

No. 617,409.

Patented Jan. 10, 1899.

R. C. STIEFEL & S. TRETHEWEY.
CONSTRUCTION OF ROLLS FOR METAL ROLLING.

(Application filed Sept. 6, 1898.)

(No Model.)

Fig. 1.

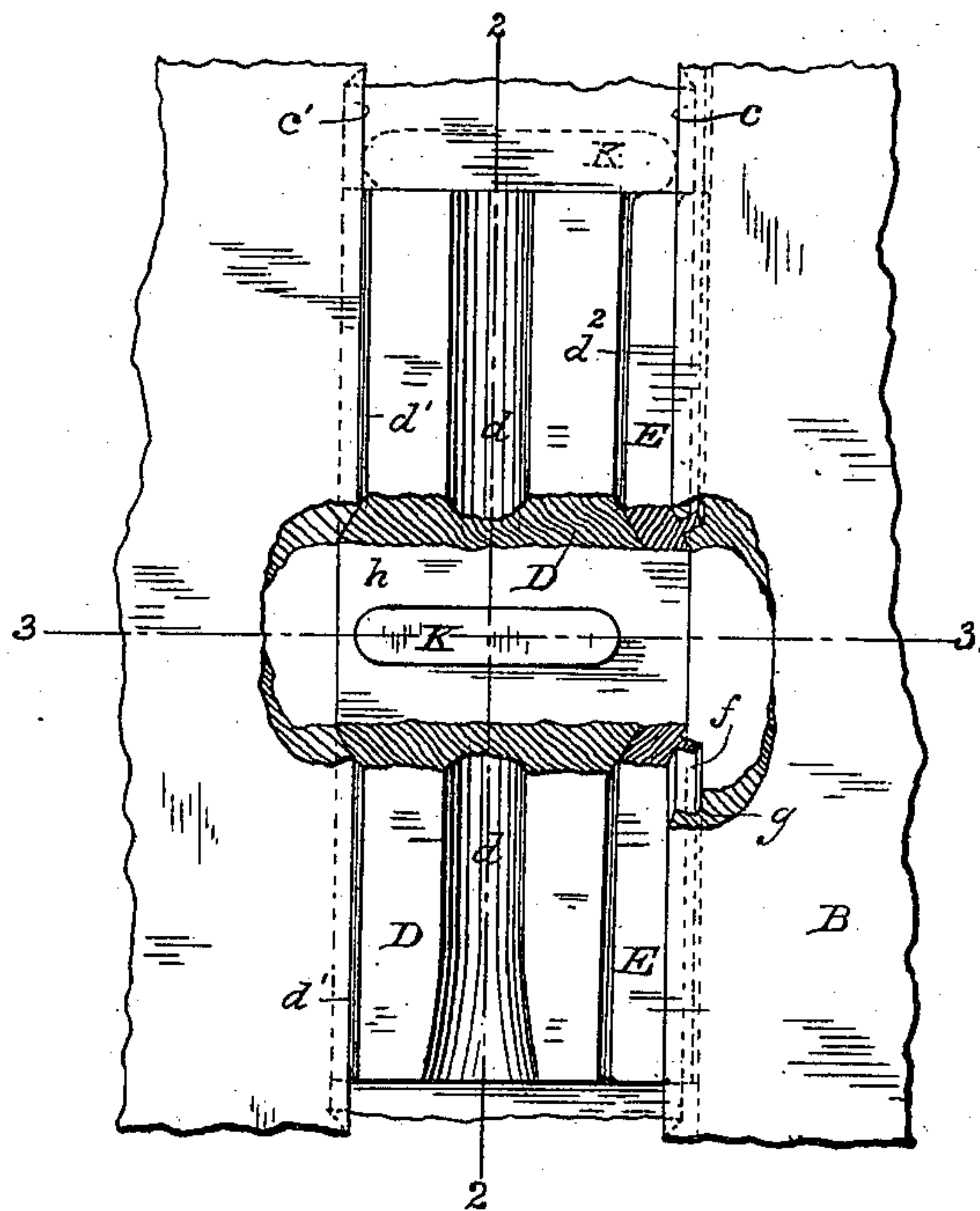


Fig. 3.

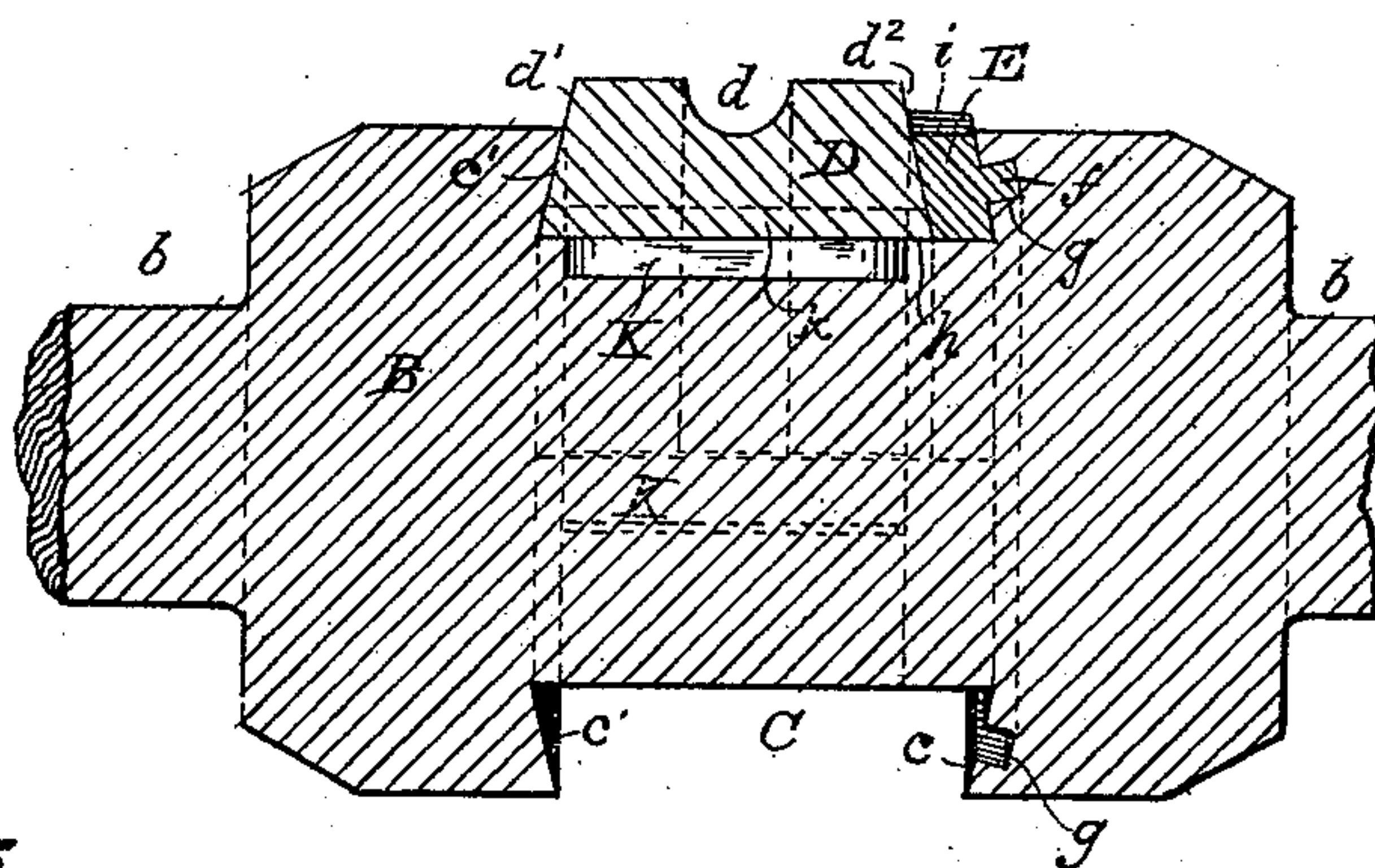
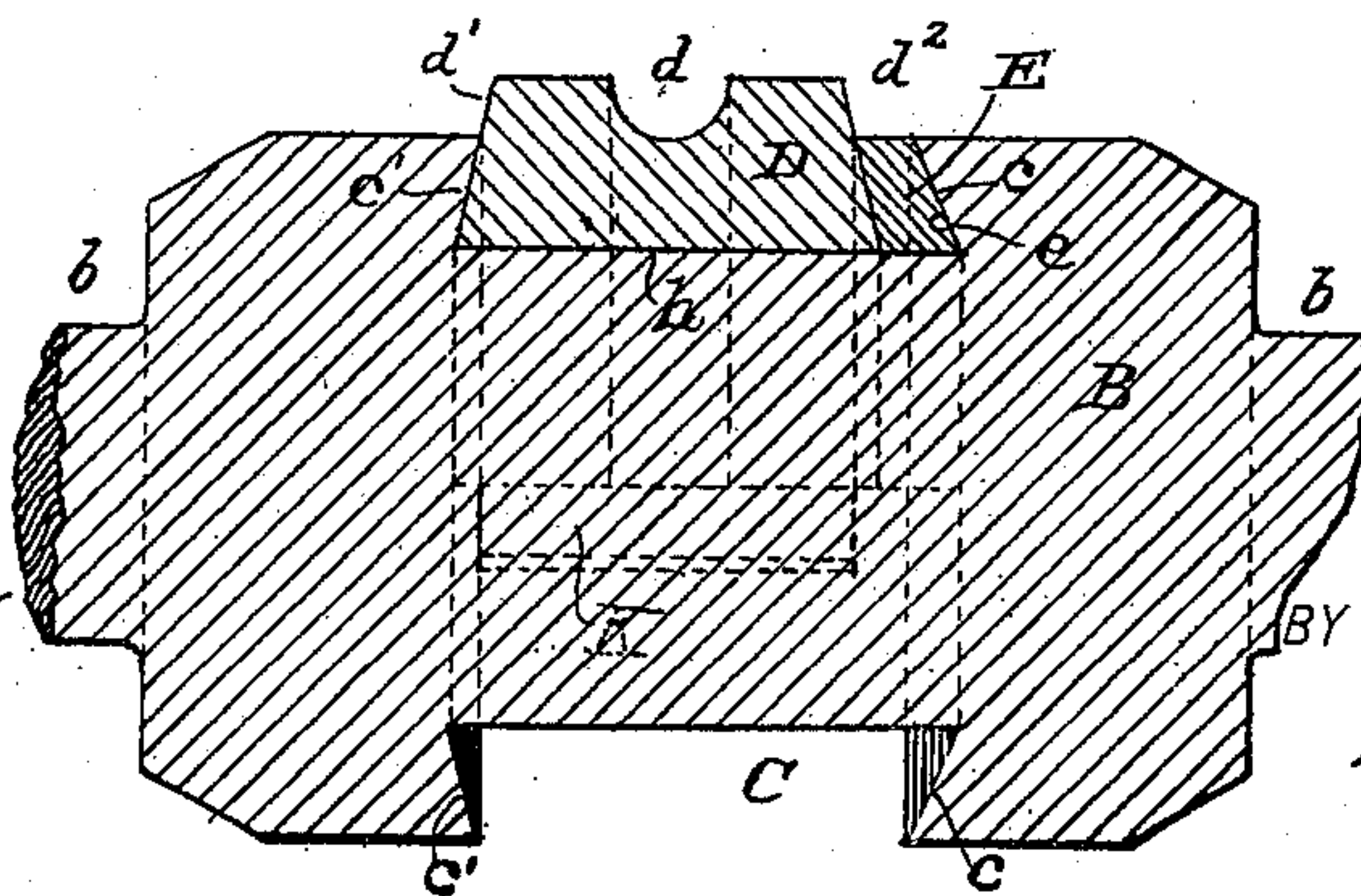


Fig. 5.



WITNESSES:

W. B. Skinkle
W. Corrie

INVENTORS:

Ralph C. Stiefel
Samuel Trethewey

BY Wm. A. Skinkle
ATTORNEY.

UNITED STATES PATENT OFFICE.

RALPH C. STIEFEL, OF ELLWOOD CITY, AND SAMUEL TRETHEWEY, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO THE SHELBY STEEL TUBE COMPANY, OF PITTSBURG, PENNSYLVANIA.

CONSTRUCTION OF ROLLS FOR METAL-ROLLING.

SPECIFICATION forming part of Letters Patent No. 617,409, dated January 10, 1899.

Application filed September 6, 1898. Serial No. 690,300. (No model.)

To all whom it may concern:

Be it known that we, RALPH C. STIEFEL, a citizen of the Republic of Switzerland, residing at Ellwood City, in the county of Lawrence, and SAMUEL TRETHEWEY, a citizen of the United States, residing at Pittsburg, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in the Construction of Rolls for Metal-Rolling, of which the following is a specification that will enable those skilled in the art to which our invention pertains to make and use the same.

Our invention relates to built-up rolls, or rolls having their working faces formed in removable blocks. Its objects are to make these blocks detachable, so that when worn or when changes may be desired they can be quickly removed from the body of the roll and replaced by new ones, to make such blocks of better or more enduring metal than can be obtained in large bodies of cast metal, from which such rolls are usually made and to provide means for securely attaching the blocks to the body of the roll in such manner that they will be firmly seated upon and supported by the body of the roll throughout their lengths and in such manner as to permit of their expansion or contraction independently of the main body of the roll and at the same time to hold them from accidentally working loose.

The accompanying drawings show our invention in the best form now known to us; but some changes obvious to and within the skill of a good mechanic and not requiring the exercise of invention might be made in the details thereof without departing from the spirit of our invention, as set forth in the claims at the end of this specification.

Figure 1 is a diagrammatic face view of the surface of a roll and the detachable block or segment which constitutes its working face applied thereto and suitably locked in place. For purposes of clearer illustration these parts are shown as laid out on a flat instead of on a cylindrical surface. Fig. 2 is a view, partly in elevation and partly in cross-section on the line 2 2 of Fig. 1, of a roll having our

improvements applied thereto. Fig. 3 is a longitudinal section of the same on the lines 3 3 of Figs. 1 and 2. Fig. 4 is a perspective elevation of the preferred form of locking key or wedge by means of which we secure our detachable working block in place. Fig. 5 is a view of a roll in longitudinal section, showing a modification of the key or wedge.

Heretofore it has been customary to make metal rolls for metal-rolling of solid cast or wrought steel with plain working faces or with one or more grooves of any desirable configuration worked in their surfaces. These rolls vary in size generally from six inches to two or three feet in diameter and of any length from several inches to several feet. They are very heavy and it is exceedingly difficult to get perfect castings for such rolls as these, for flaws and blow-holes are liable to be in the metal, and should they occur in the working surface that portion of the roll or possibly the entire roll would be rendered valueless. It is also impossible in such large metal castings, especially in steel castings, to get metal possessing the best qualities and uniformity for the work such rolls have to perform in operating upon hot metal.

The abrasion and consequent wear upon the grooves or working surfaces of the rolls is enormous, and unless of very superior and uniform metal they are soon worn out of desirable shape, in consequence of which they must be taken from their housings to be returned and have new grooves formed in them, which operation is repeated as often as may be required until the rolls are finally too much reduced in diameter to possess the necessary peripheral length and lateral stiffness and strength for their work, when they must be discarded and replaced by new ones. The result is that while such rolls are expensive as to first cost and maintenance they are comparatively short-lived.

Our invention contemplates the use of a separate block of metal of the very highest and best quality adapted for the work to be performed, securely attached to the face of a roll and having formed on its outer face the proper grooves or forms for the work it is to

produce. The desirability of such a construction has long been recognized; but prior to our invention no means, so far as we know, have been found for securing such blocks

5 against the face of the rolls in a manner that would hold them absolutely against loosening but at the same time permit of the independent circumferential expansion or contraction of the detachable block.

10 In our invention the roll B may be made in the usual way of cast-steel or other suitable metal, with its shaft or trunnions *b* made integral therewith or separately therefrom, as desirable or deemed most practicable.

15 Around this roll we form a circumferential groove C, undercut at its sides *c* and *c'*, or made wider at its bottom than at its top. In this groove we seat our segmental or detachable block D, beveled at its sides, as shown,

20 to conform to the undercut sides of the groove and containing on its outer face a working groove *d* of the shape shown or of any other desirable configuration. This block should not exceed a semicircle in the circumferential length, and while one of its sides, *d'*, is

25 straight or parallel to fit against one side, *c'*, of the groove in the roll the other side, *d''*, is made slightly inclined or tapering, so that the space between it and the side *c* of the

30 groove adjacent to it is wider at one end of the block than at the other. Quite a space is left between this inclined side of the block and the adjacent side *c* of the groove in the roll, and into this space is fitted a curved key

35 E, one side of which is straight or parallel to fit against the side of the groove, and the other side is inclined to correspond to the inclination of the side *d''* of the block. When driven tightly into the space between the

40 block and the side of the groove, this curved key forms a wedge which securely holds the block in place. In order to prevent the key from springing or being forced out of its place radially, we may make it wider on its inner

45 diameter than on its outer diameter, as shown in Fig. 5, so that its outer face *e* has a greater inclination than the opposite face, which bears against the block. We prefer, however, to form the key with parallel sides in cross-section, as shown in Figs. 1 to 4, inclusive, and

50 form upon its side a ledge or spline *f*, which takes into a corresponding groove *g* formed in the undercut sides *c* in the main groove of the roll. This spline absolutely prevents the

55 key from lifting away from the seat or bottom *h* of the groove at any point in its length while it is being driven home. The key may be driven into its place by pressure or blows applied at its larger end; but in view of its

60 peculiar shape we prefer to apply the pressure or blows at about its mid-length, and for this purpose we form on its outer side a projecting lug *i*, against which the pressure may be applied to force the key home. By attacking

65 the key at this point it will be seen that the forward or smaller end of it only is driven in the direction of the arrow in Fig. 4, while

the rear end is drawn into the space it is to fill.

The bottom of the groove C is turned to 70 perfect cylindrical shape and constitutes a flat seat upon which the inner surface of the block D rests at all points, so that even were the block D to become slightly sprung and leave the seat the pressure of the work would 75 force it back at each pass of the metal, so that there would always be the same distance from the bottom of the groove *d* to the center of the roll.

In order to prevent the segment or detach- 80 able block D from slipping circumferentially, we locate a cross-key or spline K in the face of the roll at the bottom of the groove, which key fits into a corresponding cross-groove *k* on the inner face of the block. This key may 85 be located at the longitudinal center of the block, as shown by full lines in Figs. 1, 2, and 3, or it may be at the end of the block, as shown by dotted lines in Figs. 1, 2, 3, and 4.

In assembling the parts the block D is set 90 into the groove engaging the key K and embracing the bottom of the groove for a distance not to exceed half its diameter. The tapering circular key E is then driven home until it wedges the block securely in place. 95

When hot metal is being rolled, the block D, coming in contact therewith, heats more quickly than the main body of the roll to which it is attached, and in consequence thereof it expands principally in the direction 100 of its length independently of the roll to which it is attached. The wedge-key which we use to secure the block in place will permit of this expansion and at the same time hold the block firmly down to its seat on the bot- 105 tom of the groove, so that there is no lifting or buckling of the block.

Having thus described our invention, what we claim as new and useful, and desire to se- 110 cure by Letters Patent, is—

1. The combination of a roll having a cir- 115 cumferential groove, the sides of which are inclined or undercut, a curved block provided with a working surface and set into said groove and having its sides correspondingly 120 inclined and one of them also slightly inclined lengthwise, a curved tapering key fitting between the inclined side of the block and the adjacent side of the groove with a ledge or spline along its side and a small 125 groove in the roll to receive said spline, substantially as and for the purpose hereinbefore set forth.

2. The combination of a roll having a cir- 130 cumferential groove, the sides of which are inclined or undercut, a curved block provided with a working surface and set into said groove and having its sides correspondingly 135 inclined with one of them also slightly inclined lengthwise, a curved tapering key fitting between the inclined side of the block and the adjacent side of the groove with a ledge or spline along its side and a small groove 140 in the roll to receive said spline and a cross-

key let into the inner face of the block and the face of the main groove in the roll, substantially as hereinbefore set forth.

3. The combination of a roll having a circumferential groove, the sides of which are inclined or undercut, a curved block provided with a working surface and set into said groove and having its sides correspondingly inclined with one of them also slightly inclined lengthwise, a curved tapering key or wedge fitting between the inclined side of the block and the adjacent side of the groove with a cross-key fitting into the inner face of the

block and the face of the main groove of the roll, substantially as set forth.

15

In testimony whereof we hereunto affix our signatures each in the presence of two subscribing witnesses.

RALPH C. STIEFEL.

SAMUEL TRETHEWEY.

Witnesses for Ralph C. Stiefel:

WM. A. SKINKLE,

GEO. F. WILLIAMS.

Witnesses for Samuel Trethewey:

CHARLES BITZER,

J. B. RICHARDS.