

(No Model.)

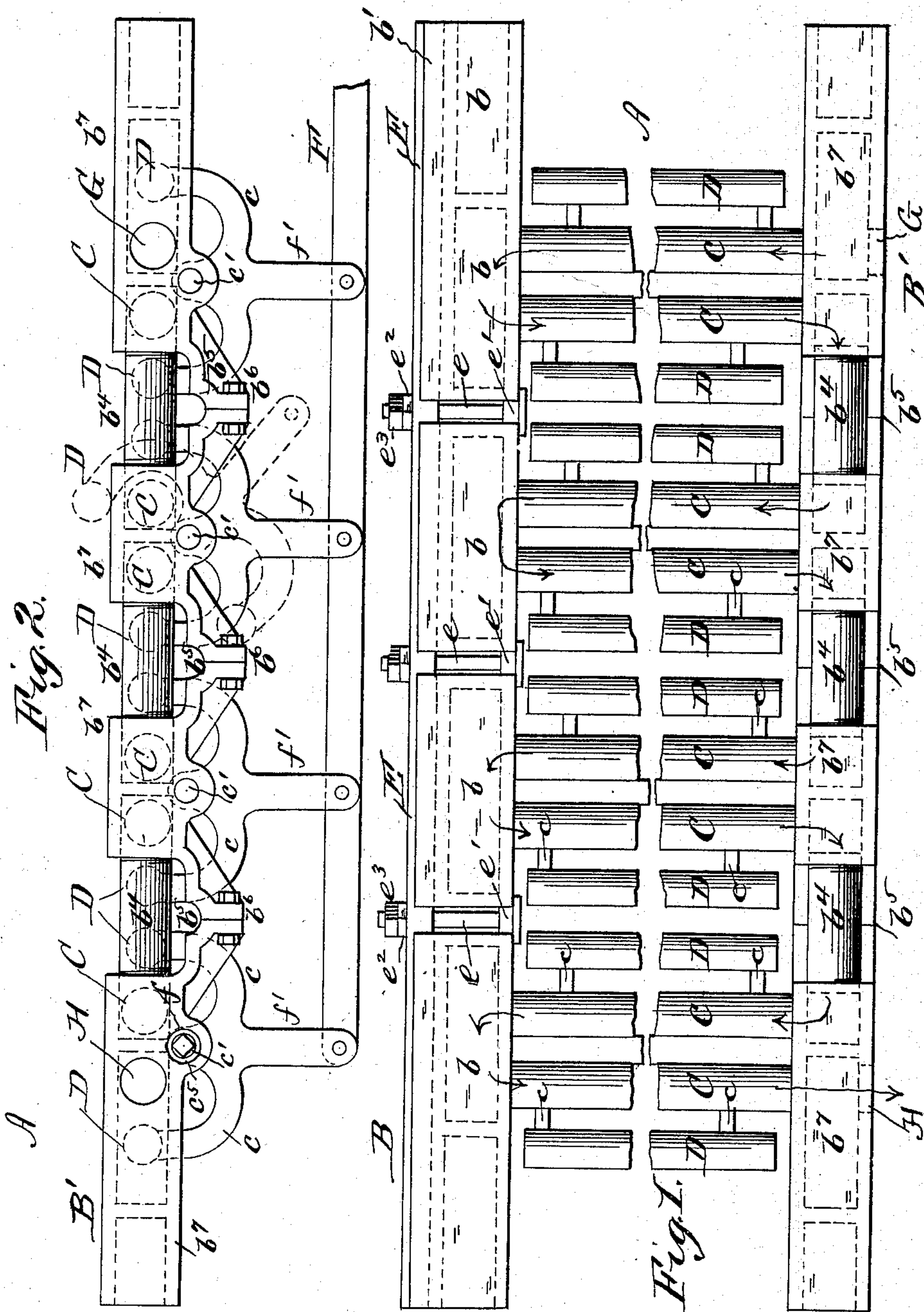
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G. L. KITSON & J. REAGAN.

GRATE BAR.

No. 388,691.

Patented Aug. 28, 1888.



WITNESSES:

Geo. R. Byington.
R. L. Ames.

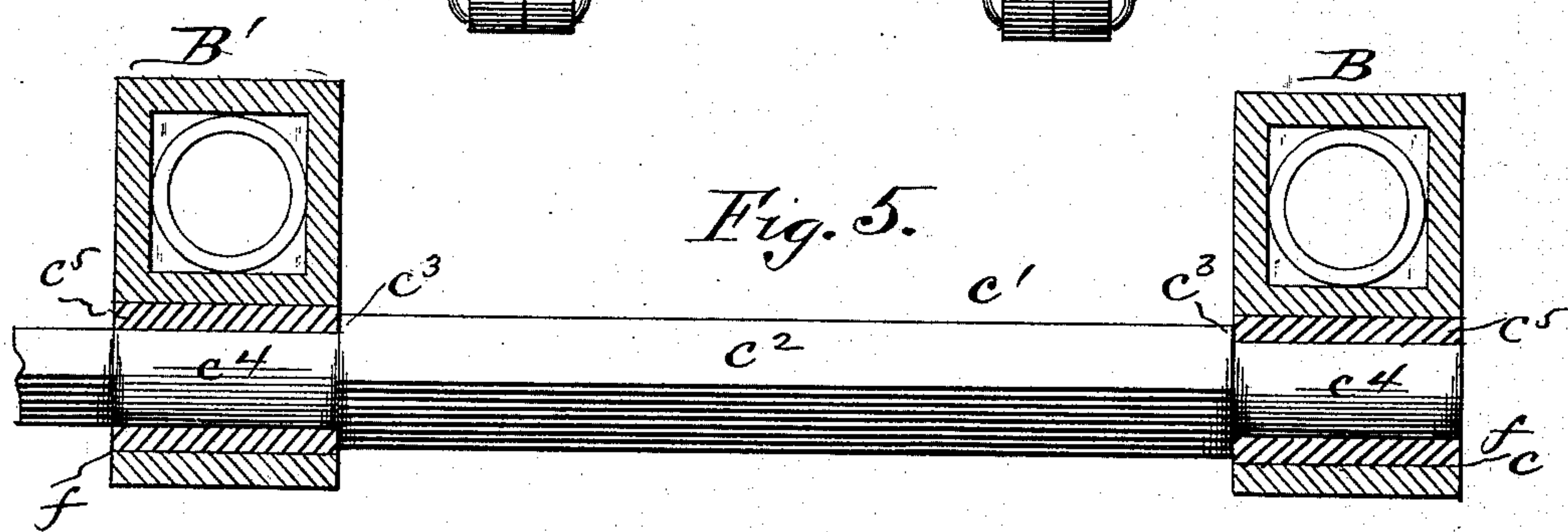
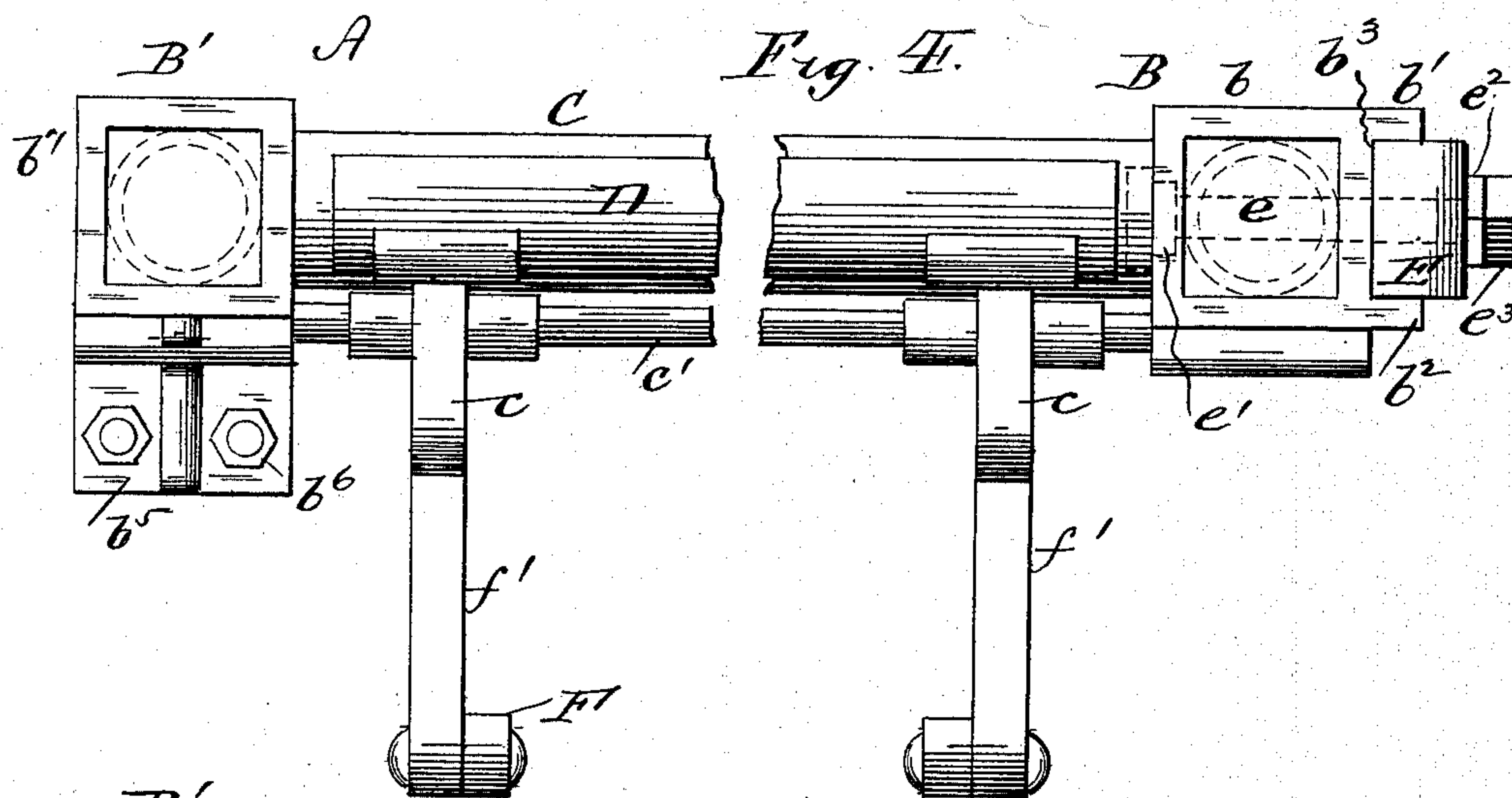
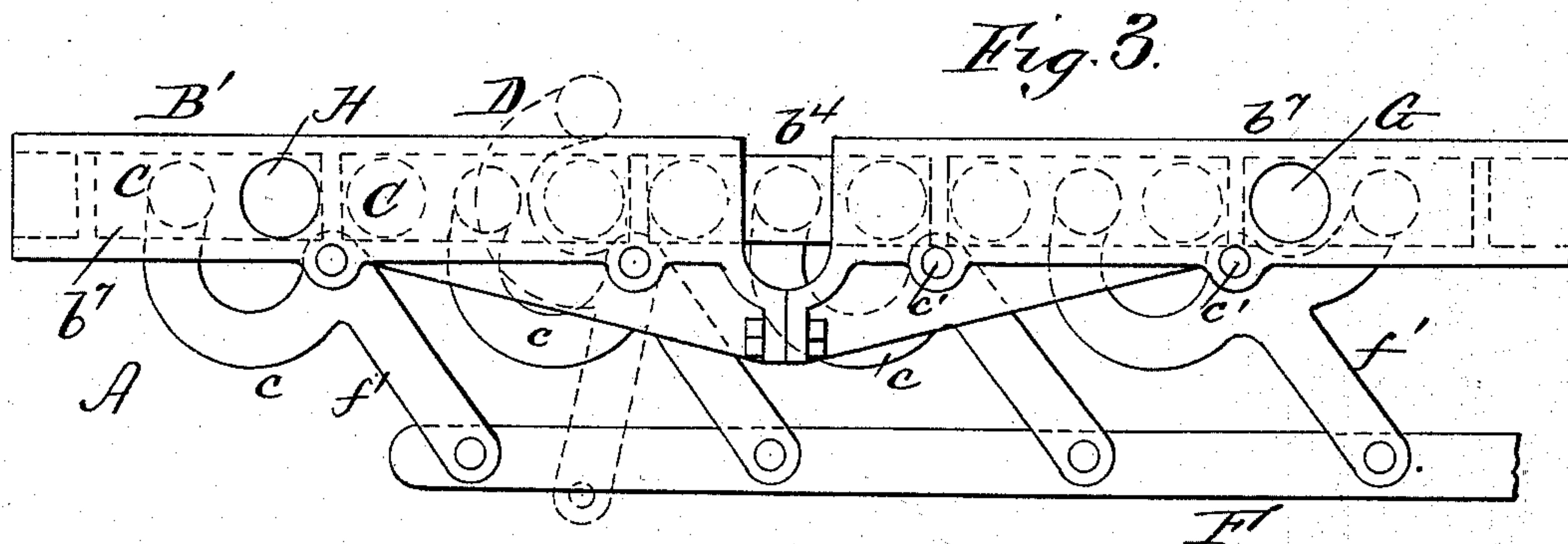
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Fig. 7

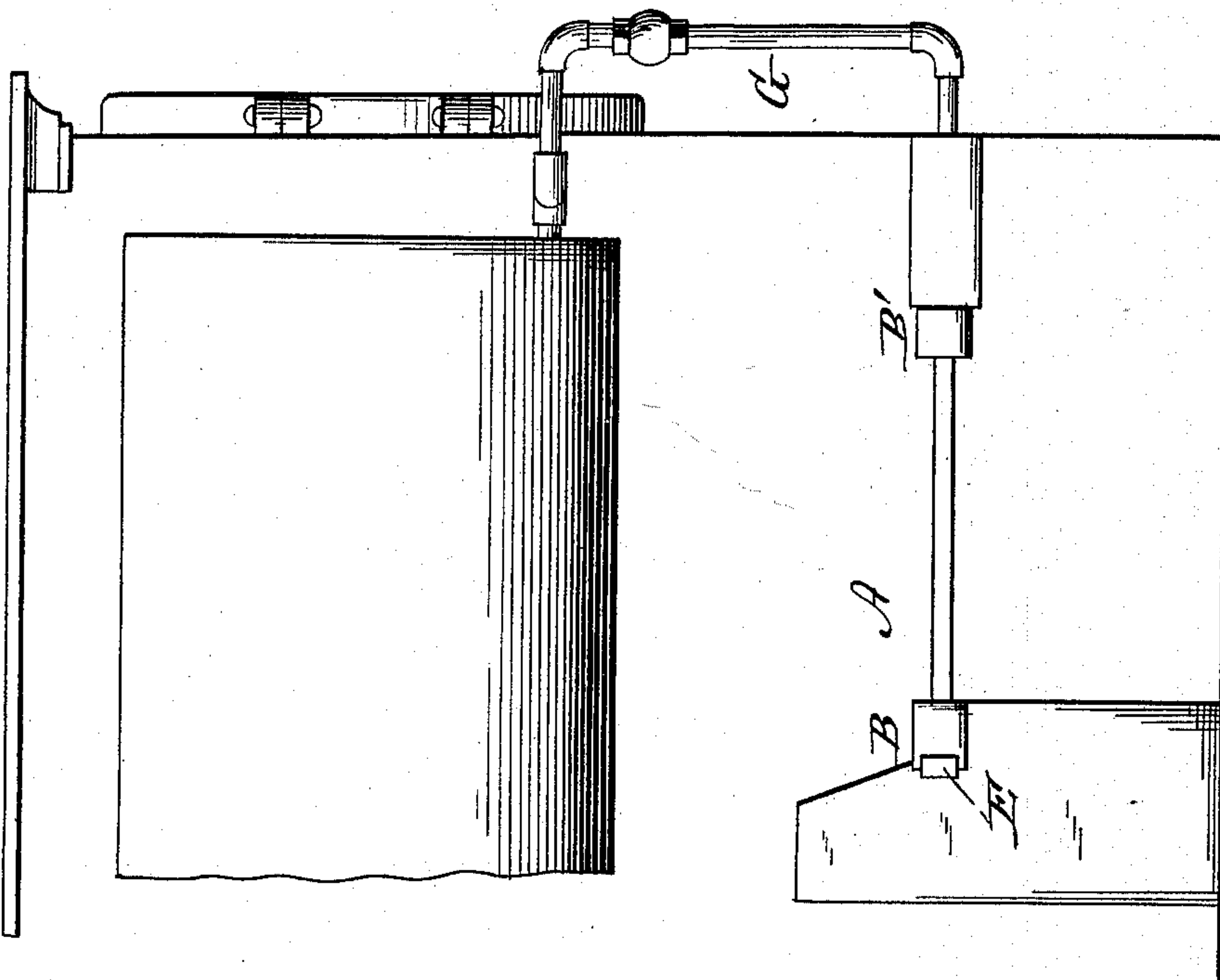
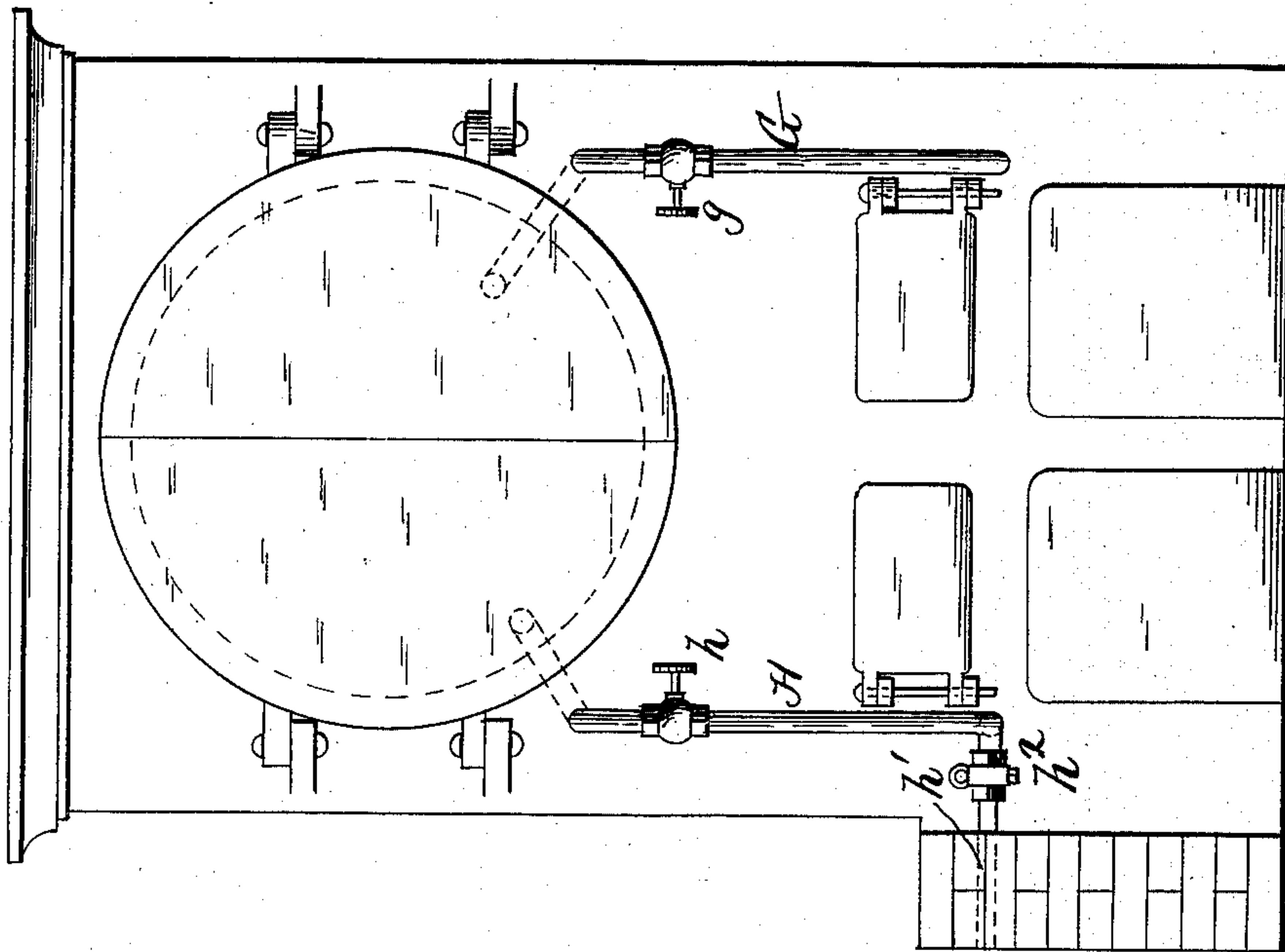


Fig. 6



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GRATE BAR.

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Fig. 8

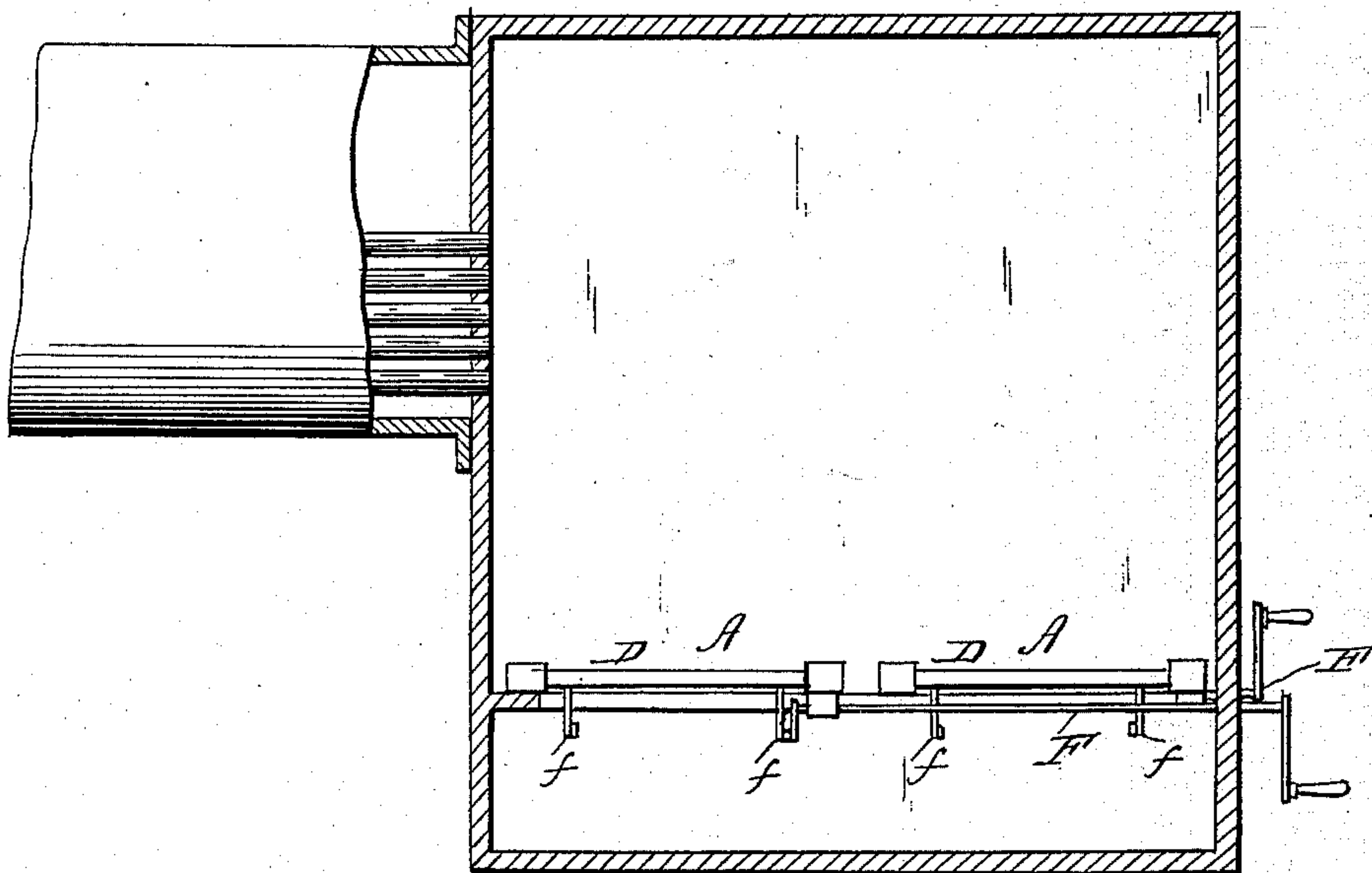
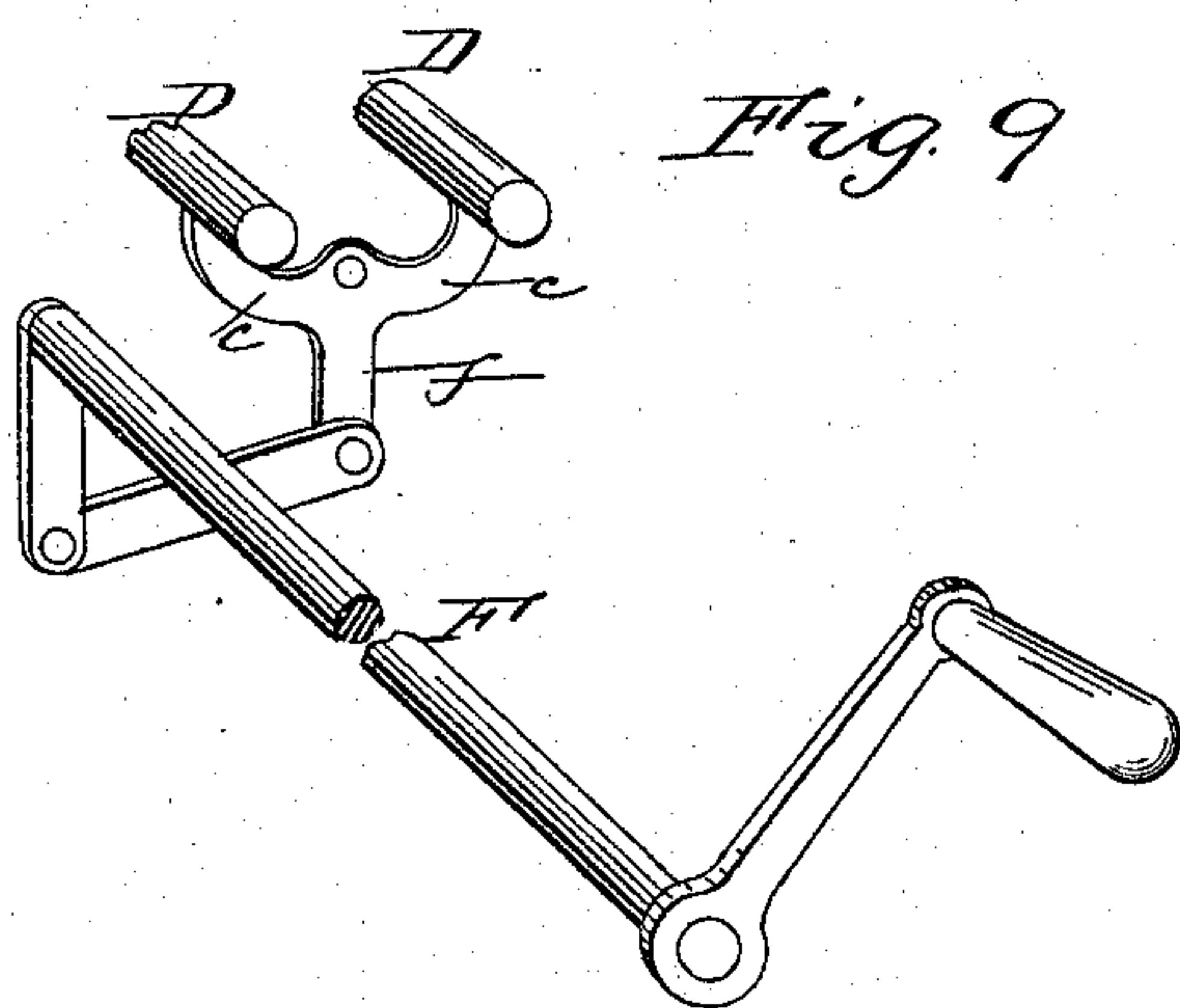


Fig. 9



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GEORGE L. KITSON AND JAMES REAGAN, OF PHILADELPHIA,
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GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 388,691, dated August 28, 1888.

Application filed March 22, 1887. Serial No. 231,943. (No model.)

To all whom it may concern:

Be it known that we, GEORGE L. KITSON and JAMES REAGAN, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Grate-Bars, of which the following is a specification, reference being had to the accompanying drawings.

Our invention has relation to a grate for all kinds of furnaces, and more particularly to that form of grate for locomotive or stationary engine boiler-furnaces wherein a number of water-bars form part of the grate; and it has for its object to so construct the grate that the component parts have freedom of independent movement to compensate for unequal or other expansion and contraction under varying degrees of temperature, and thus prevent the formation of leaking joints, and the warping of the component parts incident to this form of grate as heretofore constructed, and thus increase its efficiency and durability, and that when operated or shaken the moving parts act to first break the crust and clinkers, and then crowd or push the clinkers to open spaces then formed in the grate-bars, so that the clinkers fall through said spaces into the ash-pan; or the operating parts of the grate loose the clinkers into the ash-pan and clean the entire bottom of the fire without disturbing the bed, and in doing this an even draft is provided for all parts of the grate to more thoroughly consume the fuel, and the operation of cleaning the fire is easily effected without using a poker or slicer-bar and without opening the furnace-doors, thereby avoiding admission of cold air thereto and the consequent chilling of the under side of the boiler.

Our invention has for its further object to provide a simple economical form of water-bar grate, which can readily and cheaply be inserted into the fire-box of the furnace and its parts correspondingly removed for repairs or replacement.

Our invention accordingly consists of the combination, construction, and arrangement of parts comprising a grate for boiler or other furnaces, as hereinafter described and claimed, having reference particularly to sectional back

and front end supporting bars or rims having connection with grate-bars for admitting of independent expansion and contraction of said parts, to hollow sectional back and front end supporting bars having diaphragms or partitions and connection with tubular grate-bars and pipe-connection between said bars and the boiler, to rocking or cleaning bars for the sectional grate operated outside of the fire box, and to rocking bars preferably arranged in pairs, between each pair of which are preferably two grate-bars, and when operated to clean the fire the rocking bars of each pair move in opposite directions, one downwardly into the ash-pan and the other upwardly into the fire and over the grate-bars, to provide open spaces between the grate bars for the escape of clinkers and ashes pushed to said open spaces by the upwardly-moving rocking bars of the pairs.

Referring to the accompanying drawings, Figure 1 represents a plan, partly broken away, of a grate embodying our improvements; Fig. 2, a side elevation of same; Fig. 3, a like view showing rocking bars on one side only of the grate-bars; Fig. 4, an end view of the grate; Fig. 5, a section on line 1 1, Figs. 1 and 2; Fig. 6, an end view of boiler and furnace, showing water-pipe connection between boiler and grate; Fig. 7, a longitudinal section of part of same; Fig. 8, a like view of locomotive-boiler, showing a grate composed of two lengths or sections and operating devices for each section; and Fig. 9, a perspective of shaking-bar for one of said lengths.

A represents the grate; B B', the end supporting-bars; C, the grate-bars, and D the rocking bars for cleaning the grate.

The grate, as shown, is preferably of an oblong or square form to suit the configuration of a locomotive or stationary boiler fire-box; but it may be of any other form, to correspond with the shape of the fire-box in which it is placed.

The side bars B B' may both be constructed alike; but for purposes of convenience in fitting the grate in position in the fire-box and removing it or any of its parts therefrom for repairs or replacement, we prefer to construct these bars as follows: The bar B is composed of sec-

tions b , having outside top and bottom flanges, b' b^2 , respectively, between which flanges is a groove, b^3 , by means of which these sections b are strung or placed upon a bar, E , and are 5 firmly but loosely held upon said bar by screws or bolts e passing between the ends of adjoining sections b , said bolts having a shouldered head, e' , to space the interval between said ends and frictionally engage with the sections 10 to hold them in position.

If desired, a jam-nut or washer, e^2 , is inserted between the bolt-nuts e^3 and the bar E , as shown.

The sections b are made solid or otherwise 15 constructed when solid grate bars C are used. If the latter are tubular or water-bars, the sections b are then hollow or tubular, and their ends form partitions or diaphragms between them to direct the flow of water through the 20 water-bars of the grate. The sections b' of the end bar B are provided at their adjacent ends with pipe-connections b^4 , having right and left threaded ends, and with lugs or flanges b^5 , which meet and are loosely or otherwise 25 bolted together, as indicated at b^6 . These sections b' are hollow and provided at suitable points with partitions, when water-bars are used, for directing the flow of water through the grate or water bars.

30 The rock-bars D may be arranged one for two grate-bars, C , as shown to the left in Fig. 3; but we prefer to arrange them in pairs or provide two rocking bars for each pair of grate-bars, as indicated in Fig. 2, in which case 35 the rock-bars of a pair are mounted by means of arms c to a common shaft, c' , so that when it is moved or oscillated the rock-bars of a pair move in opposite directions relatively to the grate-bars—that is to say, one bar moves down- 40 wardly into the ash-pan and the other upwardly into the fire-box to leave open spaces between the pairs of water or grate bars, as indicated by dotted lines, Fig. 2, for the free escape of ashes and clinkers into the ash-pan.

45 One of the shafts c' , as shown more plainly in Fig. 5, which shaft is virtually the controlling-shaft for operating the entire series of rocking bars, is made square or angular, as indicated at c^2 , having end shoulders, c^3 , and 50 journals c^4 , of a smaller diameter, which have their bearings in sleeves or thimbles c^5 in openings or bearings f in the end-bar sections b b' . These thimbles c^5 are provided to fill up the large openings f necessary for the passage of 55 the angular part of the shaft to position on the grate. The remaining rock-bars are loosely mounted upon round shafts driven or otherwise secured in openings f in the end-bar sections. Only one square shaft for one of the 60 pairs of rock-bars need be used, as the latter and all the rocking bars loose on the other shafts are connected by arms f' to a shaking or operating bar, F , leading to the outside of the furnace, and the strain of operating all of them 65 falls upon the one square shaft. The rock-bar shafts having their bearings in the end-bar

sections are maintained in due alignment with the same and with the grate bars as said parts expand and contract in use, which is not the case when said shafts have their bearings separate from the grate or its end bars, as heretofore. 70 The thimbles c^5 are driven into openings f to frictionally engage with the walls of the same and maintain themselves in position; but they may otherwise be removably secured 75 in said openings, as desired. The direction of the flow of water through the grate is indicated by the arrows starting from the inlet-pipe G and ending with the outlet-pipe H , which pipes are connected with the boiler, as 80 more plainly shown in Figs. 6, 7, and 8, and are provided with suitable cut-offs, g and h , respectively.

If desired, the outlet-pipe H may have a drip or cleansing pipe, h' , provided with a 85 cock, h^2 .

If the rock and grate bars are separated from one another proportionately, as shown in Fig. 2, the arms c of the rock-bars can all align with one another, as there is ample room 90 for operating the rock-bars without their arms c striking or interfering with one another; but if said bars are close together then the alternate arms c are in different planes, as indicated in Fig. 1, so as not to strike against one an- 95 other as they are actuated.

In using our improvements in locomotive or other fire-boxes of some length, the grate is divided into two sections similar in construction, and each section has its separate actuat- 100 ing mechanism or shaking lever, as shown in Fig. 8. In locomotive-boilers the tubes G and H are preferably in the fire-box, as indicated.

In the foregoing we have shown a preferable form of grate specially applicable to locomotive or stationary boiler fire-boxes; but we do not wish to be understood as confining the invention thereto, as the construction of detail parts of our improvements may be greatly varied without departing from the spirit of the 110 same.

What we claim is—

1. In a grate, the bearing bar B , composed of separate sections connected together so as to permit of independent expansion and contraction of the same, grate-bars C , connecting the 115 sections of bar B to another bearing-bar, B' , rocking or shaking bars D , having their shafts mounted in bearings secured to the bearing-bars B and B' , and actuating mechanism for the rocking bars D , substantially as set forth. 120

2. A grate composed of hollow supporting or bearing bars B B' , composed of separate sections, hollow grate-bars C , connecting the sections of bars B B' , rocking or shaker bars D , 125 having shaft-bearings in boxes secured to bearing-bars B B' , and actuating mechanism for said shaker-bars, substantially as set forth.

3. In a grate, the combination of bearing-bar B , composed of separate hollow sections 130 frictionally secured to a bar, E , to admit of independent expansion and contraction of

said sections, bearing-bar B', composed of separate hollow sections having pipe-couplings b^4 and flanges and bolt-connections $b^5 b^6$, hollow grate-bars C C, connecting the sections of bars B B', shaker-bars D D, having shaft-bearings in boxes secured to the sections of bars B B', and actuating mechanism for said shaker-bars, substantially as set forth.

4. In a grate, the combination of bearing-bars B B', one of which is composed of sections, each section having a flange and a bolt-connection with a supporting-bar, grate-bars connecting the sections, rocking arms or shakers for the grate-bars, and actuating mechanism for the shaker-arms, substantially as and for the purpose set forth.

5. In a grate, the combination, with bearing-bars B B' and parallel grate-bars C C, grouped in pairs, of separate rocking or shaking bars D D, grouped in pairs, each pair mounted upon a common shaft with a pair of grate-bars between them and adapted to move in reverse directions to provide open spaces between the pairs of grate-bars, and actuating mechanism for bars D D, substantially as set forth.

6. In a grate, the combination of bearing-bars B B', grate-bars C C, separate rocking or shaker bars D D, arranged in pairs, and each pair mounted upon a common shaft having bearings in boxes secured to bars B B', and actuating mechanism for shaker-bars D D, substantially as set forth.

7. The sectional water-bars B B', combined with connecting tubular bars C, rocking bars D, having shafts mounted on bars B B', and actuating mechanism for bars D D, substantially as set forth.

8. In a water-grate, the combination of bar B, composed of hollow sections connected to a supporting-bar, E, grate-bars C, bar B', composed of sections having pipe-couplings b^4 , and flange bolted connections, rocking bars D, and

actuating mechanism for bars D, substantially as set forth.

9. In a grate, the combination of a bearing-bar, B, composed of sections having edge flanges, $b' b^2$, a bar, E, adapted to said flanges, and bolt-connections e , passing between said sections and engaging at one end with the sections and at the other with bar E, substantially as and for the purpose set forth.

10. In a grate, the combination of a bearing-bar, B, composed of separate sections, a rod, E, upon which said sections are strung or supported, and bolt-connections engaging at one end with the sections and at the other with said bar E to divide or space the sections from one another and secure them to said bar, substantially as set forth.

11. In a grate, the combination of bearing-bars B B', having openings f , thimbles c^5 in said openings, angular shafts C', having round journals adapted to said thimbles, rocking bars secured to said shafts, and actuating mechanism for the latter, substantially as set forth.

12. A grate composed of two parts, each part having sectional bearing-bars B B', grate-bars having shaft-bearings in boxes secured to bars B B', connecting-bars B B', rocking bars, and separate shaking devices for the rocking bars of each part of the grate, substantially as set forth.

13. A grate composed of sectional bearing water-bars B B', tubular grate-bars, inlet and outlet pipe-connections, and a drain or drip pipe with cock leading from the said outlet-pipe, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE L. KITSON.
JAMES REAGAN.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.