No. 657,168. Patented Sept. 4, 1900.

F. L. LANE & W. RAINFORTH.

HYDRAULIC OR OTHER VALVE.

(Application filed Feb. 6, 1900.)

(No Model.) 2 Sheets—Sheet 1.

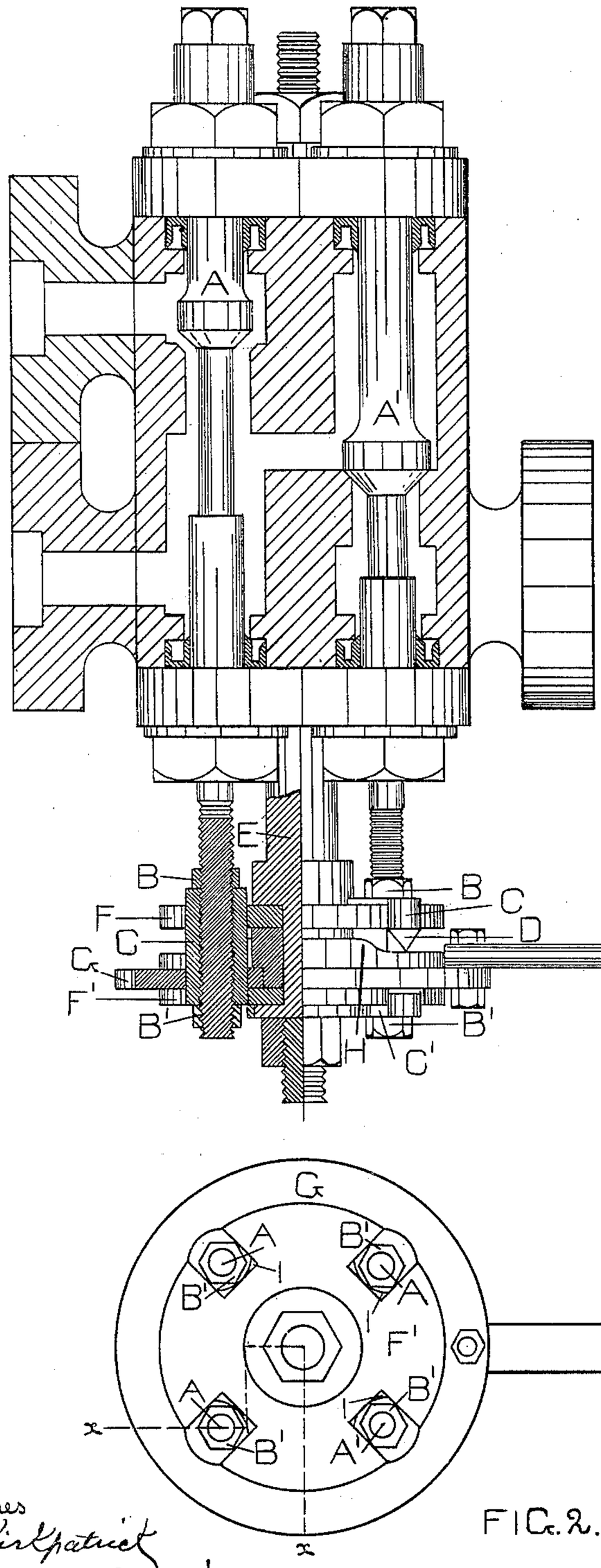

FIG. 1.

FIG. 2.

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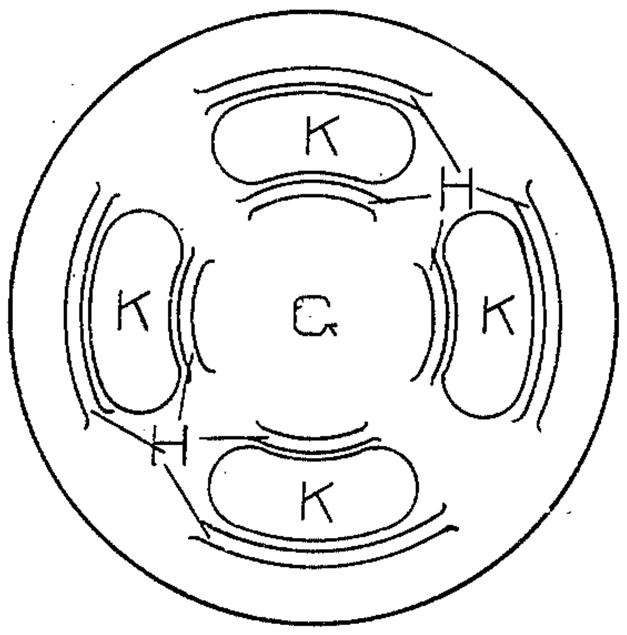

FIG. 3.

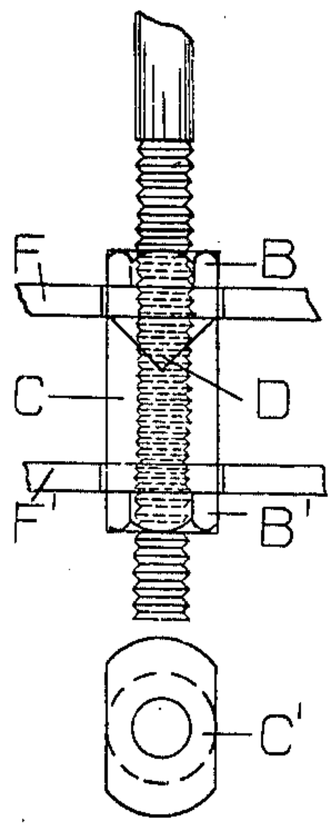

FIG. 4.

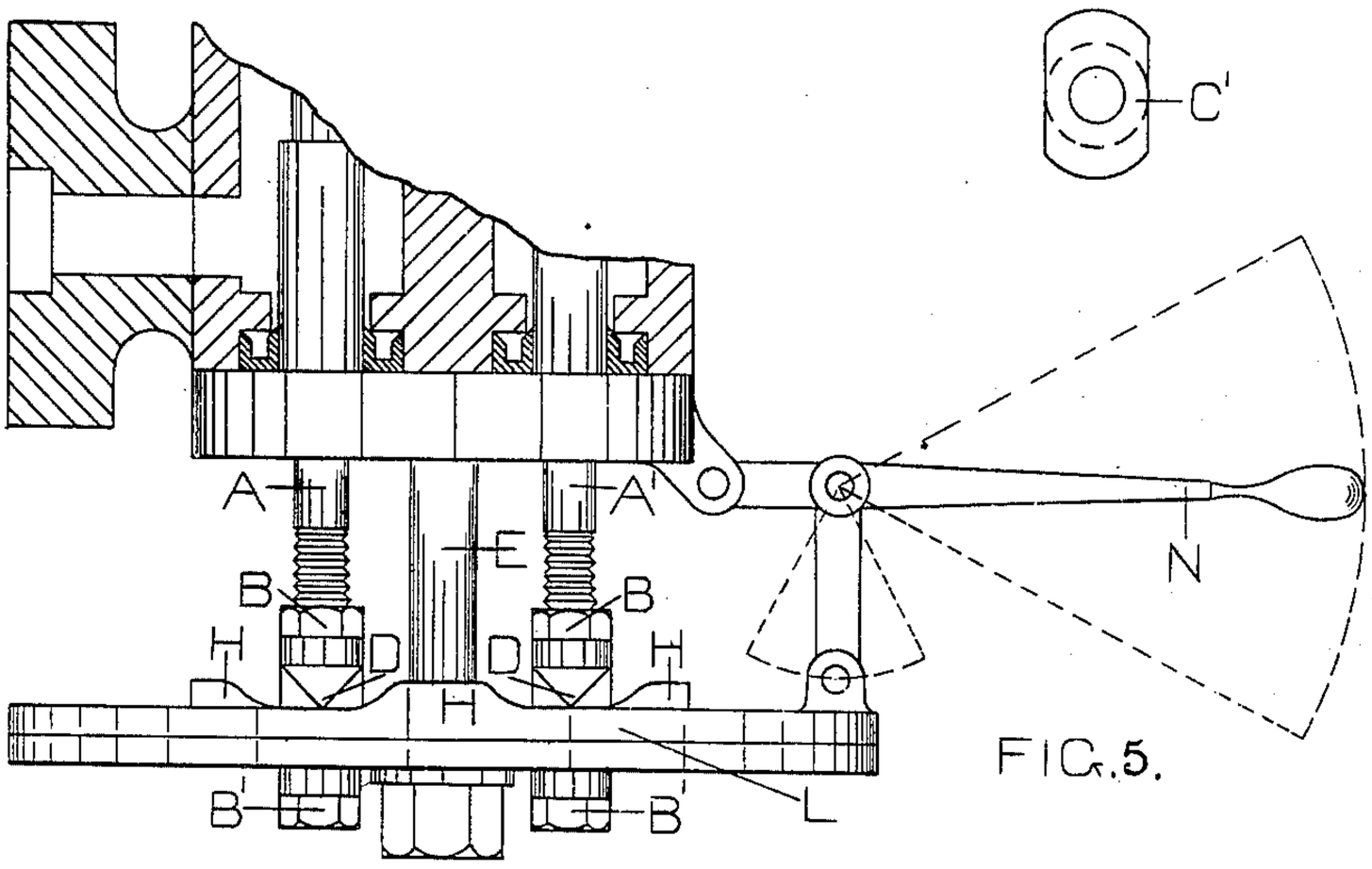

FIG. 5.

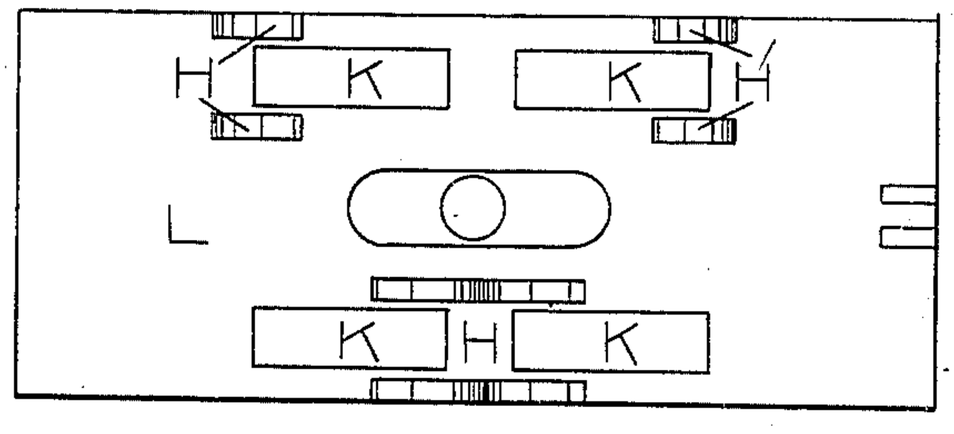

FIG. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

FRANCIS LAWRENCE LANE AND WILLIAM RAINFORTH, OF LEEDS, ENGLAND.

HYDRAULIC OR OTHER VALVE.

SPECIFICATION forming part of Letters Patent No. 657,168, dated September 4, 1900.

Application filed February 6, 1900. Serial No. 4,256. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS LAWRENCE LANE and WILLIAM RAINFORTH, subjects of the Queen of Great Britain and Ireland, residing at Leeds, in the county of York, England, have invented a new and useful Improvement in or Relating to Hydraulic or other Valves, (for which we have made application for Letters Patent in Great Britain under No. 14,119, bearing date July 8, 1899,) of which the following is a specification.

This invention relates to hydraulic and other valves, and has for its object the provision of means for readily operating a group of two or more valves through the medium of inclined surfaces mechanically actuated by hand or other power in any convenient manner.

In order that our invention may be the better understood, we will now proceed to describe the same in relation to the accompanying drawings hereunto annexed, reference being had to the letters marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a part sectional view of a form of hydraulic valve made according to our invention, in which there are two supply and two exhaust valves which have to be alternatively operated in pairs by a device having a circular motion, the section of the valve-spindle being taken on the line *x x*, Fig. 2. Fig. 2 is a plan as seen from below. Fig. 3 is a plan of the disk carrying the inclined surfaces for operating the valves. Fig. 4 is a detail view of the valve-spindle and adjustable sleeve with inclined faces. Fig. 5 is a modified form of valve-lifting device in which a reciprocating rectilineal motion is substituted for the circular motion. Fig. 6 is a plan of the reciprocating plate carrying the inclined surfaces.

To carry our invention into effect in a valve having four spindles A A A′ A′, two of which, A A, control the inlet or live ports, while the other two, A′ A′, control the outlet or exhaust ports. These spindles are carried through the bottom of the valve-casing and are screw-threaded on their exterior portion. Between two lock-nuts B B′ a sleeve C is secured on each spindle, the said sleeve being provided with inclined faces D. A central support or stud E is supported on and projects downward from the bottom of the valve-casing. This stud E carries rigidly two guide-plates F F′ and also forms a pivot for the operating-disk G, which is journaled thereon between the guide-plates F F′. The disk G is provided with inclined surfaces H, which coact with the inclined surfaces D of the sleeves C when the disk is moved about its axis relative to the sleeves by any convenient handle M, and the surfaces are arranged to lift and lower the spindles in pairs—*i. e.*, spindles A and A′—forming a pair at each alternative motion. In other words, the supply on one side and the exhaust on the other is opened, while the converse obtains in the other pair at the same operation. The sleeves C are provided with flats C′, which engage in slots I in the guide-plates F F′, so as to effectively guide the spindles and resist any transverse strain liable to be set up during the operation of the spindles by the disk G in its circular movement. Any suitable means may be provided for pressing the spindles downward to keep the valves normally on their seats. The lift of the spindles is regulated by adjusting the position of the sleeves C by means of the lock-nuts B B′. Slots K are provided in the disk G, through which the sleeves C and spindles pass, the length of the slots being sufficient to permit the proper rotation of the disk to lift the spindles to their full height.

In Figs. 5 and 6 we show a modified arrangement by substituting a rectilineal moving plate L for the rotating disk. In this case the plate L is provided with inclined surfaces H, two being arranged on one side of the plate and one with double inclines on the other. The four slots K are also provided, but in this case they are parallel to one another in pairs. The movement of the plate is effected by the bell-crank lever N, and the general operation is the same as hereinbefore described.

We do not limit ourselves to the particular arrangement or method of operation described and illustrated, as many modifications can be made without departing from the essence of our invention.

Having now described our invention, what

we claim, and desire to secure by Letters Patent, is—

1. The combination with a valve having two or more spindles to which an alternative or intermittent action is to be applied, of a plate movable transversely to said spindles, having slots through which said spindles pass and inclined surfaces on each side of said slots, one or more rigid guide-plates having holes through which the spindles pass and serving as a support for the movable plate, and sleeves adjustable lengthwise on said spindles and provided with inclined faces to be acted on by the inclined surfaces of said plate and with flattened sides engaging with the holes in the guide-plate.

2. The combination with a valve having two or more spindles to which an alternative or intermittent action is to be applied, of a support concentric with said spindles, rigid guide-plates carried by said support and having holes through which the spindles pass, sleeves adjustable lengthwise on said spindles, having flattened sides engaging with the holes in the guide-plates and inclined faces projecting on each side, and a rotary plate journaled on said support between the guide-plates, and carrying inclined surfaces to engage with the faces on the sleeves.

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

FRANCIS LAWRENCE LANE.
WILLIAM RAINFORTH.

Witnesses:
WILLIAM DAGGETT,
GEORGE COOPER.