

(No Model.)

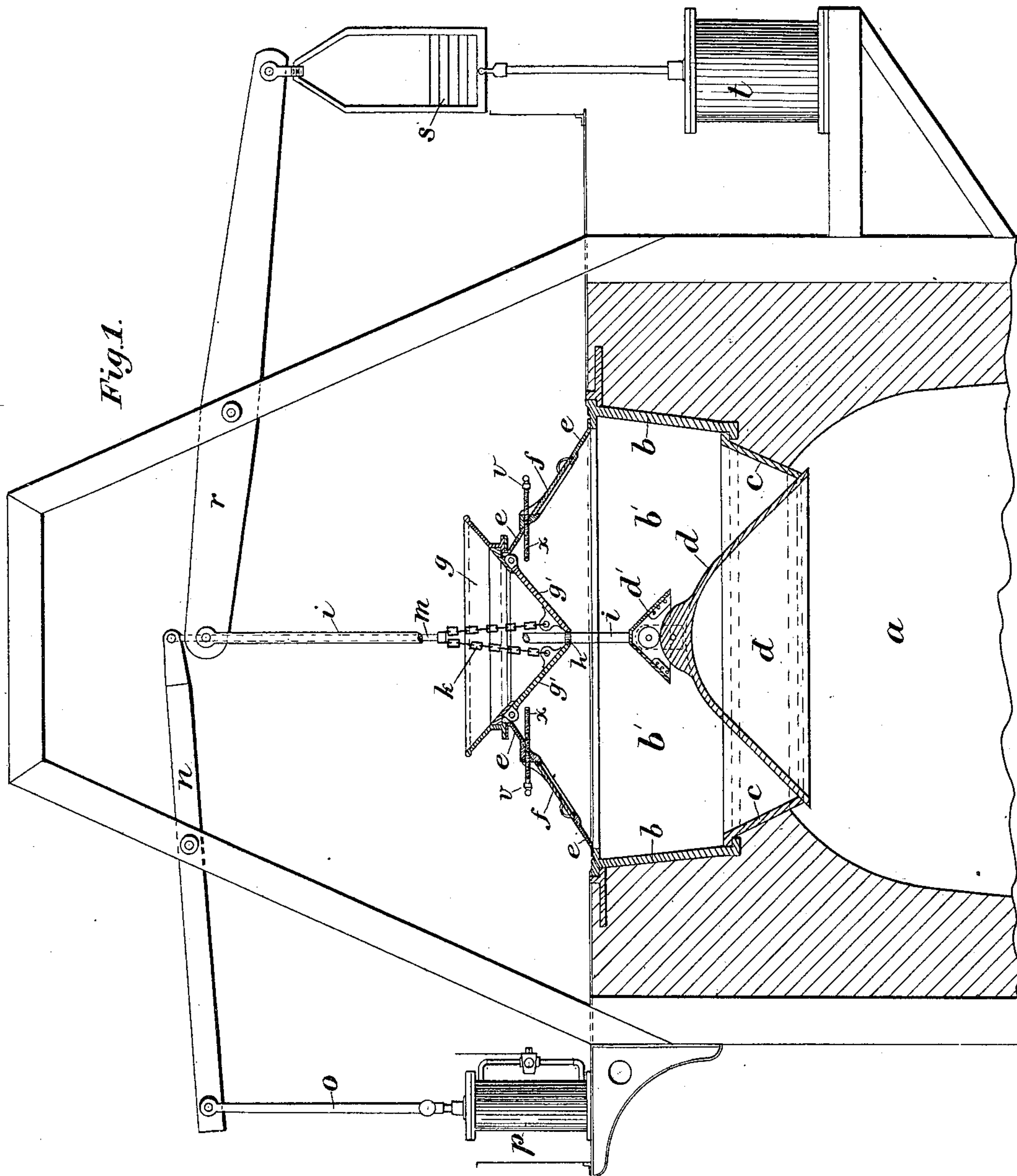
2 Sheets—Sheet 1.

W. KENNEDY & J. SCOTT.

BLAST FURNACE TOP.

No. 365,077.

Patented June 21, 1887.



Witnesses \_\_\_\_\_

M. B. Corwin

H. L. Gill.

Inventors.

Walter Kennedy  
James Scott  
by Bakewell & Kern  
Their Attys

(No Model.)

2 Sheets—Sheet 2.

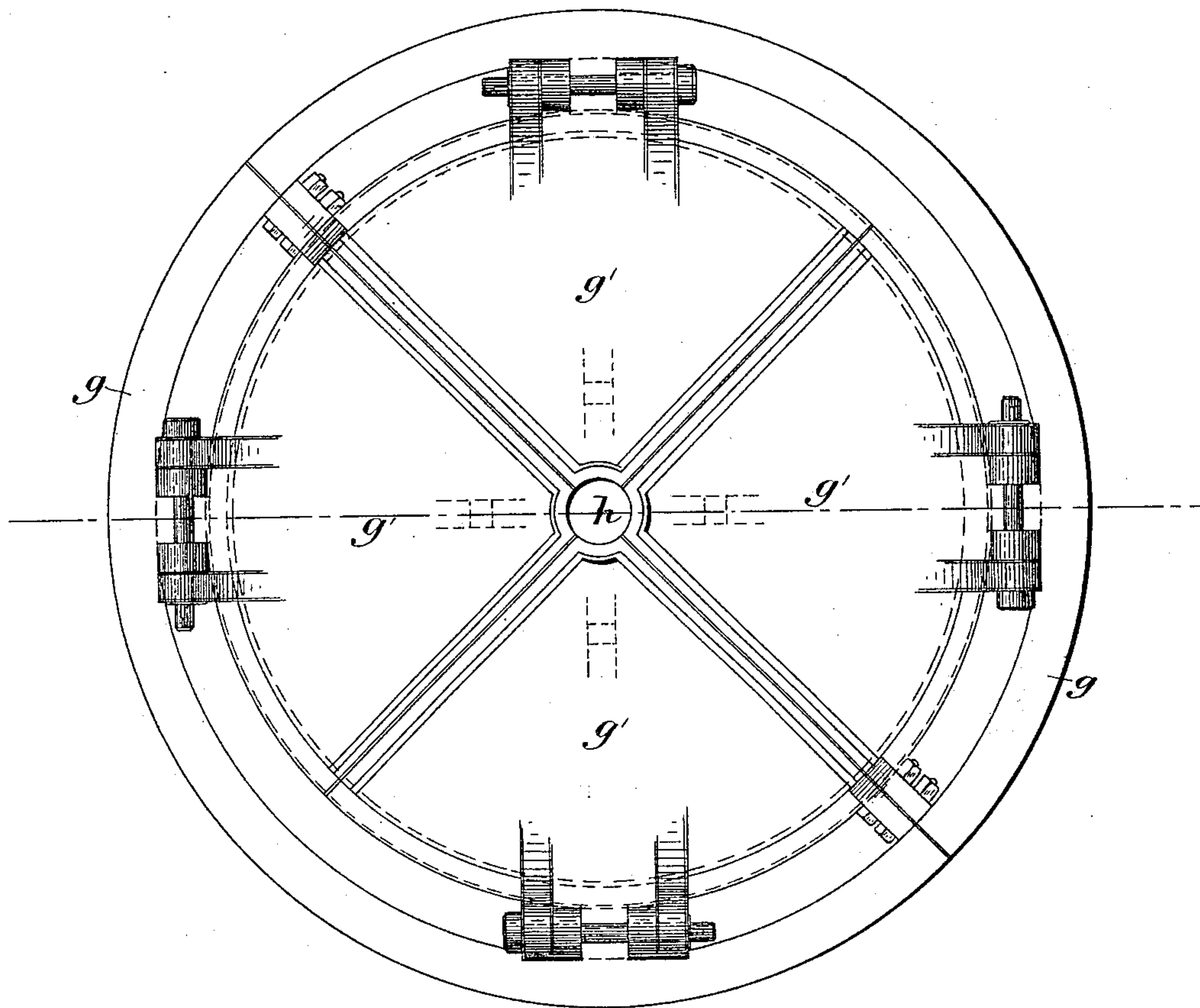
W. KENNEDY & J. SCOTT.

BLAST FURNACE TOP.

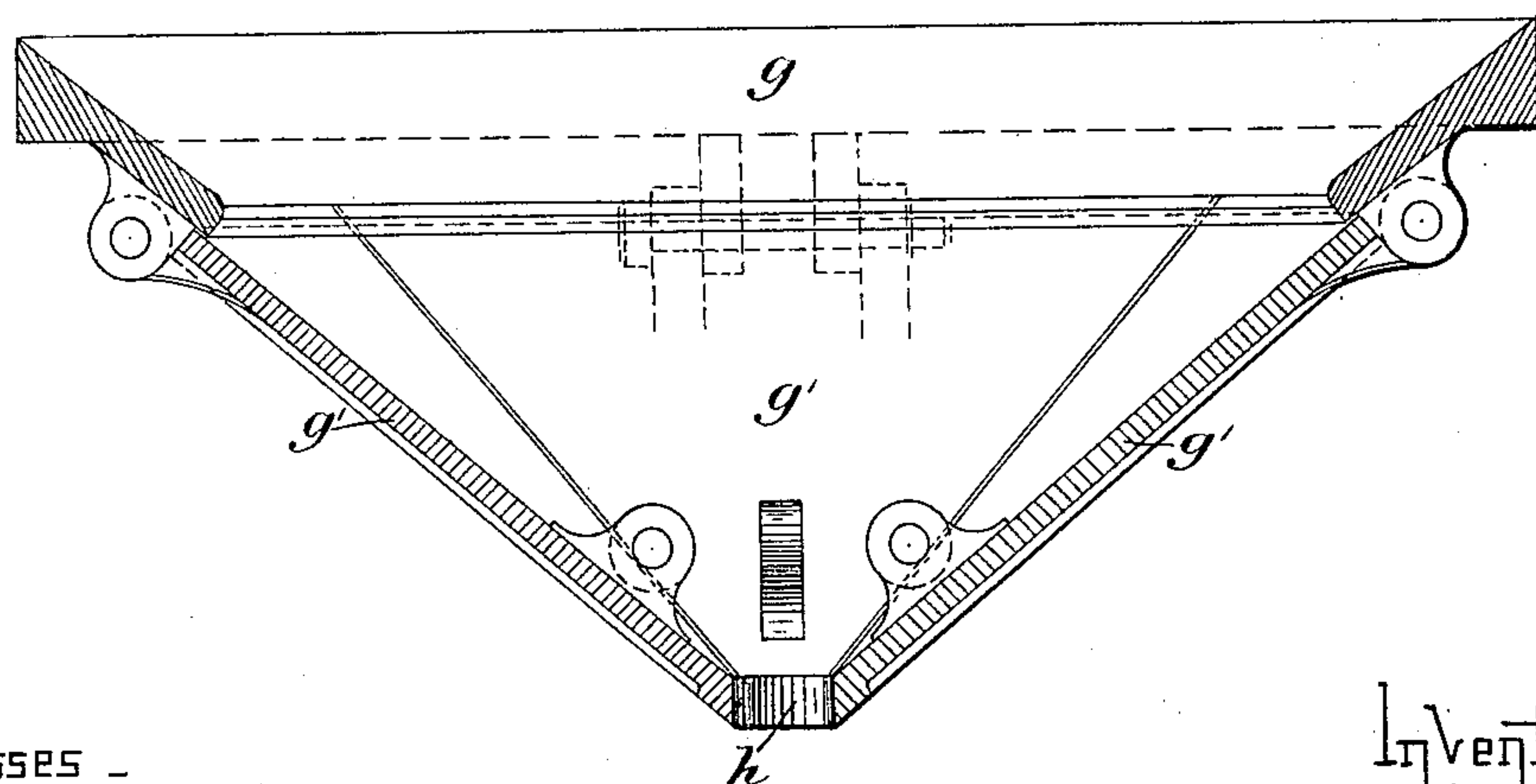
No. 365,077.

Patented June 21, 1887.

*Fig. 2.*



*Fig. 3*



Witnesses -

*W. T. Brown*  
*A. L. Gill*

Inventors -

*Walter Kennedy*  
*James Scott*  
*by B. A. Wells & Co.*  
*Their Attys*



# UNITED STATES PATENT OFFICE.

WALTER KENNEDY AND JAMES SCOTT, OF PITTSBURG, PENNSYLVANIA.

## BLAST-FURNACE TOP.

SPECIFICATION forming part of Letters Patent No. 365,077, dated June 21, 1887.

Application filed August 30, 1886. Serial No. 212,166. (No model.)

*To all whom it may concern:*

Be it known that we, WALTER KENNEDY and JAMES SCOTT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have  
5 invented a new and useful Improvement in Blast-Furnace Tops; and we do hereby declare the following to be a full, clear, and exact description thereof.

Various constructions of feeding devices for  
10 blast-furnaces have been devised to accomplish the uniform distribution of the stock as it is fed into the furnace. The form of furnace-top in general use has a hopper-shaped feed-opening, closed at the lower end by a cone-shaped  
15 bell suspended in its mouth from above. The stock is usually emptied from barrows into the hopper at one side and then distributed evenly around the bell by workmen, after which the bell is lowered and the stock permitted to slide  
20 down into the furnace, being distributed by the spreading sides of the bell. The labor attending this operation, however, is severe, and the feeding and distributing of the stock require the presence of several men at the top of the  
25 furnace. To obviate this, it has been proposed to run the barrow out over the mouth and empty the stock directly down on the apex of the bell, and also to arrange a second hopper above the bell, which, when the stock is emptied  
30 into it, will direct it down upon the apex of the bell. The effort now is to get rid of the top men and to feed the furnace automatically from the ground. To accomplish this, a "skip-  
35 hoist" is used in connection with the last-named construction. This hoist consists of a car or barrow elevated by machinery to a point above the said upper hopper, and there caused to tip and discharge its contents into such hopper,  
40 whence it slides down into the lower hopper. The even distribution of the stock is very necessary to the proper use of this system of feeding, and we have found that the tendency of the stock is to strike against the apex of the bell and collect in greater quantity at the feed  
45 side, so that when the bell is dropped an accumulation of stock at one side of the furnace results, with a corresponding paucity at the other, which produces an irregularity in the operation of the furnace.

50 Our invention is designed to overcome this difficulty, and we accomplish this end by the

hereinafter-described construction, whereby we accumulate a charge in the upper hopper and then let it fall directly on the apex of the bell, so that it is evenly distributed in the lower  
55 hopper around the bell.

To enable others skilled in the art to make and use our improvement, we will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the top of a blast-furnace provided with our improvement, only so much of the top rigging as is necessary to an understanding of the same being shown. Fig. 2 is an enlarged plan, and Fig. 3 is an en-  
60 larged section of the upper hopper.

Like letters of reference indicate like parts in each.

The furnace *a* is of the usual construction, having a metal casting, *b*, around the mouth, 70 the usual hopper, *c*, supported in the mouth, and the usual bell, *d*, closing the hopper. Fastened to the casting *b* is an inclined tight circular metallic shell, *e*, which extends above the top and supports the upper hopper, *g*. The  
75 lower part of the hopper *g* is composed of four or more hinged doors or segments, *g'*, which, where they meet at the center, are cut out, so as to form a hole, *h*, for the passage of the rod  
80 *i*, by which the bell *d* is suspended in the furnace. The inner ends of the segments *g'* are supported by chains *k*, which hang from a common rod, *m*, connected with the pivoted lever *n*. The other end of the lever *n* is connected with the piston-rod *o* of the steam-cyl-  
85 inder *p*, or to a lever or other equivalent operating device, whereby the lever *n* may be rocked or moved to raise or lower the segments *g'* at pleasure, either from the furnace-top or from the ground or any other desired  
90 place. The bell *d* is operated by the rod *i*, lever *r*, counter-balances, and cylinder *t*, or by other usual means. The shell *e* is provided with doors *f* back of the segmental doors *g'*, by which access may be had to the hopper cham-  
95 ber *b'* when necessary.

Thus constructed, the operation of our improvement is as follows, viz: The segments *g'* being in the closed position, as in Fig. 1, the stock is emptied into the hopper from the bar-  
100 row of the skip-hoist or other feeding device, and then, when the hopper has received the



proper amount, the doors  $g'$  are permitted to fall, which causes the load to drop centrally on the cone  $d'$  of the bell, and thereby be distributed equally in the chamber  $b'$  around the bell.

5 The segments are then raised and the operation is repeated until the desired quantity of material is collected in the chamber  $b'$ . Then the bell  $d$  is dropped, and the material drops into the furnace uniformly on all sides and the

10 bell is raised to place. This construction not only acts to secure the uniform feeding of the furnace, but also as a perfect gas-seal, because the chamber  $b'$  is tight, and the doors  $g'$  are closed when the bell  $d$  is open and the

15 bell  $d$  is closed when the doors  $g'$  are open, so that there is no time, when the top is open, to permit the escape of gas, and consequently no heat is wasted at the top, and the irregular action of the blast-heating stoves, due

20 to periodical escaping of gas at the top, is avoided. In case for any cause the furnace should bank up on one side, it can be cured by preventing the segment or segments on that side from swinging fully open, by putting a

25 prop or stop,  $x$ , back of it for that purpose, as will be understood and is shown at  $v$ , Fig. 1. This causes the stock on that side to be shot over to the other side of the bell  $d$ , and to collect there in greater quantity, so that when

30 discharged into the furnace more of the charge will fall on the deficient side than on the banked-up side. In this way our improvement can be utilized to cure irregularities in the operation of the furnace.

35 Our improvement adds but little to the cost of the top, and is simple and efficient in its

operation. We have it now in successful practical operation.

Although we have described certain devices for operating the hoppers, we do not desire to 40 limit ourselves to these exact means by the use of the word "devices" in the claims, as other known mechanical means may be substituted therefor.

We are aware that hoppers having hinged 45 sections have been used in coke and other ovens, and we do not desire to claim such hoppers, broadly.

What we claim as our invention, and desire to secure by Letters Patent, is— 50

1. In a blast-furnace, the combination of a feed-hopper, an upper hopper composed of hinged sections, so as to discharge its contents into the lower hopper, and devices, substantially as described, for discharging the hop- 55 pers, substantially as and for the purposes specified.

2. In a blast-furnace, the combination of a feed-hopper, an upper hopper composed of hinged sections, so as to discharge its contents 60 into the lower hopper, devices, substantially as described, for discharging the hoppers, and a stop to limit the movement of one or more of the hinged sections, substantially as and for the purposes specified. 65

In testimony whereof we have hereunto set our hands this 20th day of August, A. D. 1886.

WALTER KENNEDY.  
JAMES SCOTT.

Witnesses:

W. B. CORWIN,  
H. L. GILL.