fingers M, M, engage the tubes and the inclined sides of the notches *e* raise them successively into the chute H, the hopper finally running up the inclined ends of the rails so that the tubes are delivered over the end of the tank into a suitable receptacle. The operation is then repeated.

Having thus described our invention, what we believe is novel and desire to protect by Letters Patent is expressed in the following claims.

We claim—

1. An apparatus for testing thin metal tubes for leaks, comprising in combination a tank adapted to contain water, means therein to support a plurality of tubes in spaced relation, a chute slidably mounted over said tank and adapted to deliver tubes successively to said supporting means, means movably mounted within and adjacent to one side of said tank to engage and close one end of the tubes thus supported, and a flat-faced conduit within said tank adjacent to the other side thereof, against the face of which conduit the other end of the tubes are pressed by said movable means, the said face of said conduit having openings spaced correspondingly with said supporting means and said conduit being connected to a source of compressed air.

2. An apparatus for testing thin metal tubes for leaks, comprising in combination a tank, manually operable means to vary the level of water therein, tube-supporting racks arranged longitudinally in said tank and provided with saw-tooth notches for said tubes, an air conduit running along one side of the tank and provided with openings in its side facing said notches, a movable bar at the other side of the tank and provided with yielding abutments on its inner face to engage one end of the tubes in the racks and press their other end against said conduit, means slidable over said tank to deposit the tubes successively in said notches and, on its return stroke, to gather them up therefrom, and means to control the supply of compressed air to said conduit.

3. An apparatus for testing thin metal tubes for leaks, comprising in combination a tank, a pair of saw-tooth racks in said tank, means to force water into said tank to cover said racks, means to deposit the tubes to be tested in said racks and to subsequently remove them therefrom, means to supply compressed air into one end of said tubes, and means to close the other end of said tubes.

4. An apparatus for testing thin metal tubes for leaks, comprising in combination, a tank connected to a source of water supply, a pair of saw-tooth racks in said tank, a traveling chute to deposit the tubes in said racks, one end of said racks being inclined upwardly at one end of said tank, means depending from said chute to gather the tubes up out of the racks and to carry them over said end of the tank after having been tested, a fixed air conduit in one side of said tank having perforations in its face opposite the saw-teeth in said racks, means to close one end of said tubes and force their other end against said conduit, and manually operable means to first force water into said tank and then admit compressed air into said conduit.

5. An apparatus for testing thin metal tubes for leaks, comprising in combination, a water-tank, a support therein at each side thereof notched at regular intervals to support the tubes horizontally in said tank in parallel relation, means reciprocable above said supports for delivering the tubes in succession to the same in its forward stroke and to remove them therefrom in its return stroke, a perforated conduit running parallel to one of said supports, a bar running parallel to the other of said supports, means to move said bar into engagement with the ends of the tubes so as to press their other end against said conduit, and means to successively raise the water level in said tank so as to immerse the tubes and to admit air under pressure to said conduit.

6. An apparatus for testing thin-walled metal tubes for leaks, comprising in combination, a water-tank, notched supports for the tubes therein, a carriage slidably mounted above said supports and adapted

to deliver the tubes to said supports in its travel in one direction and to remove them therefrom on its return, a perforated conduit running along one side of said tank opposite one end of the tubes, a solid bar running along the other side of the tank opposite the other end of the tubes, means to move said bar to press the tubes against said conduit and means to supply compressed air to the latter.

7. An apparatus for testing thin-walled metal tubes for leaks, comprising in combination, a water-tank, means therein to support the tubes in parallel spaced relation, a correspondingly perforated conduit in one side of said supports and a movable bar on the other side, spring-pressed studs in the side of said bar toward the supports and similarly spaced, a strip of flexible material carried by the heads of said studs, means to introduce compressed air to said conduit, and means to move said bar toward and away from the supports, as and for the purpose described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

LESLIE E. HOOKER.
ROSS B. HOOKER.

Witnesses:
HENRY J. PICKERSGILL,
JESSIE L. SHERMAN.