(Model.)

H. HOPKINSON.

INJECTOR.

No. 489,812. Patented Jan. 10, 1893.

Fig. 1.

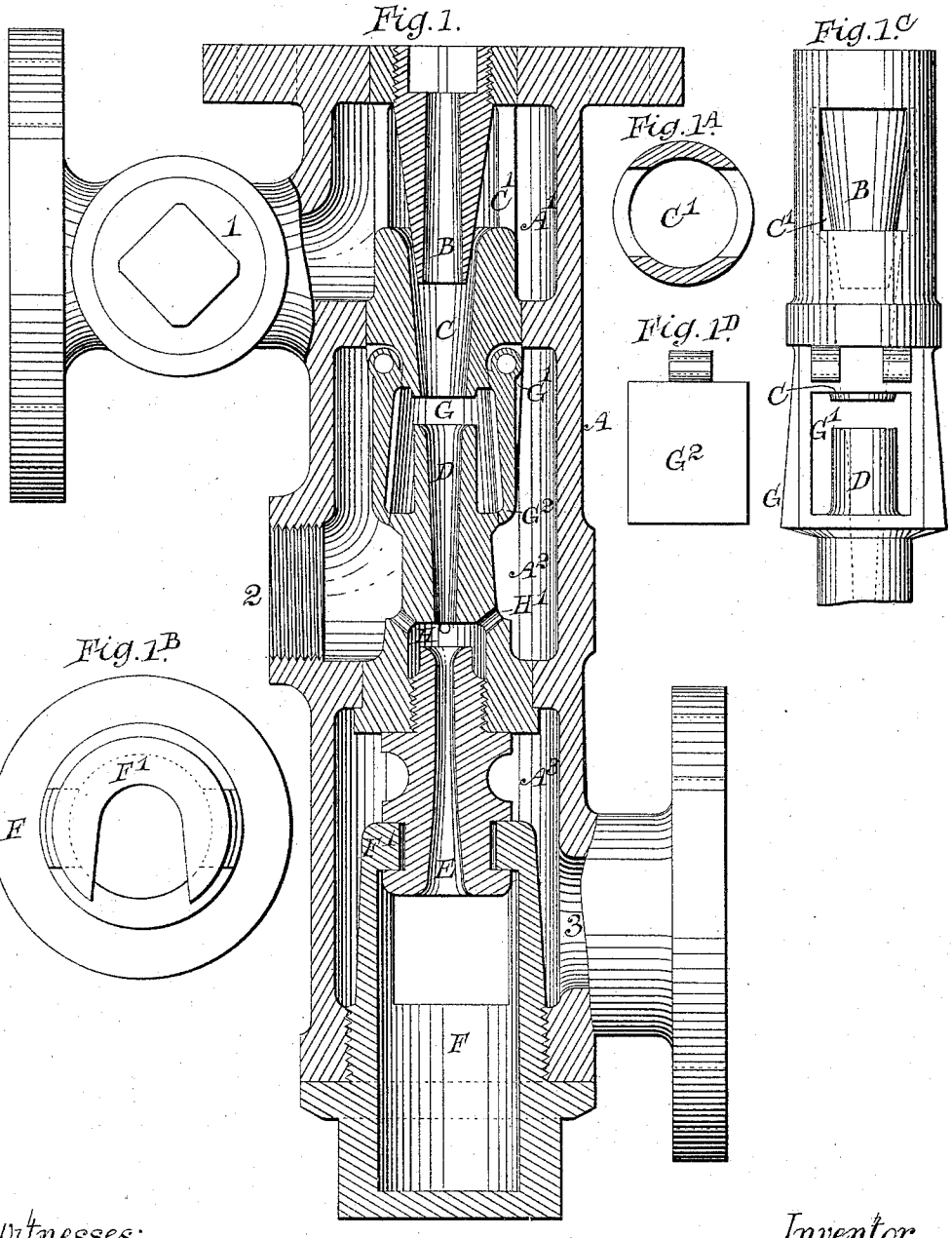

Fig. 1A.

Fig. 1C.

Fig. 1D.

Fig. 1B.

Witnesses:
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HENRY HOPKINSON, OF NOTTINGHAM, ENGLAND.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 489,812, dated January 10, 1893.

Application filed June 27, 1892. Serial No. 438,183. (Model.)

To all whom it may concern:

Be it known that I, HENRY HOPKINSON, iron merchant and brass-founder, a subject of the Queen of Great Britain, and a resident of Nottingham, England, have invented certain new and useful Improvements in Injectors, of which the following is a specification, reference being had to the accompanying drawings.

Figure 1 shows a longitudinal sectional view of a liquid injector which may be worked by steam direct from a boiler. Fig. 1^A is a transverse section of the suction cone through its inlet orifices. Fig. 1^B is a plan of the slotted two-armed nut. Fig. 1^C is an elevation of the inlet cone, the suction cone and the force cone removed from the outer casing. Fig. 1^D is a view of a valve plate.

I construct each injector with an outer case A forming their interior chambers A' A^2 A^3. The chamber A' is supplied with liquid through an inlet cock 1 leading from a well or reservoir. The chamber A^2 has a screw threaded outlet orifice 2 which may be provided with a length of pipe to lead the overflow liquid where required. The chamber A^3 surrounds the lower portion of a delivery cone E and is provided with an outlet 3 through which the liquid may be injected; B is an inlet cone supplied with steam direct from a boiler; C is a suction cone the upper end of which is circular and tightly fits into the upper flange of the chamber A' of the outer case. The lower part of the circular portion is of larger diameter than the upper end and tightly fits the interior flange of the case forming the division between the chambers A' and A^2. The circular portion within the chamber A' is partly cut away at opposite sides to form two inlet orifices C' shown in cross section at Fig. 1^A and in side view at Fig. 1^C through which liquid is admitted. The upper end of the circular portion is screw-threaded interiorly to allow of the adjustment of the inlet cone B within it. D is a force cone. E a delivery cone and F a two armed nut provided with a slotted bridle F' "shown in plan at Fig. 1^B" which engages with a groove near the lower end of the delivery cone E. By means of the nut F the cones C D and E may be adjusted to the position shown at Fig. 1 or they may be withdrawn for examination without having to remove the outer case of the injector. A circular chamber G surrounds the adjacent ends of the suction and force cones C' and D and a portion of this chamber is cut away at opposite sides "as shown at Fig. 1" to form overflow outlets G' each closed by a valve plate G^2.

Fig. 1^C shows a side view of the circular portion of the cone C with its inlet orifices C' the chamber G with its overflow outlets G' and the cones B, C and D in their relative positions and Fig. 1^D shows an outer view of one of the valve plates G^2.

H is a chamber provided with perforations H' between the cones D and E for further relieving the cones C and D of liquid. The exterior of the chamber H is flanged at its lower end and tightly fits the interior flange of the case forming the division between the chambers A^2 and A^3.

The action of the injector is as follows:—The liquid cock 1 is opened, then steam is turned on passing through the cone B into and through the cones C and D. As it passes from the cone C to D it fills the surrounding chamber G and lifts the valve plate or plates G^2 and passes through the outlet or outlets G' into the chamber A^2 of the outer case A escaping through the outlet orifice 2. A portion of the steam also escapes through the perforations H' in the chamber H. The rush of steam produces a vacuum in the chamber A' causing it to be filled with liquid through the cock 1 the liquid being forced by the jet of steam through the cones C and D to and through the delivery cone E into the chamber A^3 and out to where required through the outlet 3. As the liquid is forced by the steam jet through the cone C it forms a vacuum in the chambers G and H causing the valve plate or plates G^2 to close and air to rush into the chamber H through the perforations H'.

By arranging the parts as above described an injector is produced which if stopped by concussion or an impediment in the delivery pipe "if steam is kept on" will automatically restart itself upon the impediment being removed.

I am aware that a variety of injectors containing cones similar to those marked B, C, D and E, and valve plates, have been used

before. But I am not aware that an injector has been constructed so that the whole of the cones, valve plates and chambers G may be withdrawn for examination or repairs without removing the outer case.

What I claim is:—

In an injector, the combination with the casing A, the cones B, C, D and E and the chambers G and H connecting the said cones C, D, E, of the two-armed nut F having the slotted bridle F′ engaged with the delivery cone E, whereby said cones can be adjusted or withdrawn without disturbing the outer casing, substantially as described.

In witness whereof I have hereunto set my hand this 14th day of June, 1892.

HENRY HOPKINSON.

Witnesses:

H. W. GOUGH,

JOHN HENRY GOUGH.