(No Model.) 3 Sheets—Sheet 1.

C. L. MILLER & J. R. GEORGE.

MACHINE FOR BREAKING PIG IRON.

No. 518,416. Patented Apr. 17, 1894.

Fig. 2.

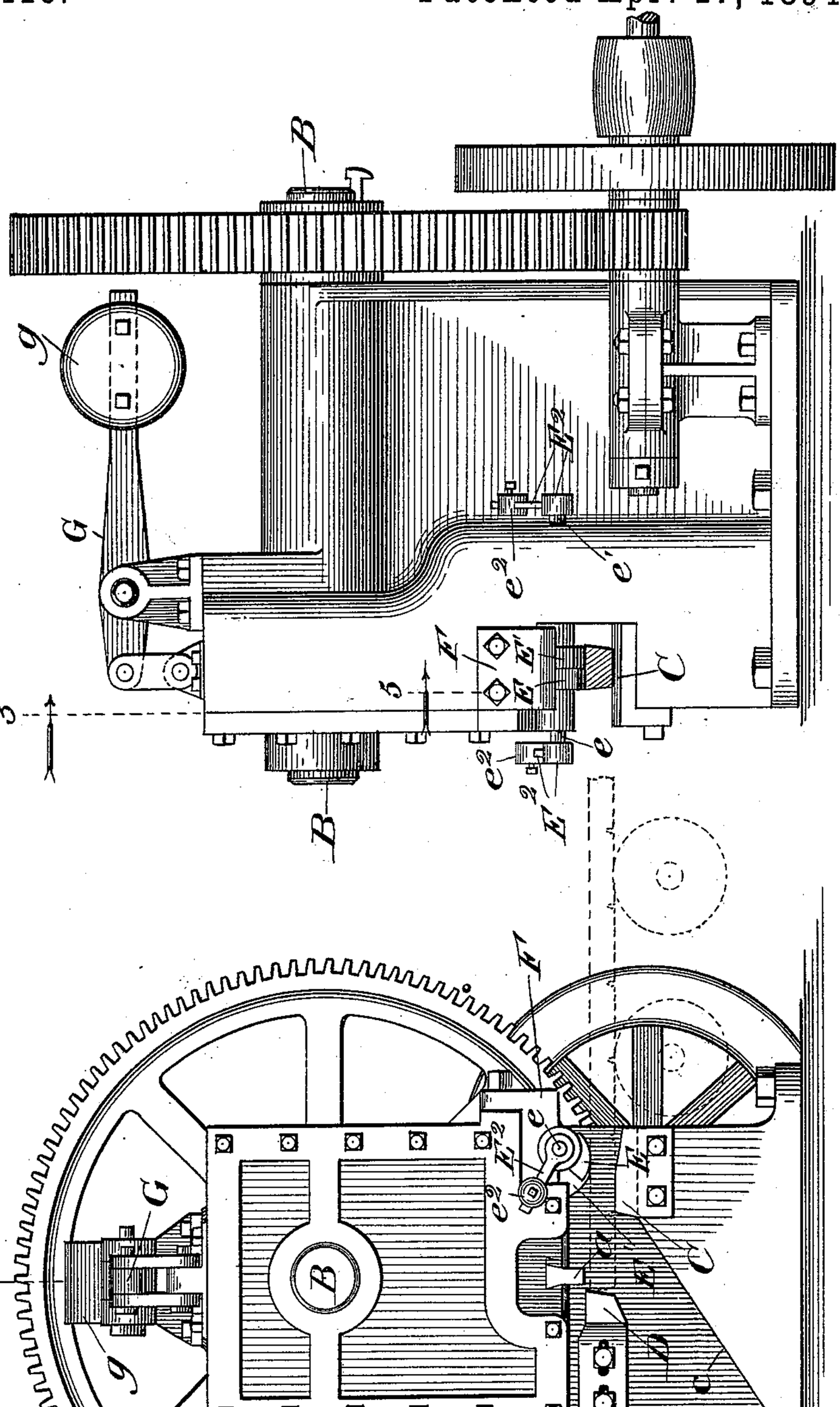


Fig. 1.

Witnesses:
Chas. E. Gaylord,
Julius Moses.

Inventors:
{Charles L. Miller,
{Jerome R. George,
By Banning & Banning & Payson
Att'ys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

C. L. MILLER & J. R. GEORGE.

MACHINE FOR BREAKING PIG IRON.

No. 518,416. Patented Apr. 17, 1894.

Fig. 4.

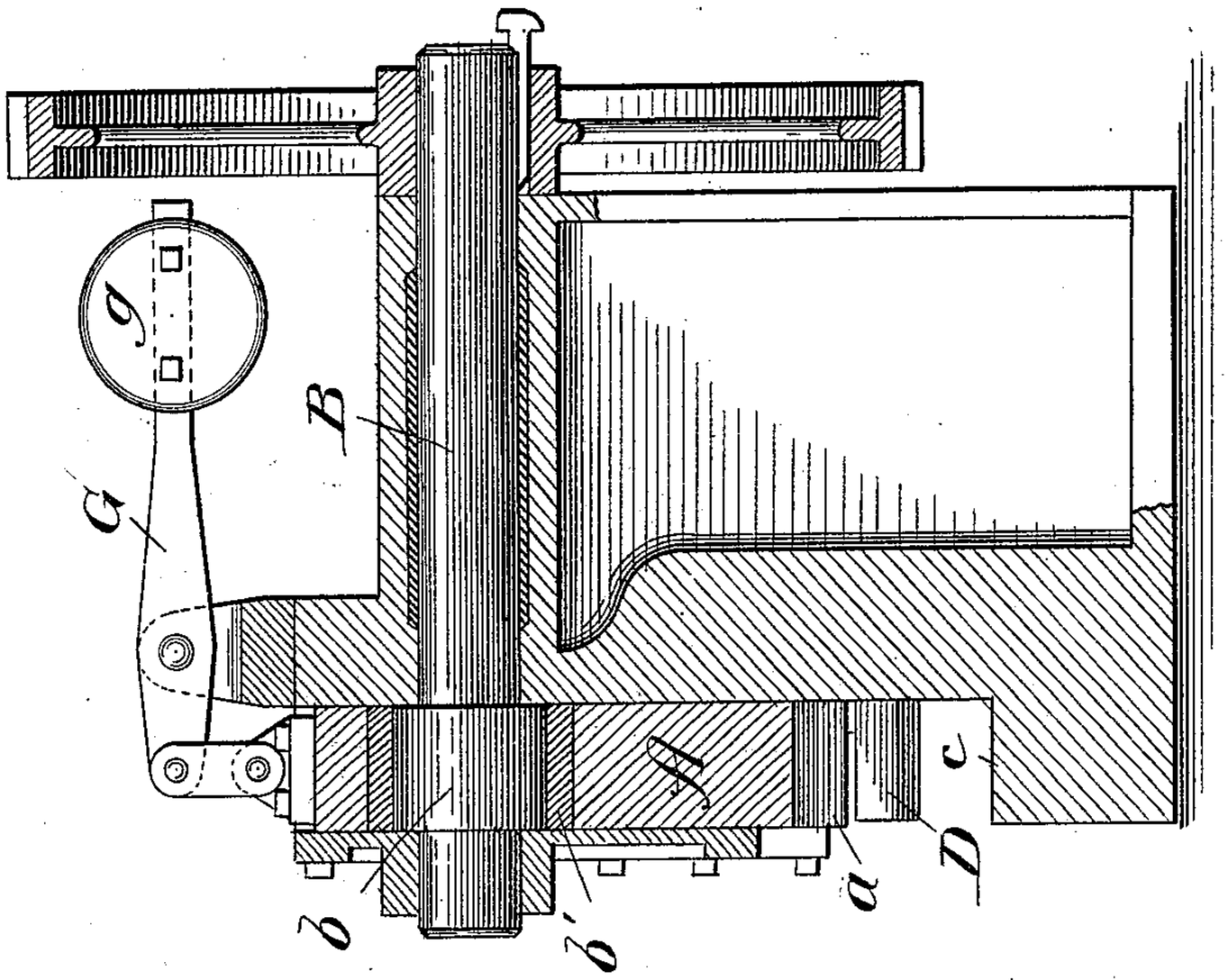
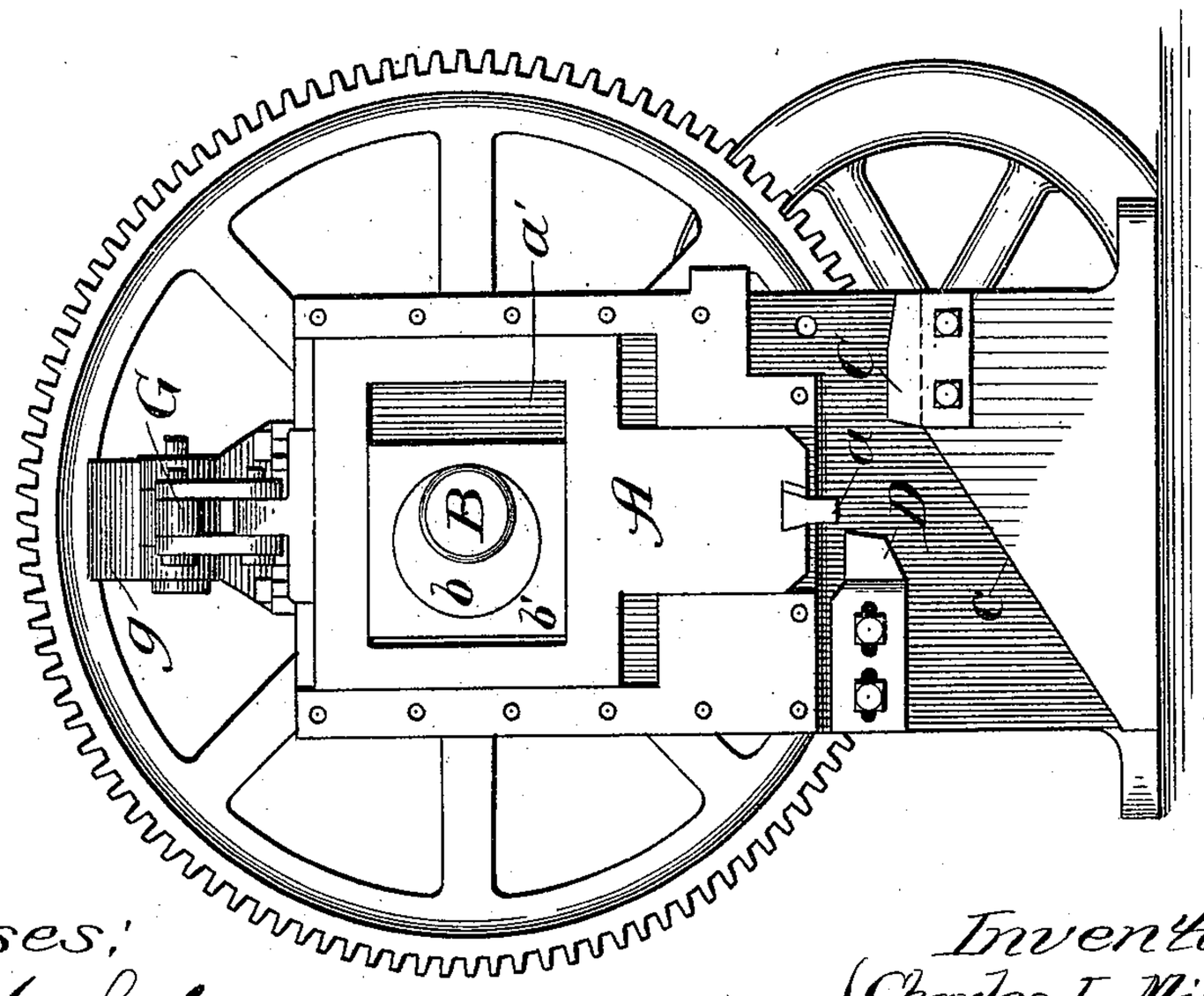


Fig. 3.



Witnesses:
Chas. E. Gaylord,
Julius Moses.

Inventors:
Charles L. Miller,
Jerome R. George,
By Banning & Banning & Payson,
Att'ys.

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

C. L. MILLER & J. R. GEORGE.

MACHINE FOR BREAKING PIG IRON.

No. 518,416. Patented Apr. 17, 1894.

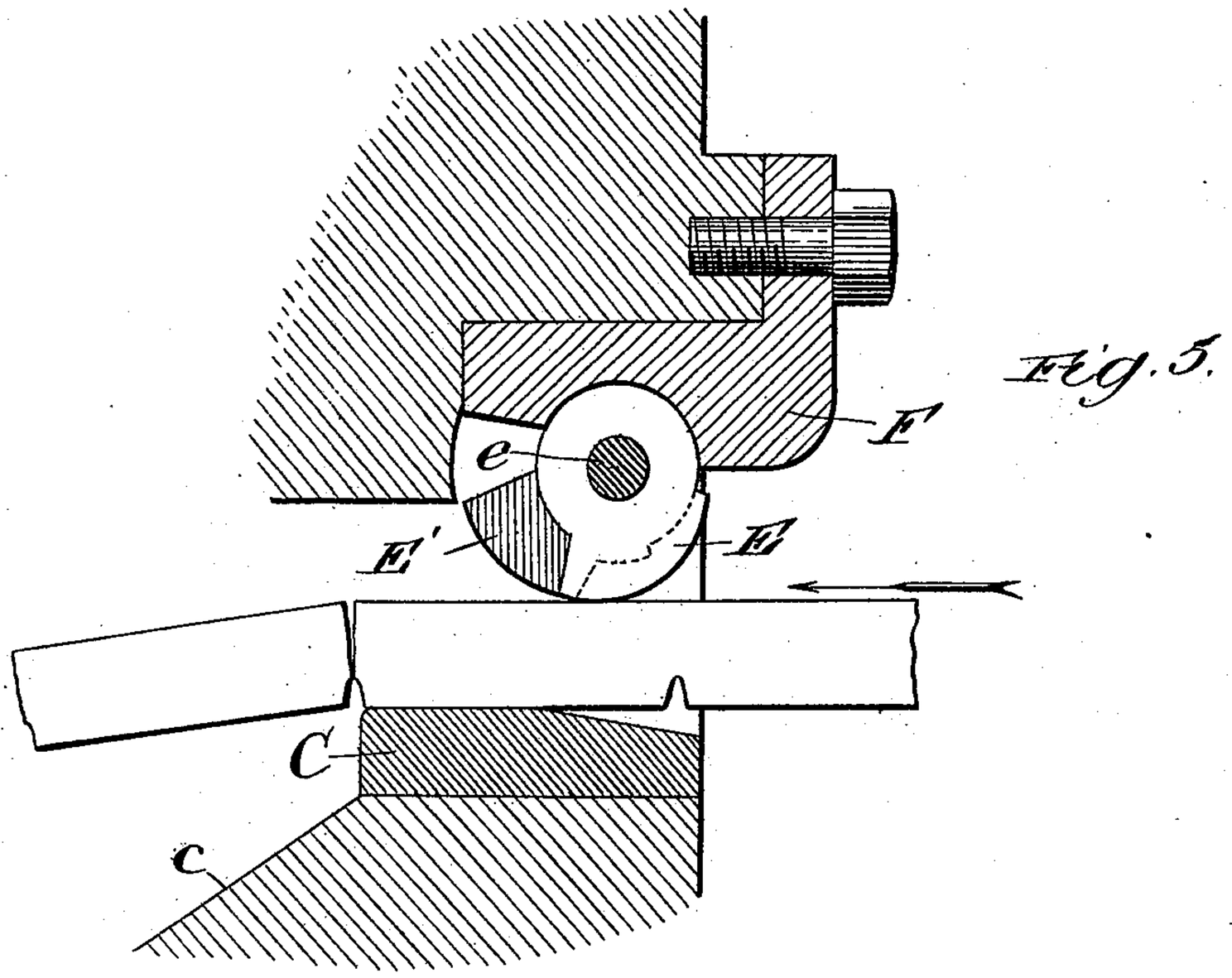


Fig. 5.

Fig. 6.

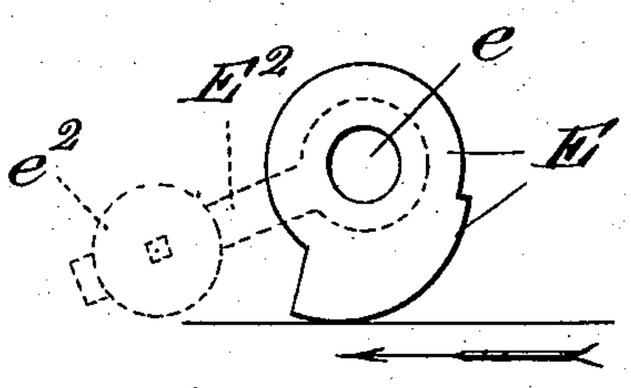


Fig. 7.

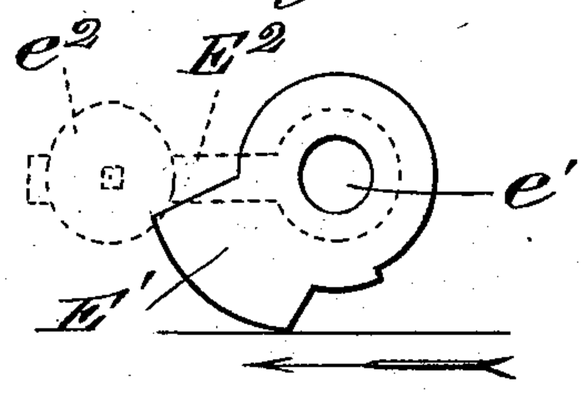
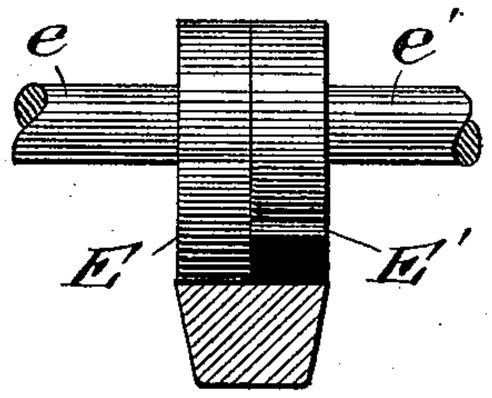


Fig. 8.



Witnesses:
Chas. E. Gaylord.
Julius Moses

Inventors:
{Charles L. Miller,
Jerome R. George,
By Banning & Banning & Payson,
Att'ys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES L. MILLER AND JEROME R. GEORGE, OF CHICAGO, ILLINOIS.

MACHINE FOR BREAKING PIG-IRON.

SPECIFICATION forming part of Letters Patent No. 518,416, dated April 17, 1894.

Application filed September 19, 1893. Serial No. 485,900. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. MILLER and JEROME R. GEORGE, of Chicago, Illinois, have invented a new and useful Improvement in Pig-Metal Breakers, of which the following is a specification.

The object of our invention, which is an improvement upon the one described in our application filed December 31, 1892, Serial No. 456,922, is to improve the mechanism used for breaking metal, particularly at blast furnace cast-houses; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front elevation of our improved breaker; Fig. 2 a side elevation of the same; Fig. 3 the same as Fig. 1, with parts omitted; Fig. 4 a vertical sectional view, taken in line 4 of Fig. 1; Fig. 5 an enlarged sectional view, taken in line 5 of Fig. 2; Figs. 6 and 7 detail views of the cams in the position shown in Fig. 5; and Fig. 8 a detail view of the cams detached.

A is a reciprocating head or plunger, *a* a ram, breaking head or block extending down therefrom, and *a'* a recess in the upper portion of the reciprocating head confining the eccentric block *b'*; B the main shaft, and *b* an eccentric thereon mounted within the eccentric block *b'*; C a rest or bearing plate secured to the frame of the machine, and *c* an incline in the bed or frame portion of the machine leading therefrom; D an adjustable stop secured to the frame; E and E' cam disks mounted respectively upon shafts *e* and *e'* and operating automatically to hold down the metal while being broken; E^2 levers or arms mounted upon shafts *e*, *e'*, and each provided with a counter weight e^2; F a bearing for shafts *e*, *e'*, secured to the frame of the machine; and G a lever fulcrumed above the frame of the machine, suitably connected at one end to the reciprocating head, and carrying at its other end a counter weight *g*.

It has heretofore been found difficult to construct breakers adapted to the varying thicknesses of metal passed through them, especially where pieces are broken successively from one end. This has been particularly due to the fact that there has been no way for automatically holding the metal down and firmly in position while subjected to the action of the breaker. The object of our invention is to overcome this difficulty by providing means, preferably automatic means, for holding the metal down in position while undergoing the breaking action.

In constructing our improved breaker, we prefer to use a series of cam disks as follows: A cam disk E, with a continuously increasing cam surface, is mounted upon the inner end of a shaft secured in a bearing extending down from the frame of the machine. An arm and counter weight are mounted on the outer end of this shaft, to secure the automatic action of the cam upon the metal to be broken. Another cam disk E', with a continuously increasing cam surface, is mounted on the inner end of a shaft in line with the one first described and adjacent thereto. This second shaft is also held in a bearing and provided with an arm and counter weight, the same as the one first described, so that the two cam disks are operated in the same way. The shortest radius of the second cam surface is substantially equal to the largest radius of the first cam surface, so that it comes into operation where the first one leaves off, and thus acts as a practical continuation thereof. Of course, the cam disks are so mounted as to offer but little resistance to the metal passing into the breaker—each disk being so arranged that its shortest radius is at the side from which the metal approaches.

We have thus described two cam disks, but in operation, especially where there is considerable variation in the thickness of the metal to be broken, it may sometimes be found advisable to have a larger number, with their cam surfaces so arranged as to come into operation successively, and thus practically act as a continuous cam. In other cases, especially where there is but little variation in the thickness of the metal to be broken, it may be advisable to form but a single cam, with one continuous surface adapted to take in the range of varying thicknesses of the metal.

Each of the arms and counter weights, above described, operates to bring the surface of the cam mounted on its shaft down into contact

with the upper surface of the metal passing into the breaker, so as to firmly hold the metal down at a point back of the place where it is to be broken, while it is being subjected to the action of the breaker.

A suitable stop is located in the path of the metal at a point necessary to provide for breaking the metal into uniform lengths; and the ram or breaking head is so located as to come down upon the metal at a point near this stop and in advance of the place where the metal is to be broken. The cams for holding the metal down being located at the other side of the point of breaking, the metal is held firmly down and in position while being broken successively from one end into uniform lengths.

As the essence of our invention consists in providing means for holding the metal down and in position while being broken, it will of course be understood that we do not intend to limit ourselves to minor features or details of construction.

We claim—

1. In a metal breaker, the combination of a cam disk mounted on a shaft, means for bringing the cam disk down upon the metal to be broken, a stop in the line of the metal, and a ram adapted to come down upon the metal at a point adjacent to the stop and in advance of the cam disk and of the place where the metal is to be broken, substantially as described.

2. In a metal breaker, a series of cam disks adapted to operate successively, and means for bringing the cam disks down upon the metal to be broken, substantially as described.

CHAS. L. MILLER.
JEROME R. GEORGE.

Witnesses:
EPHRAIM BANNING,
THOMAS A. BANNING.