

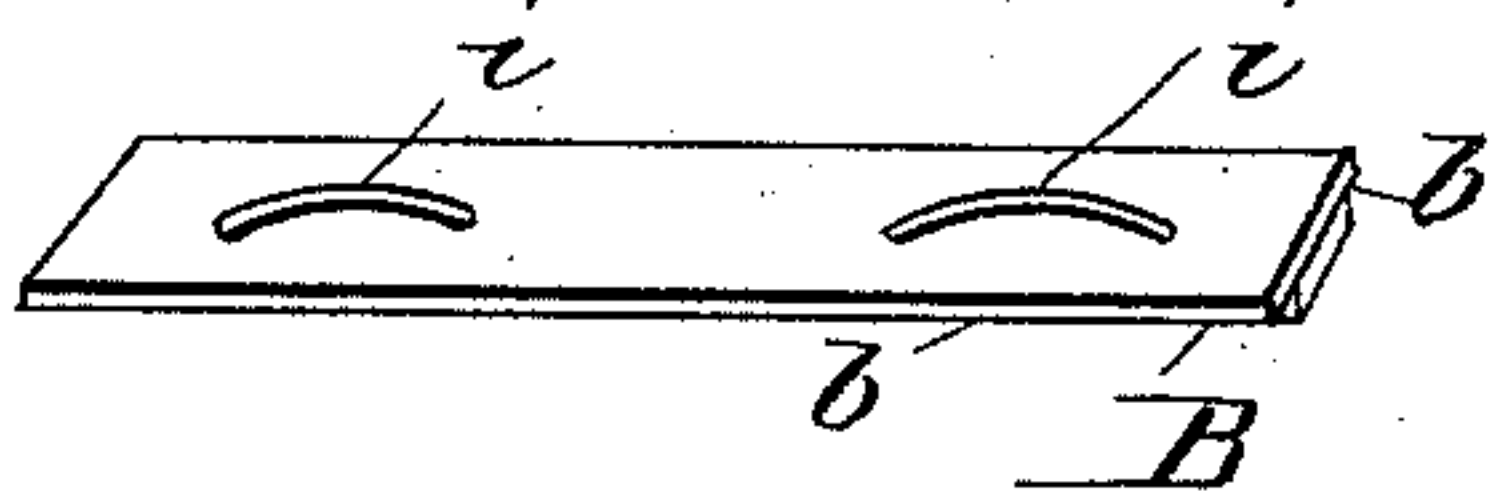
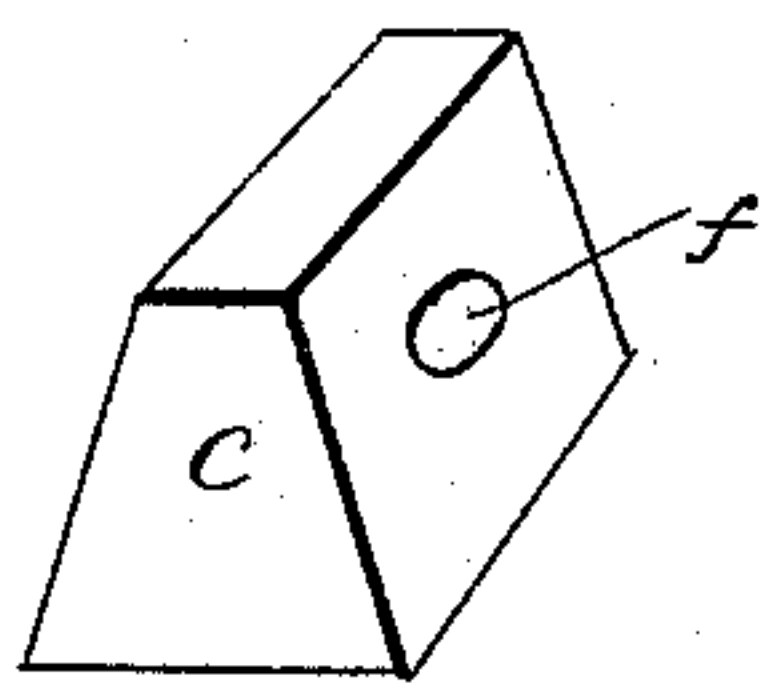
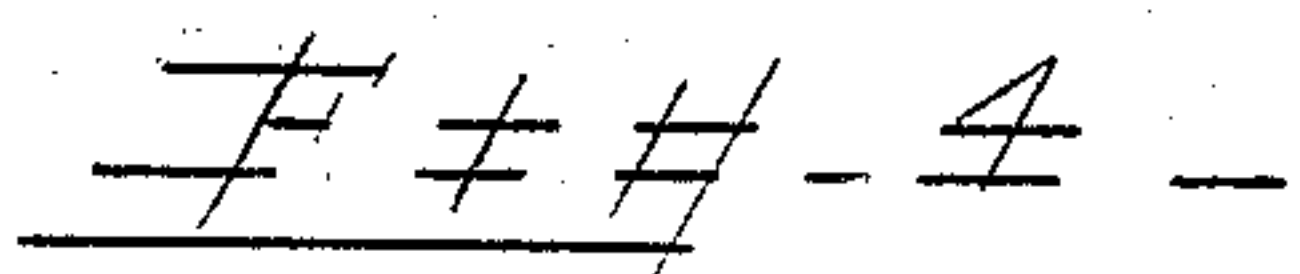
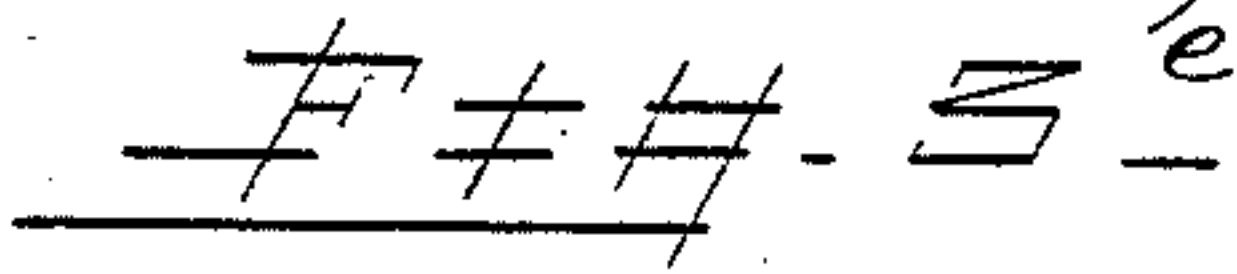
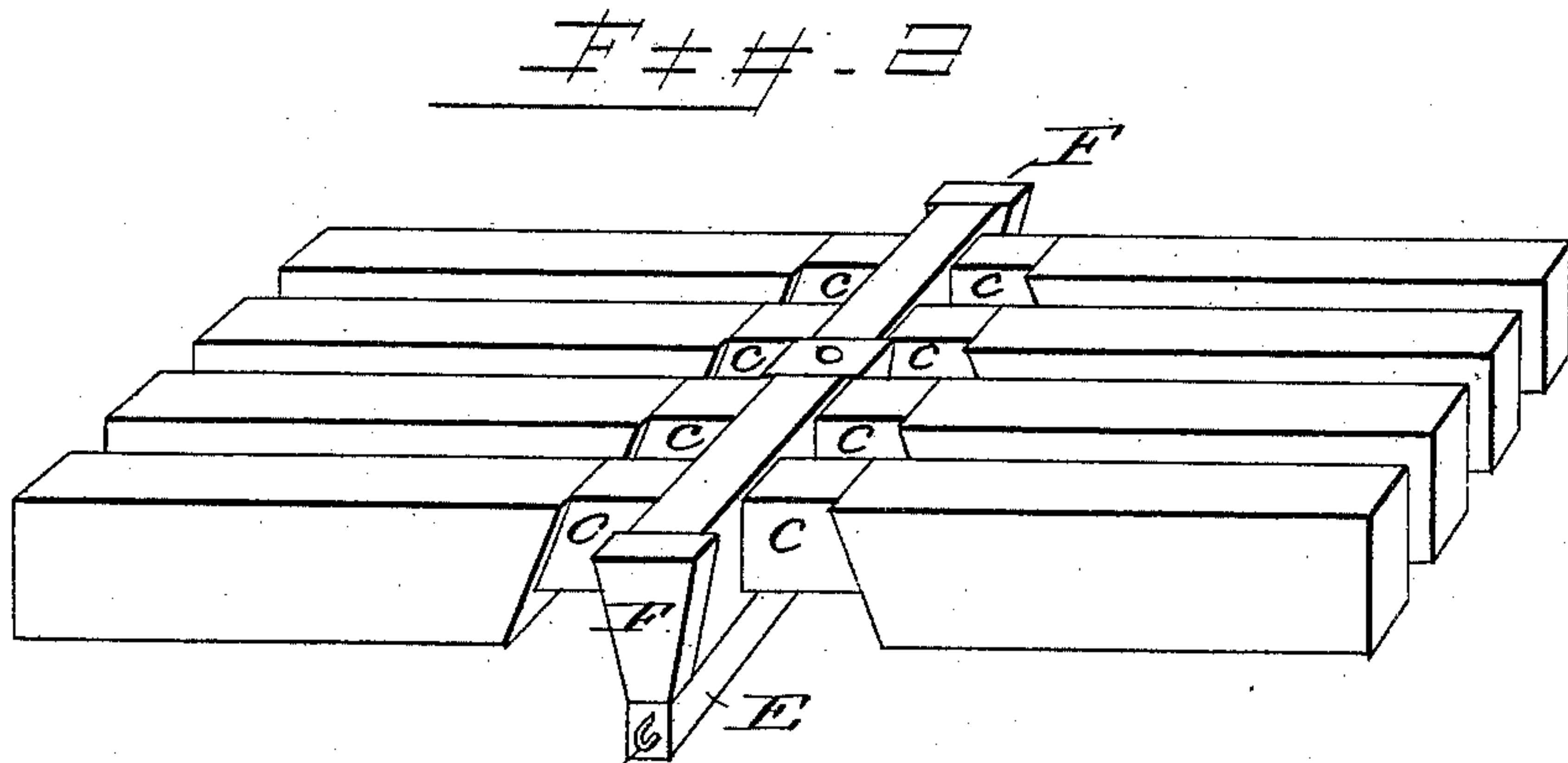
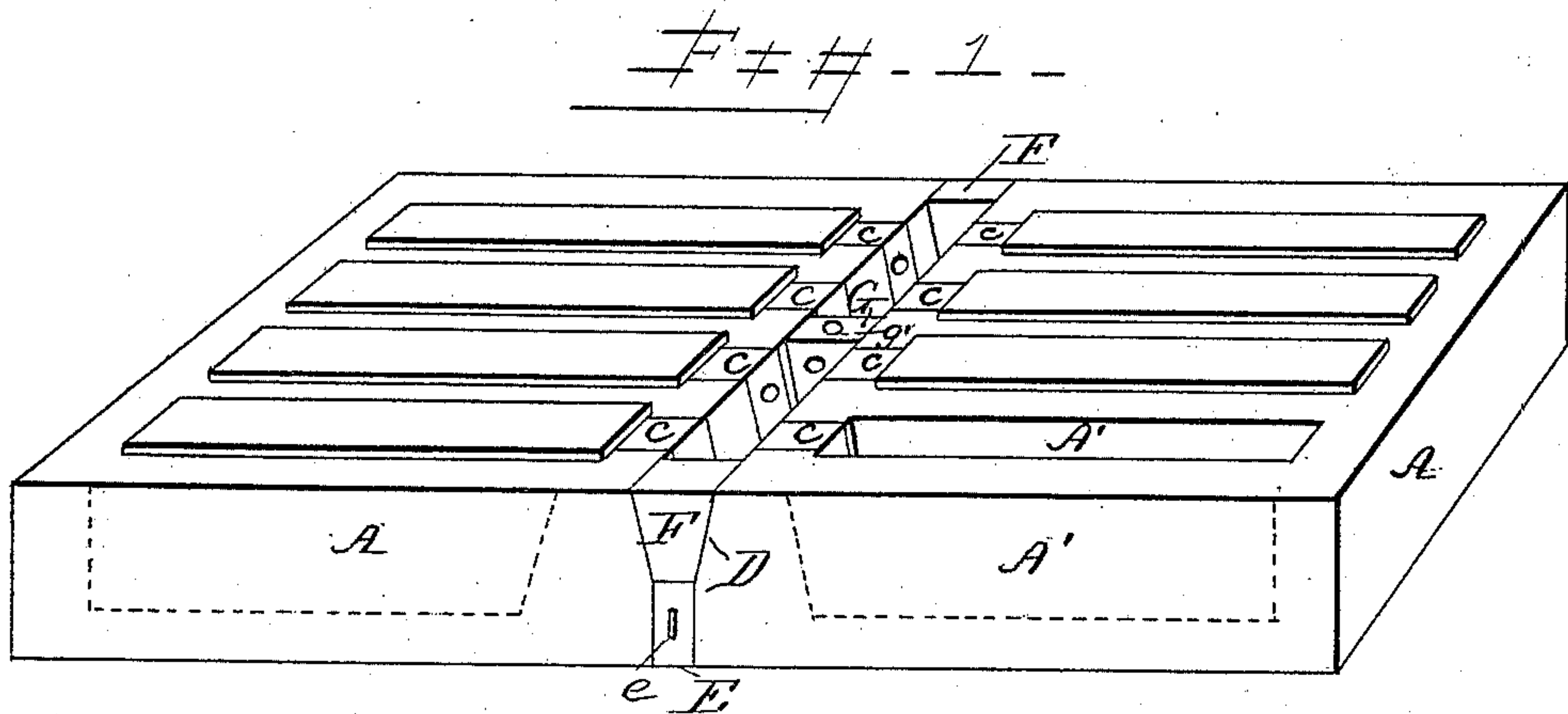
(No Model.)

G. F. McCLEANE & W. M. FABER, Jr.

INGOT MOLD.

No. 387,174.

Patented July 31, 1888.



WITNESSES.  
Albert B. Blackwood.  
L. Paul.

George F. McCleane,  
William M. Faber, Jr.  
INVENTOR.  
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# UNITED STATES PATENT OFFICE.

GEORGE F. McCLEANE AND WILLIAM M. FABER, JR., OF PITTSBURG, PENN-  
SYLVANIA.

## INGOT-MOLD.

SPECIFICATION forming part of Letters Patent No. 387,174, dated July 31, 1888.

Application filed May 24, 1888. Serial No. 274,903. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE F. McCLEANE and WILLIAM M. FABER, Jr., citizens of the United States, residing at Pittsburg, in the  
5 county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Ingot-Molds; and we do hereby declare the following to be a full, clear,  
and exact description of the invention, reference being had to the accompanying drawings,  
which form part of this specification.

This invention has relation to the manufacture of steel; and it has for its object to provide an ingot-mold in which steel can be cast  
5 sufficiently solid and with a surface smooth enough to permit of direct rolling into bars without the intermediate operation of "blooming" or hammering.

The mold now in general use for casting  
10 steel ingots is made of cast-iron in one piece, having the appearance of a truncated pyramid, the taper being very slight and just sufficient to allow clearance in "drawing." This shape of mold has proven itself unsuited to the purpose,  
25 as there is such a difficulty in drawing the ingots that a large supply of extra molds must be kept on hand to meet the requirement of the converter's successive heats, and many of the molds are soon rendered useless by the  
30 rough treatment received by them in the effort to draw. All this entails heavy expense upon the manufacturer of steel, which is overcome by our improved mold. Again, the ingot produced in this old form of mold, as is well known,  
35 is honeycombed and extremely heterogeneous, and requires considerable reworking to compact it and render it of the requisite homogeneity for the uses to which it is to be applied. This defect in the ingot makes it practically  
40 impossible to secure a constant and invariable quality of finished material, no matter with how great precision and chemical accuracy the conversion is accomplished, because no two ingots will be honeycombed in the same manner or degree, and as there can be no positive  
45 determination of their interior, so there can be no accurate standard of comparison between one ingot and another as to the exact amount of hammering and rolling required to bring  
50 them to the same quality of product. Fur-

thermore, ingots cast in the old manner have more or less honey-comb or waste at their upper end, which must be cut off before the metal is worked, and even where this honey-comb is not present the ingots require reheating and  
55 blooming before they are in condition for rolling.

We have demonstrated by actual experience, upon a very large scale, that ingots cast in our improved mold are sufficiently free from  
60 the many defects above mentioned, and that the metal as taken from the molds is in a perfect condition for rolling without the intermediate step of blooming, which, in addition to its cost, is positively injurious to steel of  
65 certain kinds, particularly low-grade steel, the reheating of the steel rendering it more brittle and less ductile than that produced by our mold and not subjected to the blooming. Another item of cost in the ordinary method  
70 is that where two or more molds are cast at the one time on a single casting-table there is a gate-piece to each ingot and a runner common to the several ingots which must be broken off, and is then valued only as waste.  
75

In our mold for casting we make but one runner where there are now two runners, thus reducing this single item exactly one-half, and on account of the peculiar shape and combination of our molds the ingots are much more  
80 readily removed therefrom, and there is such a small possibility of breaking the molds that the cost of molds and amount of labor required in the casting and drawing operations are greatly lessened, thereby lessening the cost of  
85 the steel ingots.

The object of our invention, therefore, is the provision of an ingot-mold in which all the desirable features of an open mold are retained and all the objections to a closed mold are  
90 overcome.

Our invention therefore consists in an ingot-mold having its sides and bottom and one end solid and its top and the other end removable, the top being formed of a single piece of the  
95 same metal as the mold and the removable end formed of fire-brick having an orifice through its center for the passage of the molten steel.

Our invention still further consists in the combination, with two molds having a common  
100



run, of a removable bar placed between the two molds and under the run, whereby the ingots can be readily drawn at the one time.

Our invention still further consists in the construction, combination, and arrangement of parts, more fully described hereinafter, and specifically pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a perspective view of our improved mold, one of the wells having the removable cover removed. Fig. 2 is a perspective view of a cast of ingots as they appear when taken from the mold. Fig. 3 is a perspective view of one of the removable end pieces, and Fig. 4 a view of the cover of one of the wells.

The mold-frame A, which is made of cast-iron, is rectangular in form, and comprises two or more molds, A' A', &c., in which the ingots are cast. As shown, the tops of these molds are open and are supplied with covers B, which are formed with flanges *b b*, so as to fit tightly upon the mold. A brick, C, having an orifice, *f*, for the passage of the molten metal, forms one end of the mold. The two frames A are each slightly tapered at one end, D, so that when two frames are placed together there will be formed by their contiguous sides a sprue or runner for both molds.

The bricks, C, which form the ends of the several molds, are shaped with two sloping sides, one of which coincides with the end of the mold-frame and the other making a sloping or inclined end to the mold.

A bar or lifter, E, having eyes *e e* at its ends, is placed between the two frames, their sides abutting against it, and fire-bricks F F, placed upon the top of the bar near the ends thereof, form the ends of the runner. A brick, G, having an orifice, *g*, passing through it from side to side, and an orifice, *g'*, from the top of the brick to the orifice *g*, is placed midway in the run and forms a support for the conduit for the molten metal.

In casting the mold the two frames are brought together, as shown, with the bar G in proper position between them and the bricks F F in their respective position, molder's sand being used to tamp the interstices between the several parts, and also covering the bar E and preventing the molten metal from contacting therewith. The lids B B being placed in position over the several molds, the molten metal is poured through the orifice *g'* in brick G, and from thence, through the orifice *g*, it follows the run, and, entering the several gates

in the molds, forms the ingots, which, as before stated, are sufficiently free from all surface roughness, and the honeycombing is reduced to the minimum, the lids B B effectually preventing the ebullition of the steel and causing the same to form a finished and smooth surface. After the ingots have solidified the lids B B are removed, and the ingots are removed from the molds by attaching hooks or draw-chains to the eye-holes *e e* in the end of the bar E and the whole number of ingots drawn from the molds, the several bricks being raised with them. After the ingots are drawn from the molds the bricks are removed by breaking them, and the ingots are detached from the runner.

As before explained, there being but a single runner to each pair of molds, frames, or series of ingots, the amount of the waste metal is materially lessened, and by reason of the facility with which the ingots are drawn there is a great saving in labor and but small loss from destruction of molds.

Having described our invention, we claim—

1. In an ingot-mold having an open top and end, a removable end piece composed of fire-brick and provided with a gate or passage for molten metal, substantially as described.

2. The combination, with an ingot-mold consisting of two separate frames, each frame containing two or more molds and having inclined faces, whereby said frames when placed together form a single sprue having inclined sides, of a removable bar and end bricks situated between the two frames, substantially as described.

3. The combination, with an ingot-mold consisting of independent frames having a single sprue between them, of a removable bottom and end pieces for said sprue, said bottom consisting of a rod or bar of iron, substantially as described.

4. An ingot-mold consisting of the frames A A', having inclined faces D, the removable bar E, and bricks F F, all constructed and combined substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 15th day of May, 1888.

GEO. F. McCLEANE.  
WM. M. FABER, JR.

Witnesses:

H. C. EVERT,  
LOUIS MOESER.

It is hereby certified that Letters Patent No. 387,174, granted July 31, 1888, upon the application of George F. McCleane and William M. Faber, Jr., of Pittsburg, Pennsylvania, for an improvement in "Ingot-Molds," was erroneously issued to the said "George F. McCleane and William M. Faber, Jr.," as joint owners; that said Letters Patent should have been issued to said *George F. McCleane* as sole owner, by assignment, of the entire interest; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 7th day of August, A. D. 1888.

[SEAL.]

D. L. HAWKINS,  
*Assistant Secretary of the Interior.*

Countersigned:

BENTON J. HALL,  
*Commissioner of Patents.*