

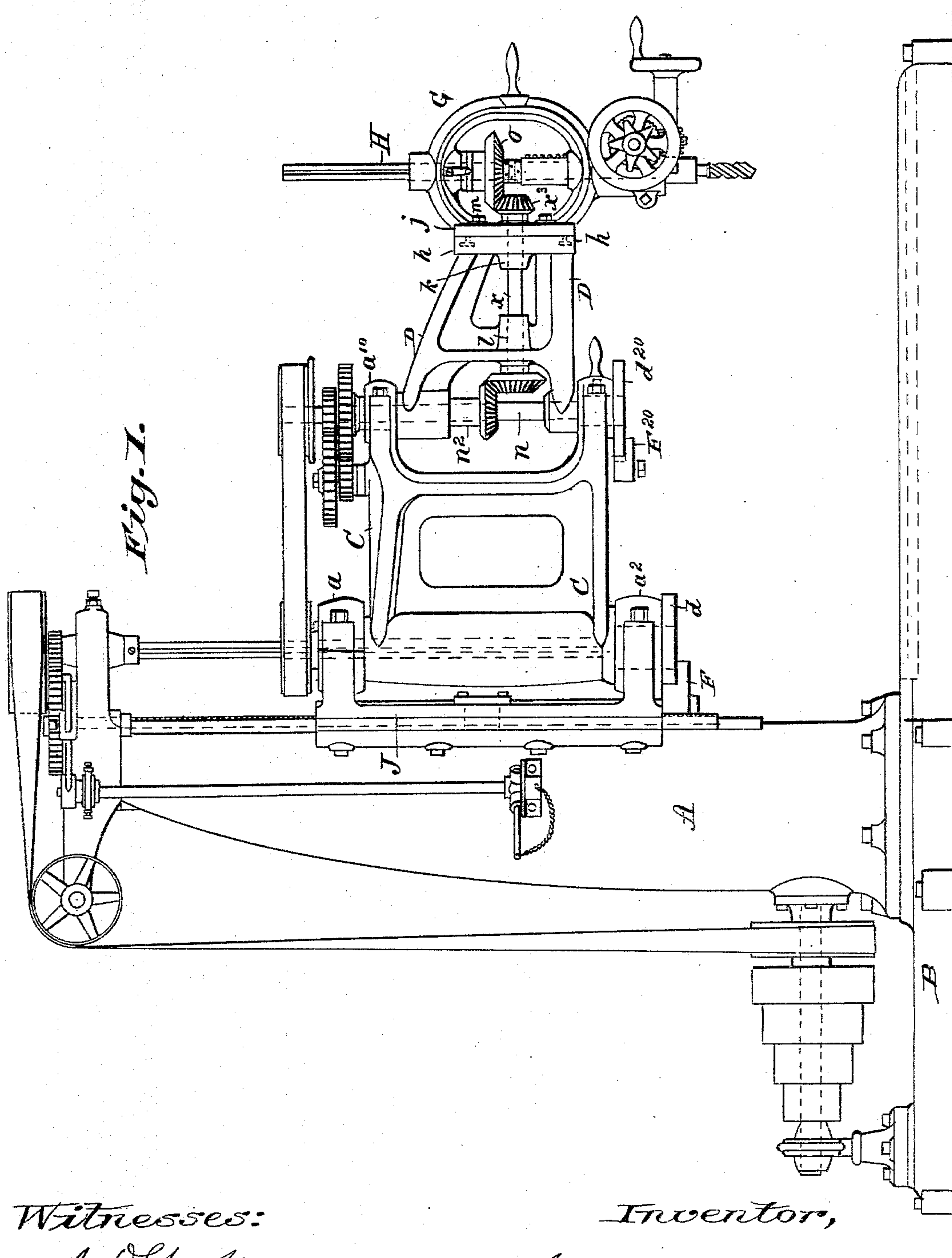
(No Model.)

2 Sheets—Sheet 1.

C. H. BAUSH.
DRILLING MACHINE.

No. 515,988.

Patented Mar. 6, 1894.



Witnesses:

J. W. Garfield
A. J. Clemons

Inventor,

Christian H. Baush,
per Chapman & Co.
Attys.

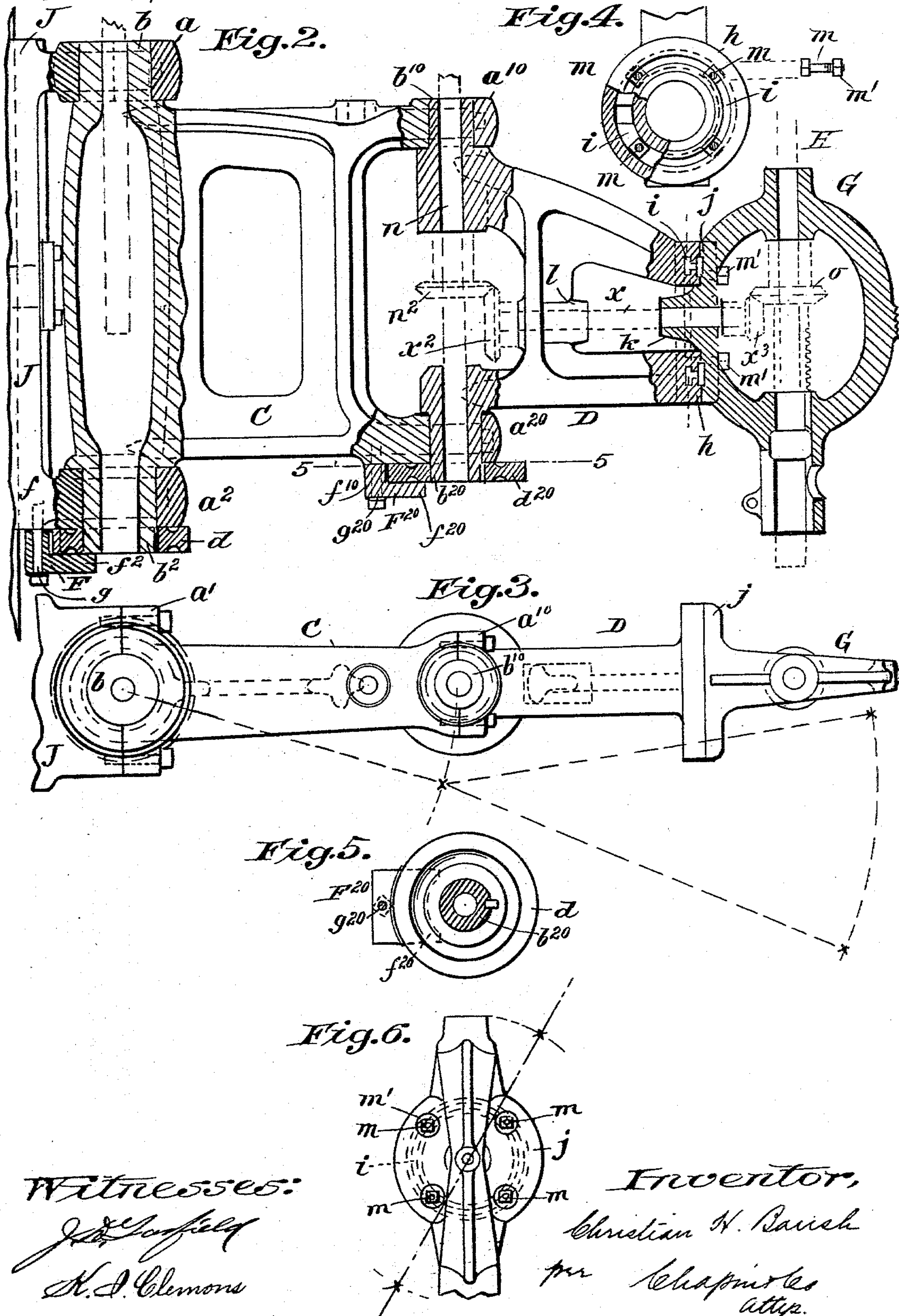
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UNITED STATES PATENT OFFICE.

CHRISTIAN H. BAUSH, OF HOLYOKE, MASSACHUSETTS.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 515,988, dated March 6, 1894.

Application filed February 4, 1893. Serial No. 460,940. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN H. BAUSH, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Drilling-Machines, of which the following is a specification.

This invention in part relates to improvements in radial drills that is, drilling machines in which the drilling tool is carried at the extremity of a simple or compound jointed arm standing radially from a post or standard; and the invention in part relates to improvements in universal drills, that is, drilling machines in which the drilling tool is so mounted on a radial arm that it may be swung or revolved about the standard and also so that it may be turned independently of, and in various angular directions to, the radial line of extension of the arm from the standard.

The objects of this invention are, first, to provide improved means relative to the joint which the radially movable arm has to or upon the support therefor, whereby the joint may be so temporarily locked at will as to hold the arm rigidly in any given radial extension from its center of movement; and, secondly, to provide improved features to the universal drill carrying head of the machine, all as will hereinafter be rendered more apparent.

With respect to these portions of the drilling machine the invention consists in the constructions and combinations of parts, all substantially as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings in which—

Figure 1 is a side view of the universal drilling machine with the present improvements applied thereupon. Fig. 2 is a view on a larger scale partially in side elevation and partially in central vertical section through the jointed radial arm, and the universal head in which the drill-spindle is mounted. Fig. 3 is a plan view of the parts, shown in Fig. 2. Fig. 4 is an end view of the circular end of the radial arm, (the universal head being understood as removed,) with, however, parts of said end-portion of the arm shown in section taken on the plane indicated

by the line 4—4, Fig. 2. Fig. 5 is a horizontal section of a part of the machine taken on the line 5—5, Fig. 2, with the parts below the plane of section shown in plan view. Fig. 6 is an end or vertical edge view of the universal head, and an end-portion of the supporting arm therefor which appears behind or beyond the said head.

In the drawings, A represents the standard or upright which is of a rigid construction and has a suitable connection by bolting or otherwise to the bed or base, B.

The horizontally and radially extended portion of the drilling machine, here shown, comprises a back-arm, C, and a front-arm, D, and G represents the universal head which carries the drill-spindle, H. The front-arm, D, has a pivotal or swivel-joint connection with the forward portion of the back-arm, C, and this back-arm has a pivotal or swivel-joint connection with a frame or carrier, J, which is vertically adjustable upon the upright A.

The frame or carrier has upper and lower forwardly extended rigid and substantial members, a and a^2 , with vertical, axially aligned journal apertures in each; and the back-arm, C, has upwardly and downwardly extended hubs or bosses, b and b^2 , which respectively have bearings within the apertures in the aforesaid members, a and a^2 ; the lower one, a^2 , practically sustaining the weight of the back-arm, C, and the appurtenances thereof. The downwardly extended hub, b^2 , projects below the under side of the member, a^2 , receiving, as a fixture thereof, the disk or annulus d , which is keyed or otherwise affixed thereto as a permanent flange, the upper side of which is in close bearing upon the under side of the aforesaid member, a^2 .

F indicates a confining dog to engage the said flange, d , to prevent, when the back-arm has been adjusted, any movement thereof radially from its center of swing. This dog consists of the body portion, f , and the flange or lug, f^2 ; the screw-bolt, g , passes vertically upwardly through the body portion of the dog and with a screw-engagement into a tapped hole therefor vertically formed within the under side of the carrier, J; and the head of this screw-bolt coming to engagement against the under side of the dog so upwardly forces the latter that it exerts a

firm and effective binding tension against the flange, d , to hold it so hard against the under side of part a^2 , as to prevent any swinging movement of the back-arm. The front arm 5 has substantially the same form of joint connection with the back-arm as the back-arm has with the carrier J, and the same form of confining device is applied for temporarily preventing the swinging of the front-arm on 10 the back-arm as has been described for preventing the swinging of the back-arm relative to the upright, or more strictly speaking, relative to the carrier, J, which, for the time being, may be regarded as a part of the up- 15 right: that is to say, the back-arm has upper and lower forwardly extended rigid and substantially formed members, a^{10} and a^{20} , with vertical axially aligned journal apertures in each; and the front-arm, D, has, at its rear, 20 upwardly and downwardly extended hubs or bosses, b^{10} and b^{20} , which respectively have bearings within the last named apertures; the hub, b^{20} , projecting below member, a^{20} , receives the part, d^{20} , constituting the flange, 25 while the dog, F^{20} consisting of body, f^{10} , and extended lug, f^{20} , is applied to bind, due to the forcing action of the screw-bolt, g^{20} , the lug of the dog against the flange to hold the arm, D, against swinging movement. These 30 parts, of course, might be inverted and applied relative to the tops of the members a and a^{10} , although for convenience of access, and as otherwise more practical, as manifest, they are applied beneath.

35 It is apparent that the head, G, may be swung in unison with the doubly jointed carrying arms therefor, and on reference to the drawings it will be furthermore seen that the head may rotate about a horizontal axis which 40 is at right angles to the length of the front-arm.

The universal head consists of a circular, elliptical, or otherwise appropriately formed body with its back portion constructed with 45 reference to having the swiveling connection upon the front-arm, D, and with reference to forming a bearing for the horizontal shaft, x , which drives the drill-spindle, which spindle is arranged at right angles to the said shaft, 50 x ,—the shaft having a gear connection with the spindle in such a manner as to rotate it and yet permit the longitudinal movement of the drill-spindle for feeding it to its work or withdrawing it therefrom. The forward end, 55 h , of the front-arm, D, is formed annular and has the concentric T-slot, i , therein, all as clearly indicated in Figs. 2 and 4. The rear side or edge of the head, G, is formed with the circular or annular portion, j , and also with 60 the rearwardly extended hollow hub, k , which is in peripheral bearing against the inner wall of the annular part, h ; this hollow hub being in axial alignment with the bearing-hub, l , which is at the rear portion of the arm, D. Bolts, 65 m , are entered at suitable intervals within and around the T-slot, i , through a hole, p , therefor, they having their heads disposed

within the inner widened portion of the slot, while their shanks are extended forwardly 70 through the contracted annular orifice of the slot and loosely through and beyond the circular rear portion, j , of the universal head, receiving confining nuts, m' , thereon. The head is principally and accurately supported 75 or journaled by the bearing of its hub, k , peripherally within the part, h , while the T-slot and bolt connection constitutes a means for effectively confining the universal head to 80 present the drill-spindle in any line of right angles to and radially of the center of its movement which is coincident with the axis 85 of the shaft, x , which has its bearings through the hubs l and k , being extended rearwardly and forwardly therebeyond.

The vertical shaft, n , is mounted in the 85 journal-bearing constituted therefor in the hollow hubs or bosses, b^{10} , b^{20} ,—the shafts, n and x , having the bevel gears, n^2 and x^2 , in mesh, and the drill-spindle has connected thereto the bevel-gear, o , which is in mesh 90 with the bevel-gear, x^3 , fixed on the forward end of the aforesaid shaft, x . The shaft, n , takes power through means of pulley and belt in a manner manifest on an inspection 95 of Fig. 1, but no novelty resides in the means for driving shaft, n^2 , and hence a particular description thereof is herein unnecessary.

The drill-spindle is rotated, as stated, by reason of the connection therewith of the gear, 100 o , which in turn is driven by the gear on shaft, x , but it is to be understood that the drill-spindle has, in conjunction therewith, mechanism for feeding it axially and this also constitutes no part of the present invention and 105 need not be referred to.

It will be manifest that the front-arm may be doubled on the back-arm or be swung into 110 other extension therefrom, and that the universal head may be moved to present the drill for drilling in any line at right angles to any line of extension which the front-arm 115 may have, and therefore it becomes possible to drill at any inclination to the main standard when the head is anywhere to the front or either side thereof, a capability not found 120 in any drilling machines at present known to me.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a drilling machine, the combination 120 with a standard or upright support having a member with a vertical aperture, of an arm with a boss or hub extended down through the aperture to turn therein, and having at 125 its extended extremity, the attached horizontal flange which bears against the contiguous under surface of the said apertured member, and a dog, comprising a hub adapted to be 130 screw-bolted to the support, and the lug or extension to have, when the bolt is turned up, an upward pressure upon the flange to firmly bind it against the under face of the said apertured member.

2. In a drilling machine, the combination
with a horizontally extended radial arm pro-
vided with an extremity of annular form sur-
rounding a horizontal axis, and a journal-
5 bearing at a rear part of said arm in coinci-
dence with the axis of the annular extremity,
of a centrally open universal head compris-
ing at its rear a circular face and a rear-
wardly extended hollow hub, the face bear-
10 ing on the end face circular arm extremity
and the hollow hub externally bearing on the
inner periphery of said extremity, a shaft

supported in the journal bearing of the arm
and in the said hollow hub and having on its
portion within the head a gear wheel, and the 15
drill-spindle mounted at right angles to the
length of said shaft for rotation on the head,
and having a gear connected thereto which is
in mesh with the said shaft-gear, substan-
tially as described.

CHRISTIAN H. BAUSH.

Witnesses:

WM. S. BELLOWS,
H. A. CHAPIN.