

2 Sheets—Sheet 1.

GRATE.

Patented Nov. 24, 1885.



Ed. Roche
Wm. G. Lipsey

William E. Kelly
By his attorneys,
Gifford Brown

(No Model.)

W. E. KELLY.
GRATE.

2 Sheets—Sheet 2.

No. 331,141.

Patented Nov. 24, 1885.

Fig. 7.

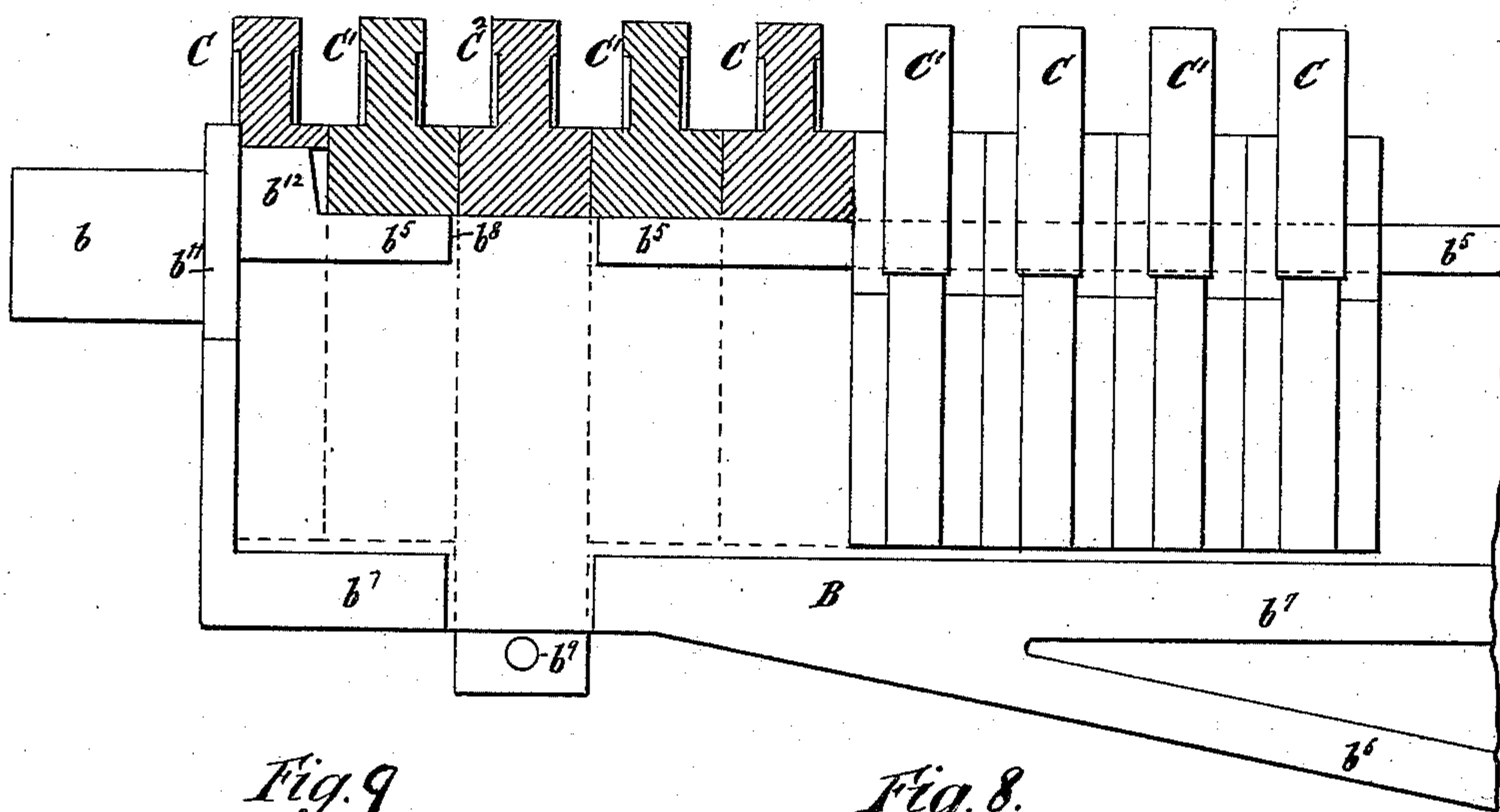


Fig. 9.

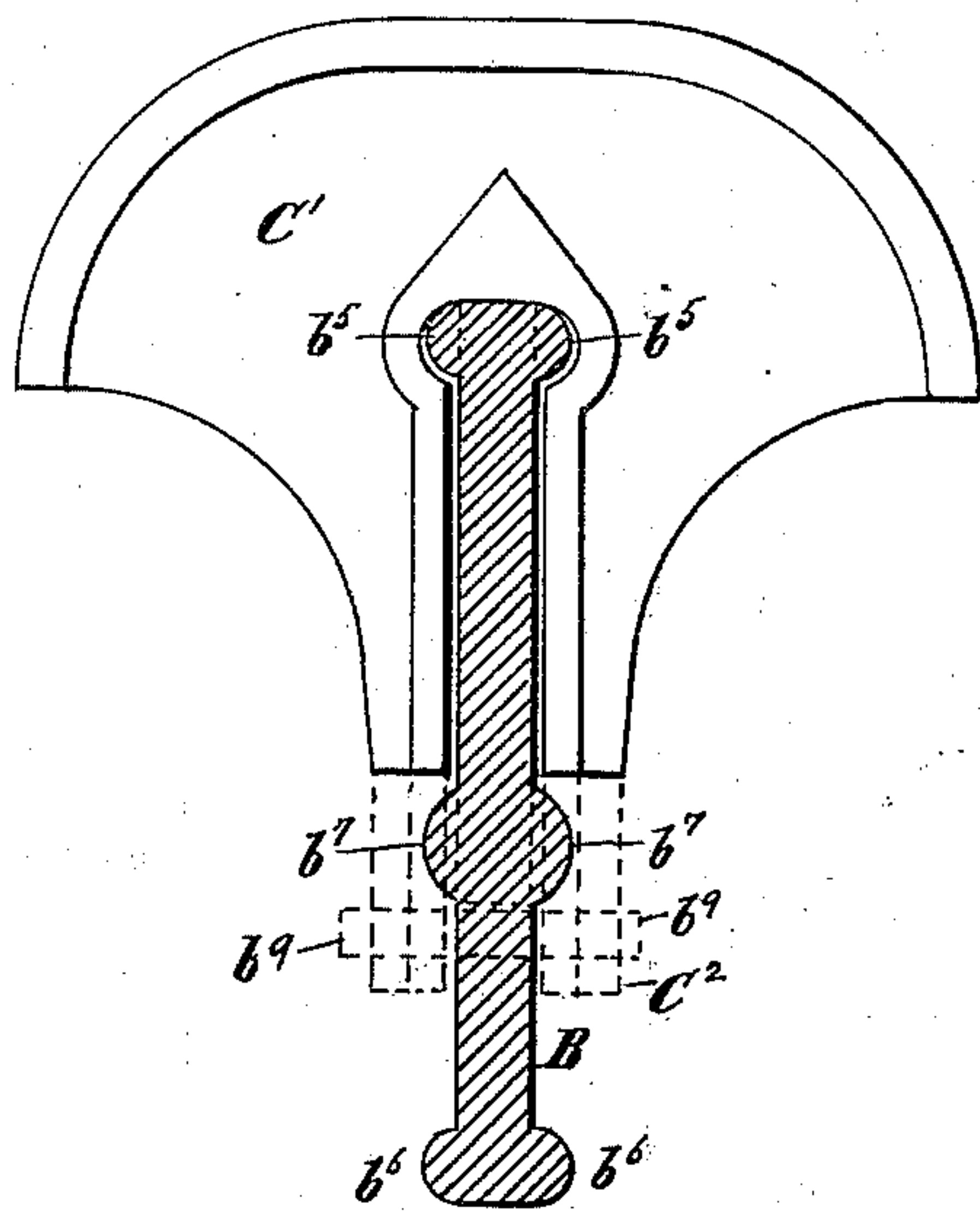
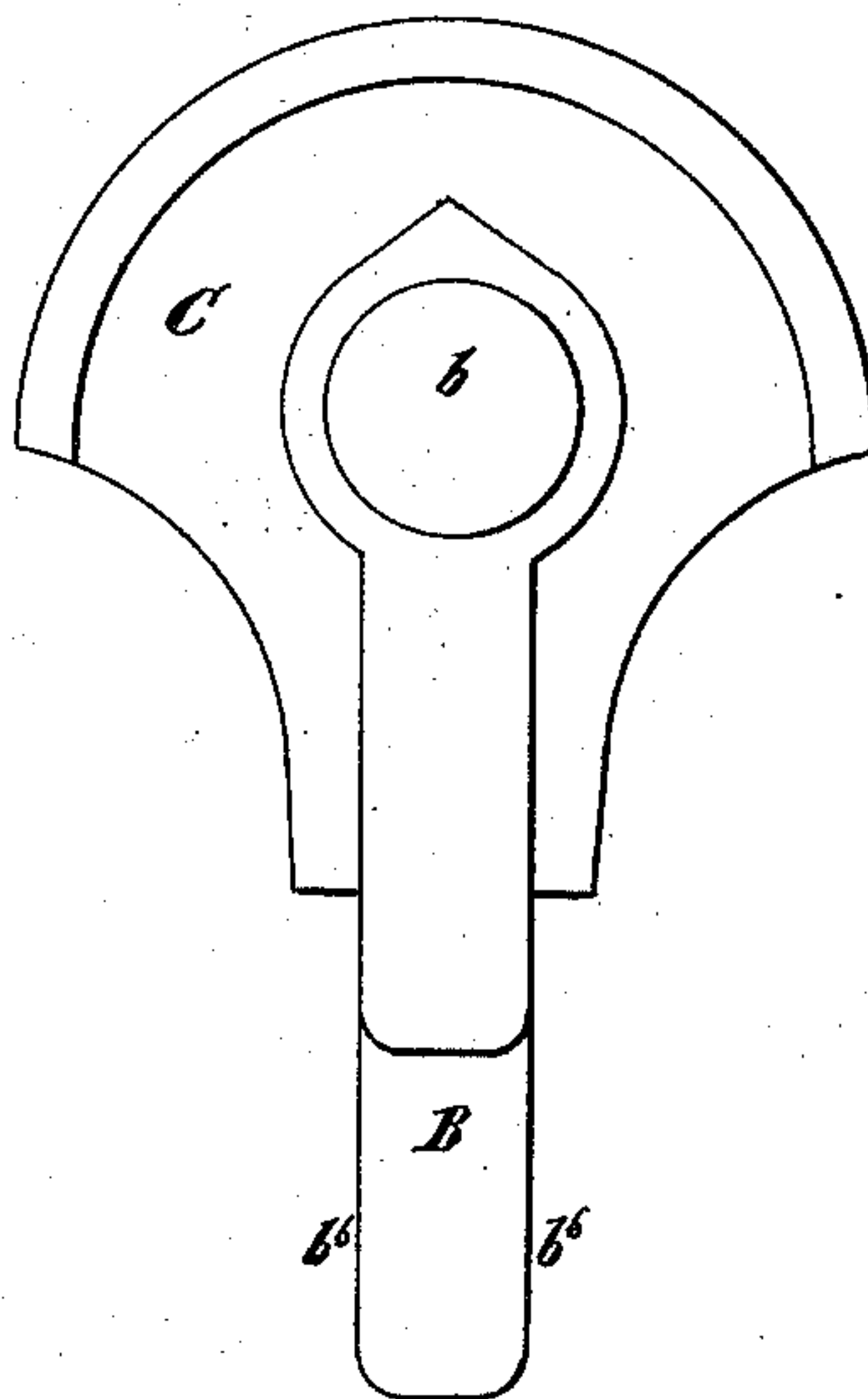


Fig. 8.



Witnesses
E. J. Roche
W. G. Lipsey

Inventor
William E. Kelly
by his attorneys,
Gifford & Brown

UNITED STATES PATENT OFFICE.

WILLIAM E. KELLY, OF NEW BRUNSWICK, NEW JERSEY.

GRATE.

SPECIFICATION forming part of Letters Patent No. 331,141, dated November 24, 1885.

Application filed January 31, 1885. Serial No. 154,556. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. KELLY, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Improvement in Grates, of which the following is a specification.

I will describe in detail a grate embodying my improvement, and then point out the various features in the claims.

10 The accompanying drawings illustrate a grate embodying my improvement.

Figure 1 is a plan of the grate with certain parts omitted and furnace-walls illustrated in section. Fig. 2 is a sectional side view of the grate, one of the furnace-walls being also shown in section. Fig. 3 is a transverse section of the grate, taken at the plane of the dotted line *x x*, Fig. 1, and looking in the direction of the arrow at the end of the said line. Fig. 4 is a perspective view of the end portion of one of the end pieces of the grate-frame. Fig. 5 is a longitudinal section of a corner of the grate. Fig. 6 is a transverse section of one of the side pieces of the grate-frame. Fig. 7 is an enlarged side view of one of the grate-bars, certain of its leaves being shown in section. Fig. 8 is an end view of the grate-bar. Fig. 9 is a transverse section of the grate-bar.

Similar letters of reference designate corresponding parts in all the figures.

30 The grate-frame consists of two end pieces, A, and two side pieces, A'. The end pieces, A, consist, essentially, of bar-like portions *a*, having inwardly-inclined upper surfaces, and legs *a'*, extending downwardly from the bar-like portions. These legs *a'* extend not only under the bar-like portions, but also beyond the same at about right angles. In other words, the legs are L-shaped in the cross-section. 40 From these end pieces lugs *a''* extend horizontally. The side pieces, A', rest on the lugs *a''*, and are supported thereby. Above the lugs *a''* of the end pieces, A, ribs *a'''* extend from their inner surfaces. The ends of the side pieces, A', are bent inward, so as to fit around the ends and inner sides of the ribs *a'''*, as shown more particularly in Fig. 5. Bolts *a''''* pass through lugs *a''*, extending from the side pieces, A', and also through the lugs *a''*, and thereby 50 secure the side pieces and end pieces together. This is a very desirable way of securing the

parts together, because it prevents the spreading of the side pieces.

B designates the grate-bars. They are provided with journals *b*, which fit in cavities 55 formed in the upper edges of the side pieces, A', and are secured therein by means of cap-bars *b'*, extending over them. The cap-bars have inwardly-inclined upper surfaces. Bolts *b''* pass through the cap-bars *b'*, and also through lugs *b'''*, extending inwardly from the side pieces, A', and secure the cap-bars in place. The nuts of the bolts are at the lower ends of the bolts below the lugs *b'''*. They are therefore so low down that they will not suffer from 65 the heat of the fire on the grate.

The grate-bars B are, as here shown, flat-sided, with the exception of ribs *b''''*, extending from opposite sides at the top edges, ribs *b'''''*, extending from opposite sides at the bottom 70 edges, and ribs *b''''''*, extending from opposite sides a short distance above the bottom. The bars are straight along the top, but downwardly arched at the bottom from the middle toward the ends. The ribs *b''''* extend along the bottom edges, and consequently conform to the arch thereof. The ribs *b'''''* extend horizontally along the bar from end to end, joining the ribs *b''''* at the upper ends of the latter. The bars thus are strengthened most where they 80 are subjected to the greatest strain.

The grate-bars B are provided with leaves C C' C''. These leaves are slotted from the bottom upward, so that they may be slipped over the grate-bars B from the upper edges of the 85 latter. The slots of the leaves C C' are large enough at the top to fit over the ribs *b''''*, but they are small enough below to fit snugly against the sides of the bars below the ribs *b''''*. In short, the slots of these leaves C C' conform 90 to the shape of that portion of the bars which is above the ribs *b''''*. There are interruptions *b''''''* in the ribs *b''''* for a distance equal to the width of one of the leaves C C' C''. Each of the leaves C C' of the bars is slipped downwardly upon its bar, the ends being passed 95 through the interruptions of the ribs *b''''*. After each leaf is thus placed it is moved lengthwise of its bar, and then it will be interlocked with the bar, so that it cannot be removed by merely moving it upward. After all the leaves C C' 100 have thus been applied a leaf, C'', which has

a parallel-sided slot, is slipped upon the bar through the interruptions of the ribs b^5 . It keeps the other leaves, $C C'$, in place, and hence may be termed a "master-leaf" or "key-leaf."

5 It is secured in position by means of a pin, b^9 , passed through its lower portion and through the bar.

The top surfaces of the leaves C have the form of arcs concentric with the journals b of the bars B ; but the top surfaces of the leaves C' are severally composed of two arcs of the same radii as the arcs of the top surfaces of the leaves C , but separated by an intermediate flat portion. The leaves C' consequently project farther in both directions from the bars than do the leaves C . The leaves C and C' are alternated on the bars, and are so arranged upon the adjacent bars that the leaves C of each bar are opposite the leaves C' of the next bars. The leaves C^2 may have their top surfaces like the top surfaces of either the bars C or the bars C' , as circumstances require.

The top surfaces of all the leaves $C C' C^2$ are narrower than the parts fitting upon the bars B ; hence the portions fitting upon the bars serve as spacing-pieces for regulating the distances between the top surfaces. These spacing-pieces may extend wholly from one side or from both sides of the several leaves. The spacing-pieces are so shaped as to have diverging inclined surfaces at the upper portion for shedding anything which may fall upon them. Preferably the top surfaces of the bars overhang the portions immediately below them, in order to afford clearance to anything descending below the top surfaces.

By extending the leaves far down the sides of the bars the latter are protected from injury through heat and preserved in better condition than otherwise would be possible.

The leaves can be renewed from time to time. They may be broken off, or the master-leaves may be detached and lifted off and the other leaves subsequently slipped lengthwise of the bars to the interruptions of the ribs b^5 and then lifted off. The new leaves may be applied in the manner already described.

It is worthy of remark that the leaves may be renewed without removing the bars.

The bars B have, near their journals b , flanges b^{11} and shoulders b^{12} for strengthening them.

The end pieces, A , of the grate-frame have lugs a^7 , which extend toward the leaves of the adjacent grate-bars.

The bars B have cylindric studs b^{10} projecting from their lower portion at one end. These studs are received in cavities or holes in a reach-bar, D . By moving the reach-bar all the bars B , and with them the leaves $C C' C^2$, may be rocked in unison.

The grate-frame, the bars, and their leaves may be made of cast-iron.

55 The reach-bar D has extending from one side a screw-threaded pin, d , which may be cast therein or otherwise affixed thereto. A

coupling-piece, E , is screwed upon this screw-threaded pin d . The coupling-piece E has at one end a screw-threaded socket, in which a rod, F , is screwed. The rod F is connected to a lever, G , which is fulcrumed to a bracket, G' , extending, as here shown, from one of the furnace-walls. The rod F is bifurcated at the outer end to embrace the lever G , and is connected to the lever by a pin passing transversely through it and the lever. By adjusting the coupling-piece E upon the screw-thread of the pin d in the direction of the length of the said pin before the rod F is connected to the coupling-piece, it may be brought into any desired position with relation to the reach-bar D , in order to admit of arranging the lever G conveniently. The rod F may be screwed farther into or out of the coupling-piece E , to suit the position which it is desirable for the lever G normally to occupy. When the rod is secured to the lever G , it precludes such adjustments. By swinging the lever G the rocking of the grate-bars will be effected.

I do not wish to be confined to locking the leaves $C C'$ to the bars B by means of the ribs b^5 , as any other shape of the bars and leaves whereby a different transverse projection of the bars and a correspondingly-varying width in the slots of the leaves or the latter alone would subserve the same end.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The bars B , arched along the bottom and provided with the ribs b^5 , conforming to the arch of the bottom, and the ribs b^7 , substantially as specified.

2. The combination, with grate-bars B , of leaves slotted from the bottom upward, the bars and the slots of the leaves being of different widths at different portions, so that they may interlock, and the bars having interruptions through which the leaves may be passed downward, and from which the leaves may afterward be moved lengthwise of the bars, substantially as specified.

3. The combination, with grate-bars having longitudinal ribs provided with interruptions, of leaves having slots corresponding with the cross-section of the grate-bars, and a leaf or leaves bolted or otherwise secured in place upon the grate-bars for preventing displacement of the leaves first named, substantially as specified.

4. The combination, with grate-bars having varying transverse projections, leaves having slots of varying widths extending from the bottom upward, interruptions in the bars, through which these leaves may be passed, and master or key leaves, substantially as specified.

5. The combination, with the grate-bars B , having shoulders b^{12} , flanges b^{11} , journals b , and interruptions b^5 , of leaves provided with slots extending from the bottom upward, substantially as specified.

6. The combination, with the bars B , provided with ribs b^5 , having interruptions b^8 , of

the leaves C C', the leaves C², and the pins b⁹, substantially as specified.

7. The combination of the reach-bar D, provided with the pin d, of the coupling-piece E, 5 adjustable relatively to the reach-bar along the pin d, and the rod F, substantially as specified.

8. The combination of the reach-bar D, provided with the pin d, of the coupling-piece E, 10 adjustable along the pin d, the rod F, screwing into the coupling-piece, and the lever G, to which the said rod is so connected that the rod will be prevented from adjustment in the coupling-piece, and the coupling-piece will be

precluded from adjustment along the pin d, 15 substantially as specified.

9. The combination, in a grate-frame, of the end pieces, A, provided with legs a', lugs a², ribs a³, the side pieces, A', resting upon the lugs a² and fitting the ribs a³, and the bolts a⁴, 20 passing through the lugs a², and lugs a⁵, extending from the side pieces, A', substantially as specified.

WILLIAM E. KELLY.

Witnesses:

T. J. KEANE,

E. T. ROCHE.