

(No Model.)

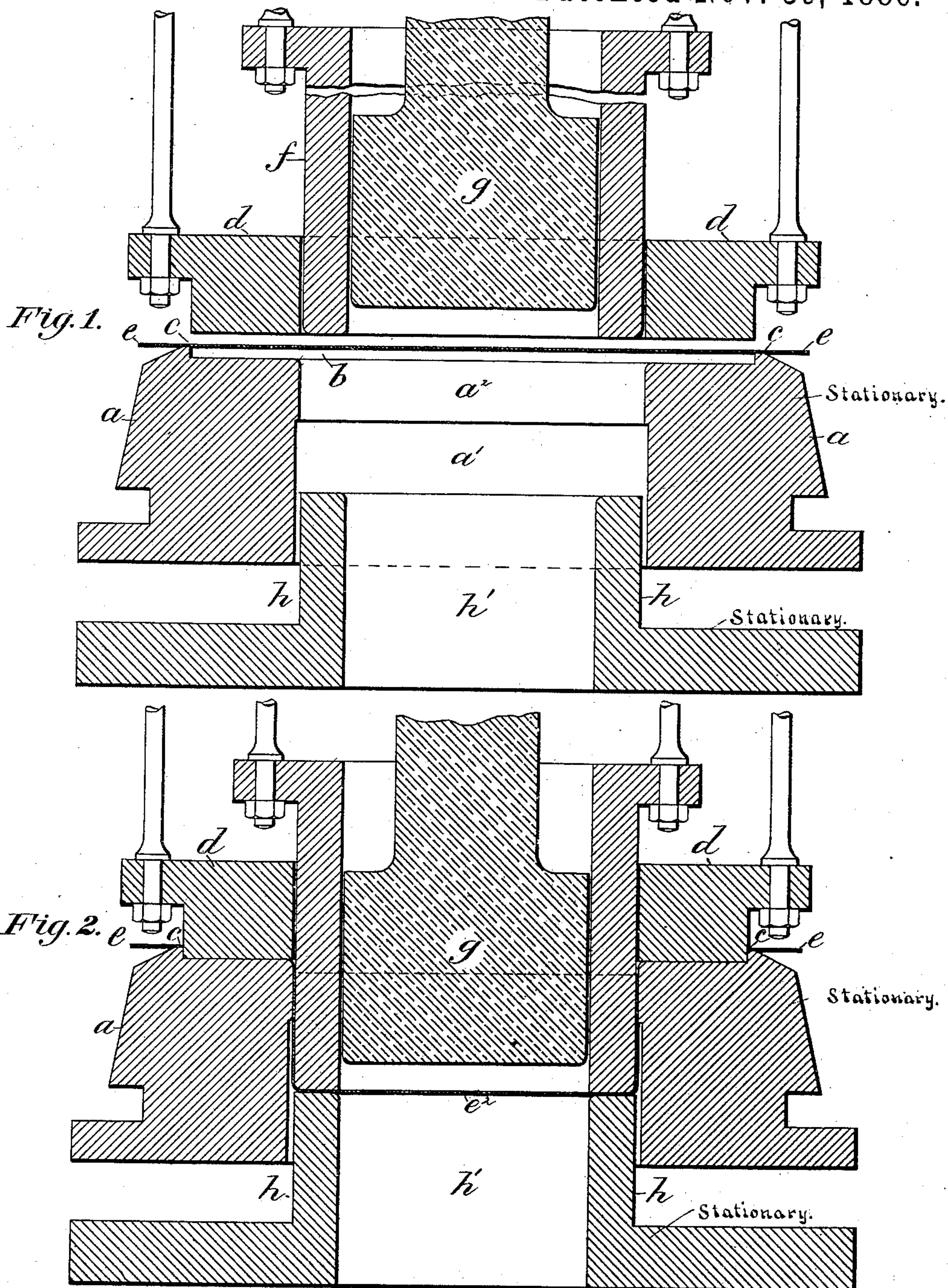
5 Sheets—Sheet 1.

G. F. BUTTERS.

MACHINE FOR DRAWING SHEET METAL ARTICLES.

No. 353,439.

Patented Nov. 30, 1886.



Witnesses.

M. A. Corwin
A. L. Gill

Inventor

George F. Butters

by Bakewell & Co.
his attys

(No Model.)

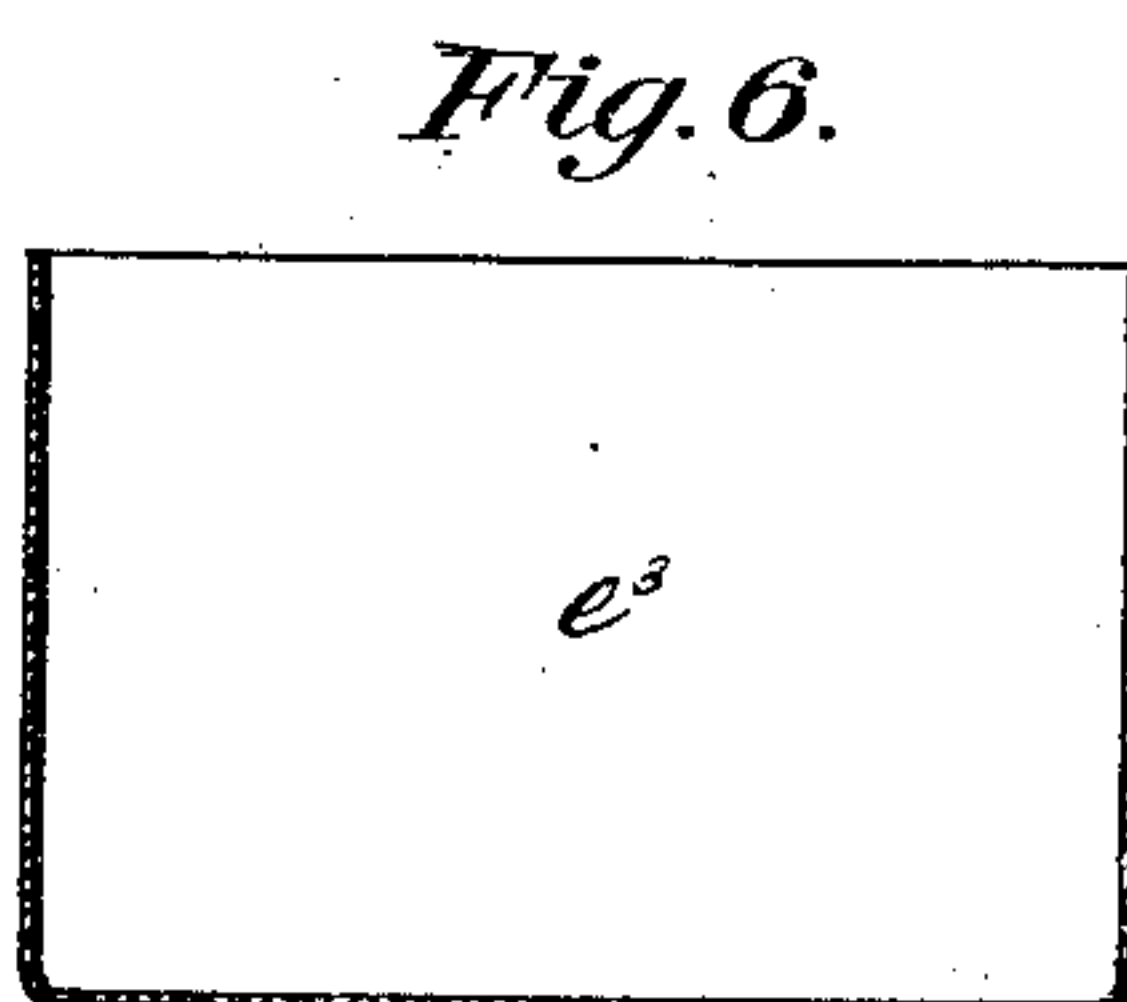
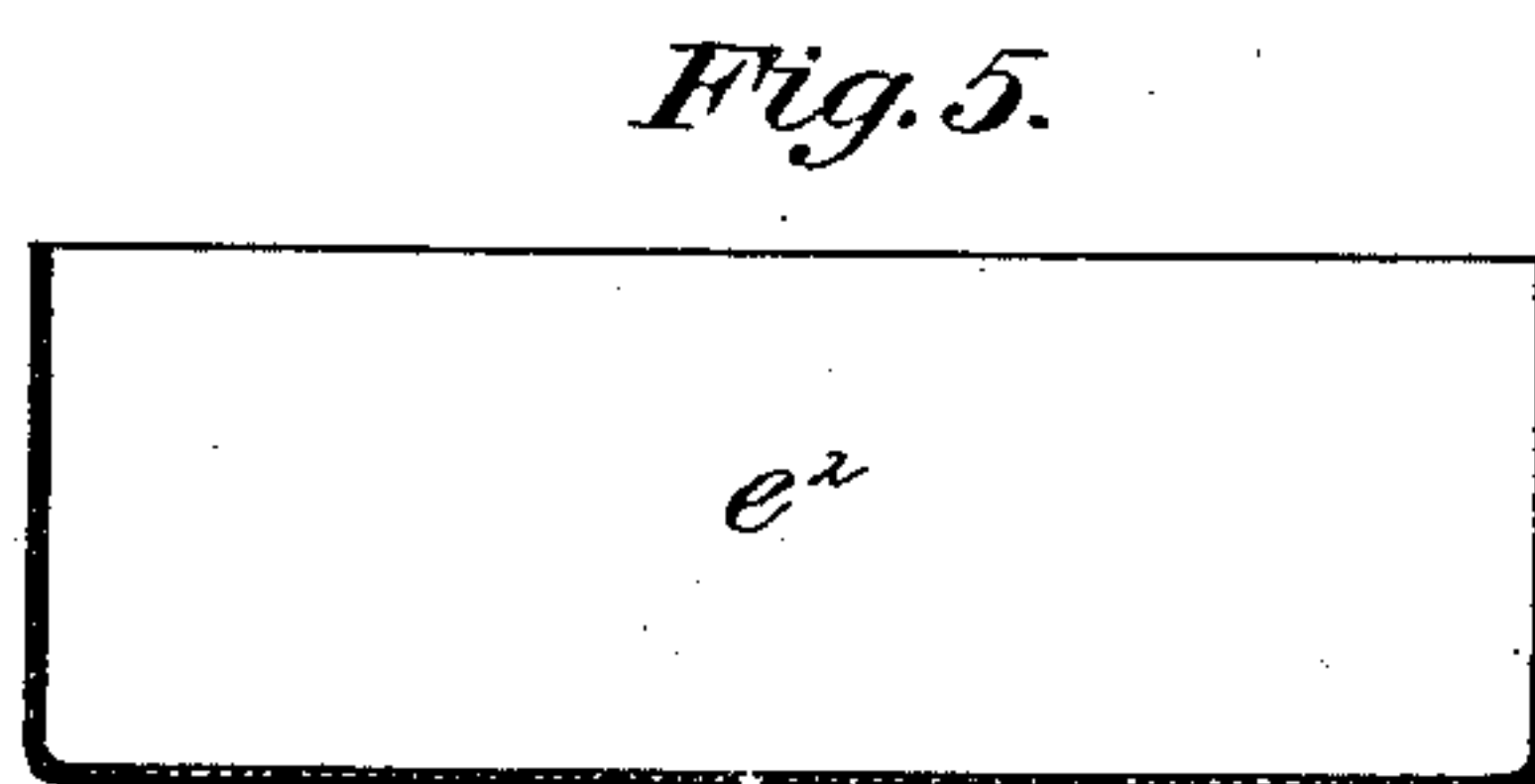
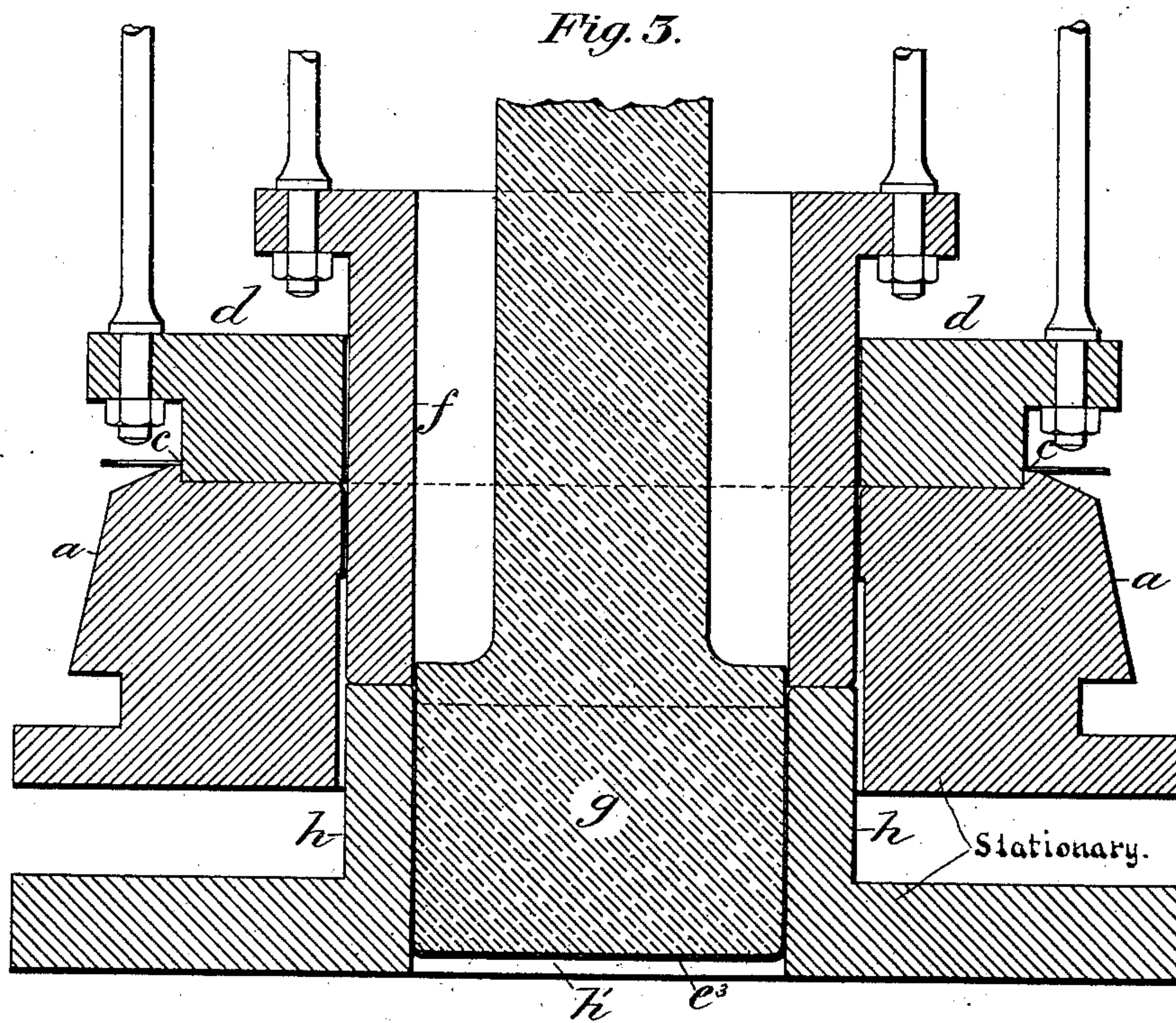
5 Sheets—Sheet 2.

G. F. BUTTERS.

MACHINE FOR DRAWING SHEET METAL ARTICLES.

No. 353,439.

Patented Nov. 30, 1886.



Witnesses
W. B. Corwin
H. L. Gill

Inventor.
George F. Butters
by Bakewell Kerr
his attys

(No Model.)

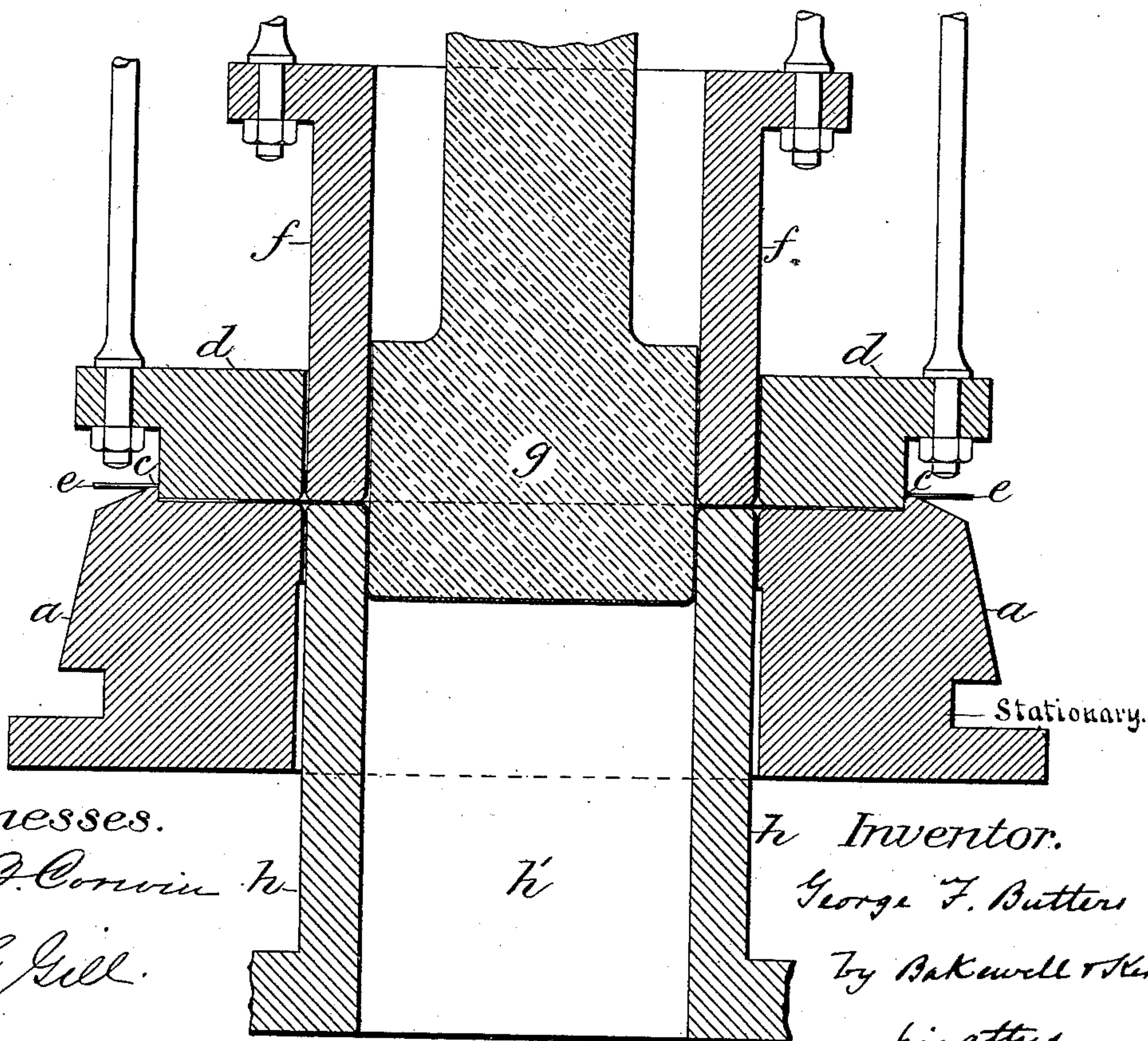
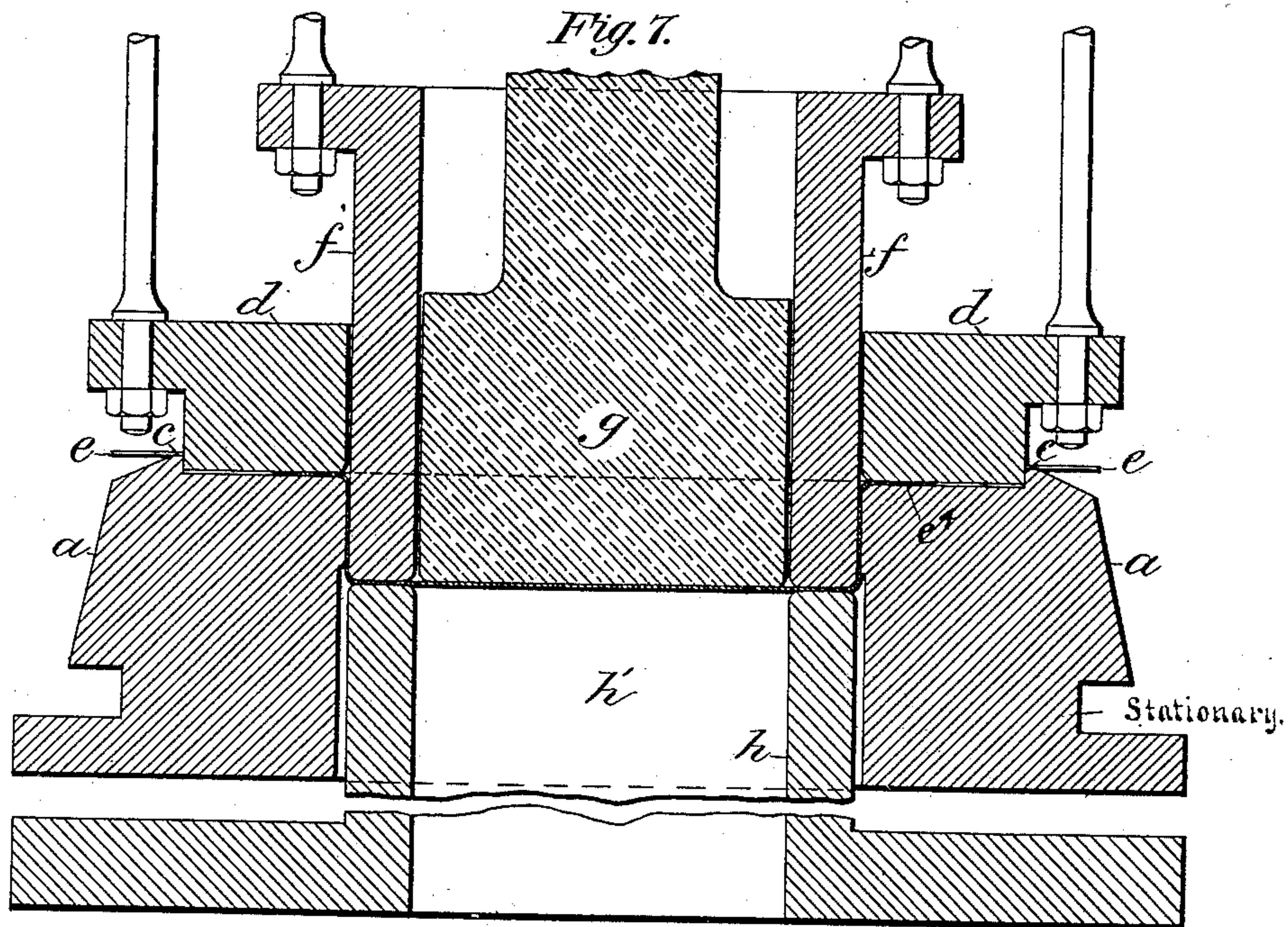
5 Sheets—Sheet 3.

G. F. BUTTERS.

MACHINE FOR DRAWING SHEET METAL ARTICLES.

No. 353,439.

Patented Nov. 30, 1886.



Witnesses.
W. B. Convin Jr.
H. L. Gull.

Inventor.
George F. Butters
By Bakewell & Kerr
his attys

Fig. 8.

(No Model.)

5 Sheets—Sheet 4.

G. F. BUTTERS.

MACHINE FOR DRAWING SHEET METAL ARTICLES.

No. 353,439.

Patented Nov. 30, 1886.

Fig. 9.

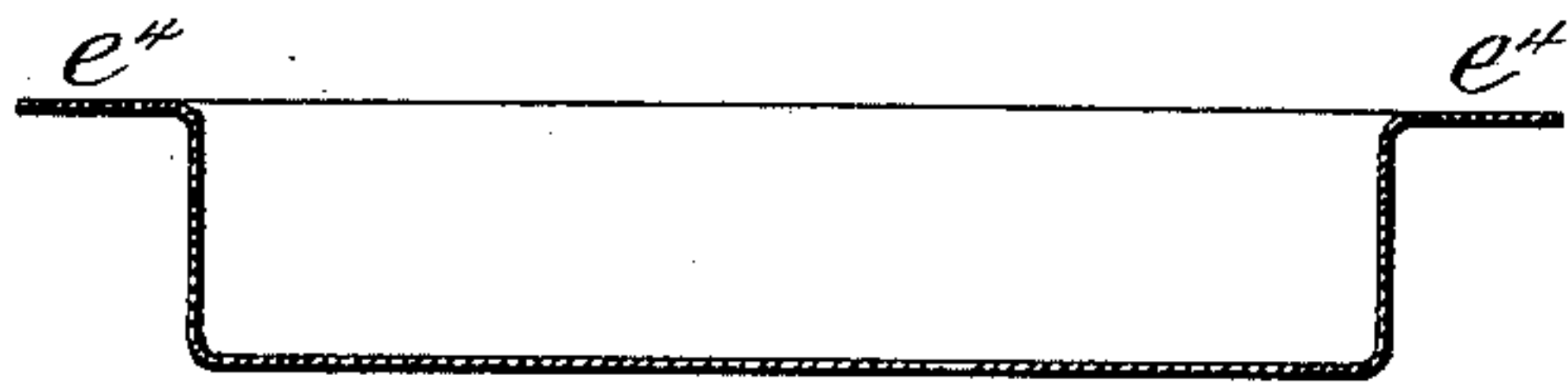
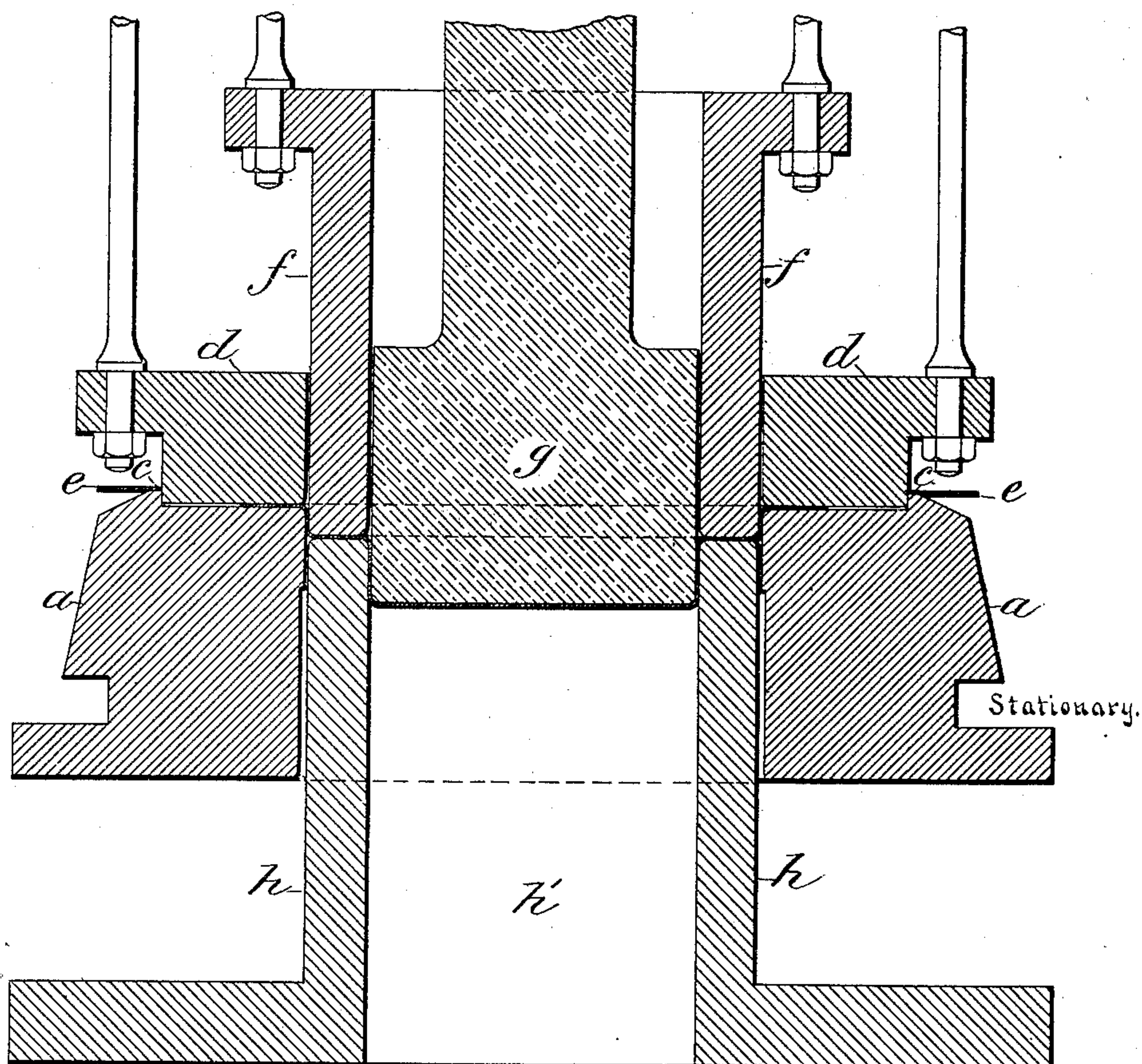


Fig. 10.



Fig. 11.



Witnesses.

W. T. Corwin
A. L. Gill

Inventor.

George F. Butters
by Bakerwell & Kerr
his attys

(No Model.)

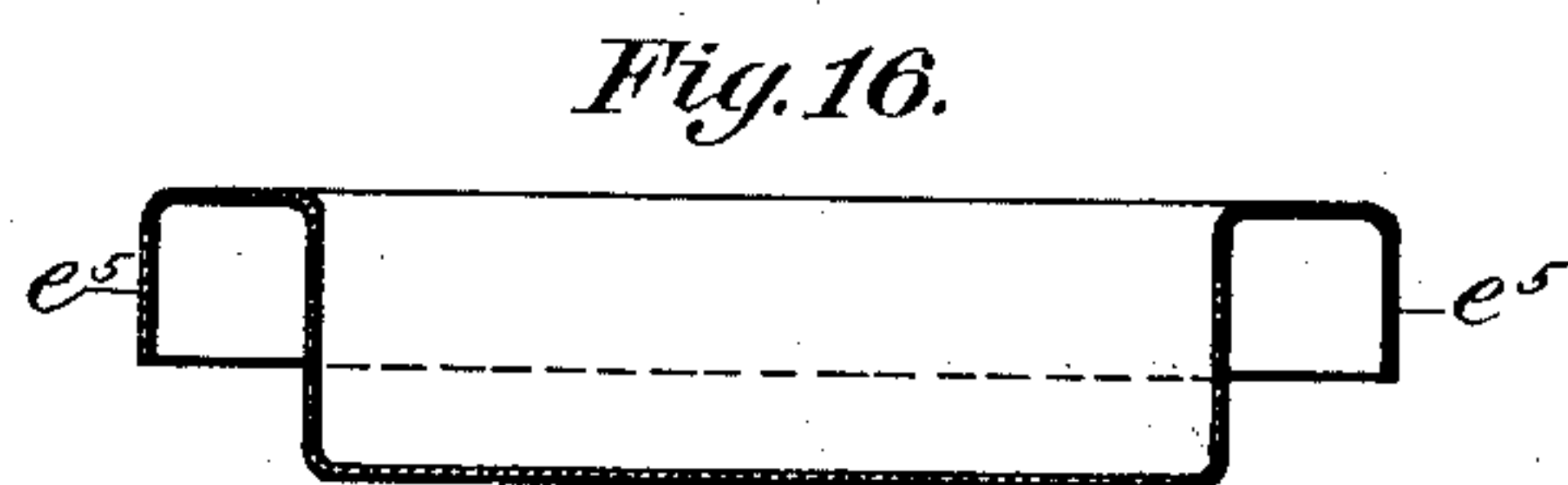
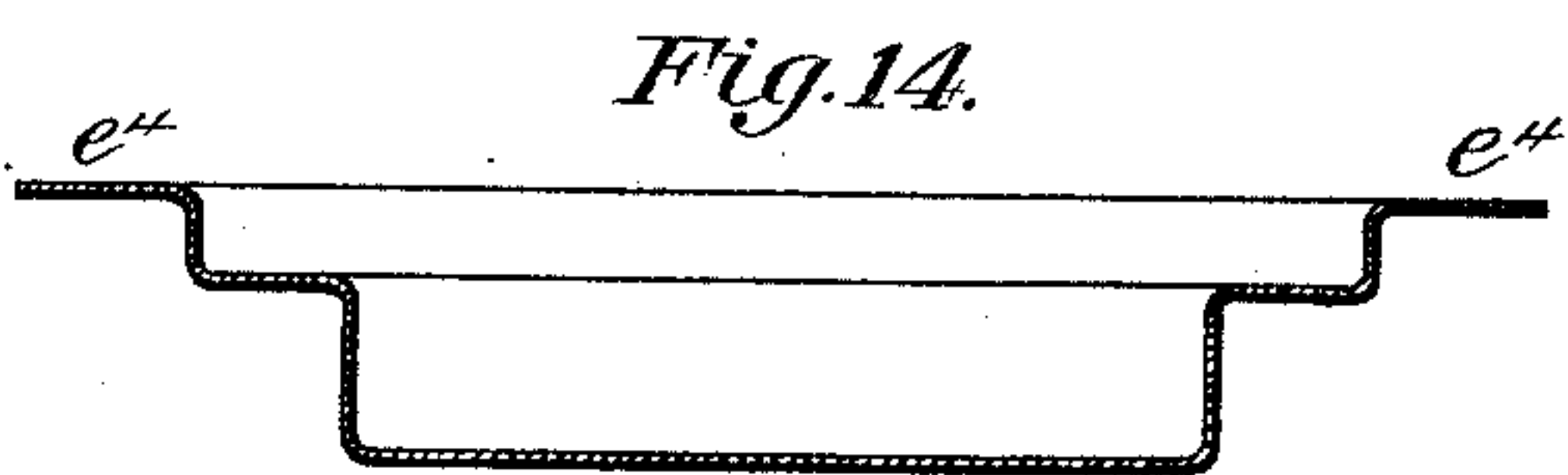
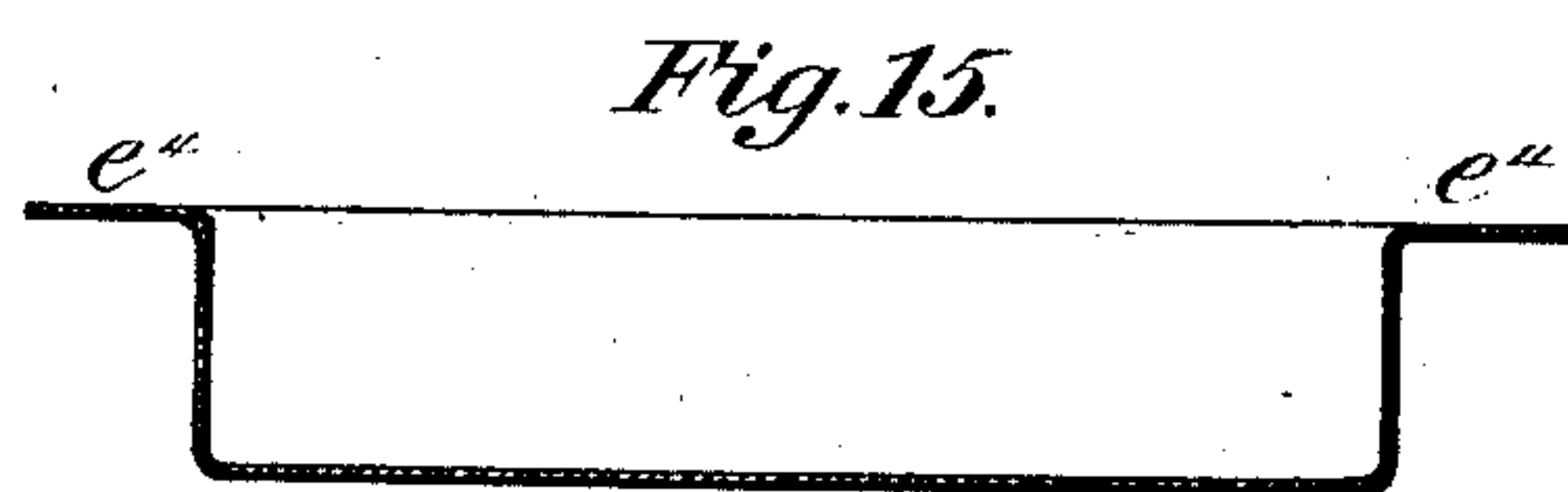
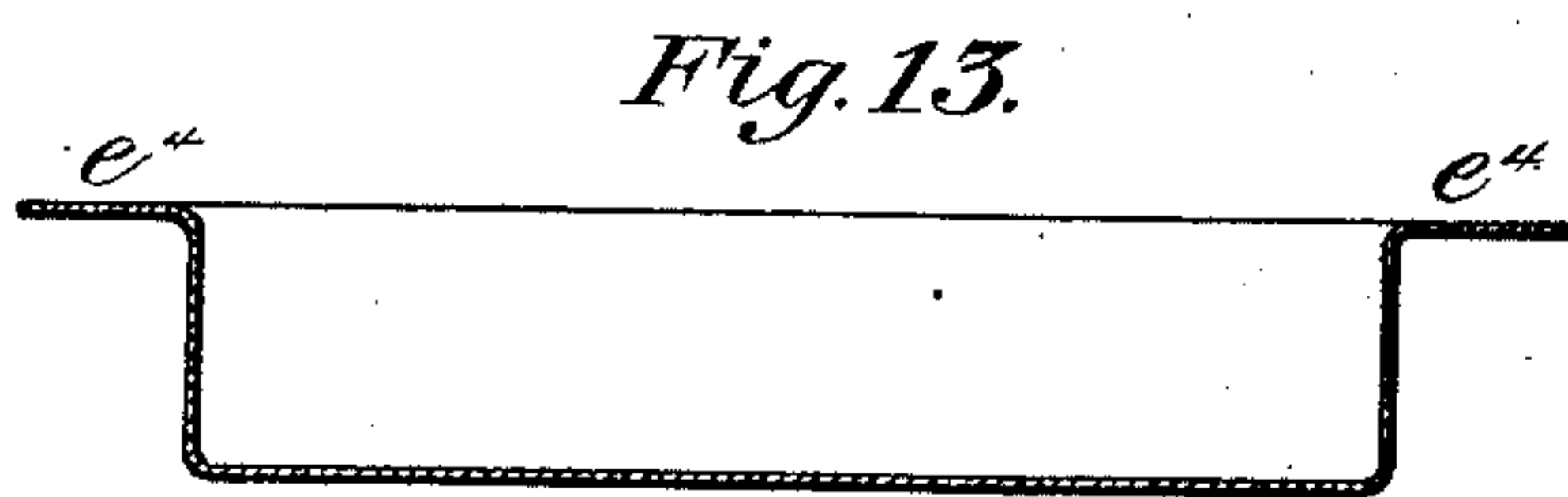
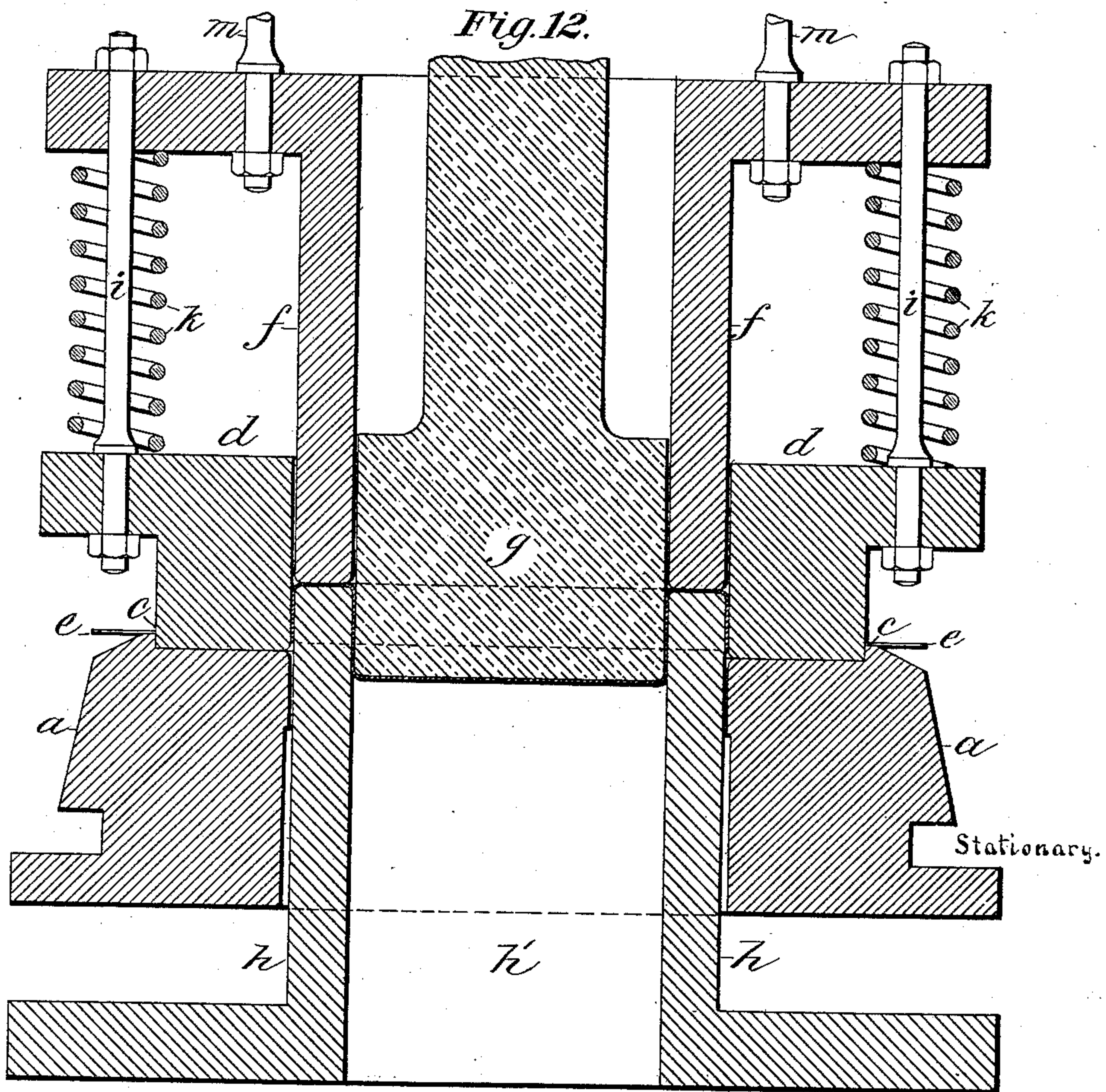
5 Sheets—Sheet 5.

G. F. BUTTERS.

MACHINE FOR DRAWING SHEET METAL ARTICLES.

No. 353,439.

Patented Nov. 30, 1886.



Witnesses.

W. D. Corwin
A. L. Hill

Inventor.

George F. Butters
by *Bakerwell & Kent*
his attys

UNITED STATES PATENT OFFICE.

GEORGE F. BUTTERS, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO ARCHIBALD W. PAULL, OF SAME PLACE.

MACHINE FOR DRAWING SHEET-METAL ARTICLES.

SPECIFICATION forming part of Letters Patent No. 353,439, dated November 30, 1886.

Application filed May 8 1886. Serial No. 201,514. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. BUTTERS, of Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Improvement in Dies for Drawing Sheet-Metal Articles; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention in dies for drawing sheet-metal articles has special reference to carrying into effect the method which forms the subject of the joint application No. 186,970, filed by A. W. Paull and myself on December 29, 1885, and the methods forming the subjects of three other applications of said Paull and myself, filed April 23, 1886, Nos. 199,902, 199,903, 199,904.

To enable others skilled in the art to make and use my improvement, I will now describe it by reference to the accompanying five sheets of drawings, in which—

Figures 1, 2, and 3 are like views of a set of dies and plunger for performing two drawings on a blank by a continuous operation, whereby it is transformed from a flat disk into a deep cup, the three views illustrating the different positions assumed by the parts at different stages of the operation. Figs. 4, 5, and 6 are views of the blank in the condition shown in Figs. 1, 2, and 3. Figs. 7 and 8 are sectional views of the same appliances for making a wide-flanged cup. Figs. 9 and 10 show the blank. Figs. 11 and 12 are sectional views of the same appliances as used in making double and reflex flanged cups. Figs. 13, 14, 15, and 16 are views of the blank.

Like letters of reference indicate like parts in each.

In Figs. 1, 2 and 3, *a* indicates a die, having a cylindrical central cavity or matrix, *a'*, the mouth of which is slightly narrower than it is farther down, for relieving the sides of the article during the subsequent operation of the machine. Around the mouth of the matrix *a'* is a shallow recess, *b*, the circular edge of which is formed by the knife or shear *c*. The die *a* is stationary, and is fitted on a suitable frame or bed-plate, as will be understood.

Above the die *a* is a reciprocating clamping-ring or holder, *d*, of such diameter as to fit

nicely into the recess *b*, its square outer corner acting with the knife *c* as a shear, for the purpose of cutting the rough blank *e* to the requisite circular shape. Inside of the ring *d* is a hollow plunger, *f*, the movement of which is independent of that of the ring *d*. Inside of the hollow plunger *f* is a solid reciprocating plunger, *g*. Situate in the lower end of the matrix *a'* is a second die, *h*, having a matrix, *h'*. In this example the die *h* is fastened to the die *a* or to the bed-plate; or the dies *a* and *h* may be cast in one piece. These parts are used in a drawing-press of the ordinary and well-known construction. Such presses as heretofore made had a plunger and clamping-ring, each of which had an independent reciprocating movement imparted to it by a separate eccentric on the power-shaft, journaled in the top or head of the machine. In the present machine each of the three parts *d f g* has a separate reciprocating movement imparted to it by a separate eccentric, as in the ordinary construction.

The operation of this machine is as follows, viz: The rough blank of sheet metal *e* is placed on the top of the circular knife *c*, and then the ring *d* descends upon it, shearing the edges and forcing the properly-shaped blank *e'* (see Fig. 4) down into the recess *b*, where it clamps so much of its surface as extends beyond the matrix *a'* upon the upper face of the die, as shown in Fig. 1. The hollow plunger then descends on the blank thus held and forces it into the matrix *a'*, drawing its edge from between the clamping-faces of the die and ring and forming a cup, *e''*, as shown in Figs. 2 and 5. This cup is carried down in the matrix until its flange passes the contracted part *a''* of the die and until it is clamped by the hollow plunger *f*, which now acts as a clamping-ring upon the upper end of the second and smaller die, *h*, as shown in Fig. 2. The plunger *g* then descends on the central unflanged portion of the blank and forces it into the matrix *h'*, drawing the clamped and flanged portions into the die and forming a deep narrow cup, *e'''*, as shown in Fig. 6. In the second drawing thus described the flange of the cup *e''*, being in the wider portion of the matrix *a'*, is not clamped, but free, the only portion of the blank *e''* which is clamped

being the outer circle of the bottom or unflanged part, which is between the meeting faces of the hollow plunger *f* and the die *h*. The consequence is that the clamped and flanged portions will be evenly and smoothly drawn by the plunger *g* from between the clamping-surfaces into the matrix *h'* without buckling or undue strain on the thin cold sheet metal.

In Figs. 7 and 8 I show how these devices are used to make a cup with a wide flange. The rough blank *e* is placed on the cutter *c*, and cut to the proper form by the descent of the ring *d*, as in Fig. 1. The plungers *f* and *g* then descend together until a cup with a narrow flange, *e'*, is formed, as shown in Figs. 7 and 9. Then the movement of the plunger *g* ceases for the time being, and the plunger *f* is retracted. At the same time die *h* rises, and the outer portion of the bottom of the cup, which is beyond the sides of the plunger *g*, is clamped between the ends of the parts *f* and *h*, which continue to rise until their meeting faces are in the same horizontal plane of the meeting faces of the die *e* and ring *d*, as shown in Fig. 8. As the plunger *g* remains stationary during this movement it causes the metal to be drawn between the clamping-faces *f* and *h*, and to go to form the sides of the narrow cup and additional width of flange *e'*. (Shown in Figs. 8 and 10.)

In Fig. 11, I show how these devices are used to make a double cup. Here the blank is cut as in Fig. 1. Then the plungers *f* and *g* descend together until they form a flanged cup such as is shown in Fig. 13, when the plunger *f* encounters the end of the die *h*. Then the plunger *g* remains stationary and the plunger *f* and die *h* rise, operating, as described in connection with Figs. 7 and 8, until they form a double-cupped blank such as is shown in Figs. 11 and 14.

In Fig. 12 I show how to make a reflex-flanged cup. Here the blank is cut as in Fig. 1, and a flanged cup such as is shown in Fig. 15 is made by the joint downward movement of the plungers *f* and *g*. Then the parts *f* and *h* rise together, drawing the metal into a smaller cup over the plunger *g*, and also when they rise above the plane of the clamping-faces of the die *a* and ring *d*, drawing the flange *e'* from between the clamping ring and die, and bending it reversely. During this action the plunger *g* also rises, but more slowly than the other parts. The result is a blank with a reverse flange, *e''*, as shown in Fig. 16.

In Fig. 12 I show the clamping-ring *d* as con-

nected with the plunger *f* by rods *i*, and provided with springs *k*, so that one set of connecting-rods *m*, with their yokes and eccentrics, will serve to operate both. The springs hold the ring *d* in advance of the plunger, so that it comes down on and clamps the blank before the plunger begins to act thereon, which it is able to do by reason of the compressibility of the springs, as will be understood. The shear *c* may of course be omitted and the blanks cut to shape by other means.

The cup-shaped blanks which are produced by my improved dies are used for various purposes—such as for lantern fittings, pans, &c.—being finished by other operations and tools.

The object of my improvement is the reduction of the cost of manufacture by a saving of time and labor, which is accomplished by the use of my invention.

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

1. The combination, in a machine for drawing sheet metal, of a die having a cylindrical matrix, a clamping-ring acting in conjunction with the face of the die, a second die situated in the first die, a hollow plunger working into the first die and against the face of the second die, and a plunger working through the hollow plunger and into the second die, substantially as and for the purposes described.

2. The combination, in a machine for drawing sheet metal, of a die having a cylindrical matrix the mouth of which is slightly narrowed, a second die situated in the wider part of the matrix of the first die, a hollow plunger working through the narrow mouth of the first die and against the face of the second die, and a plunger working through the hollow plunger into the second die, substantially as and for the purposes described.

3. The combination, in a machine for drawing sheet metal, of the die *a*, clamping-ring *d*, the clamping-die plungers *f* *h*, working inside of the die *a* and ring *d*, and the plunger *g*, working inside of the die-plungers *f* and *h*, the die *a*, ring *d*, and plunger *f* performing the first step on the blank, and the plungers *f*, *g*, and *h* completing the formation of the article, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 25th day of February, A. D. 1886.

GEORGE F. BUTTERS.

Witnesses:

W. B. CORWIN,
THOMAS B. KERR.