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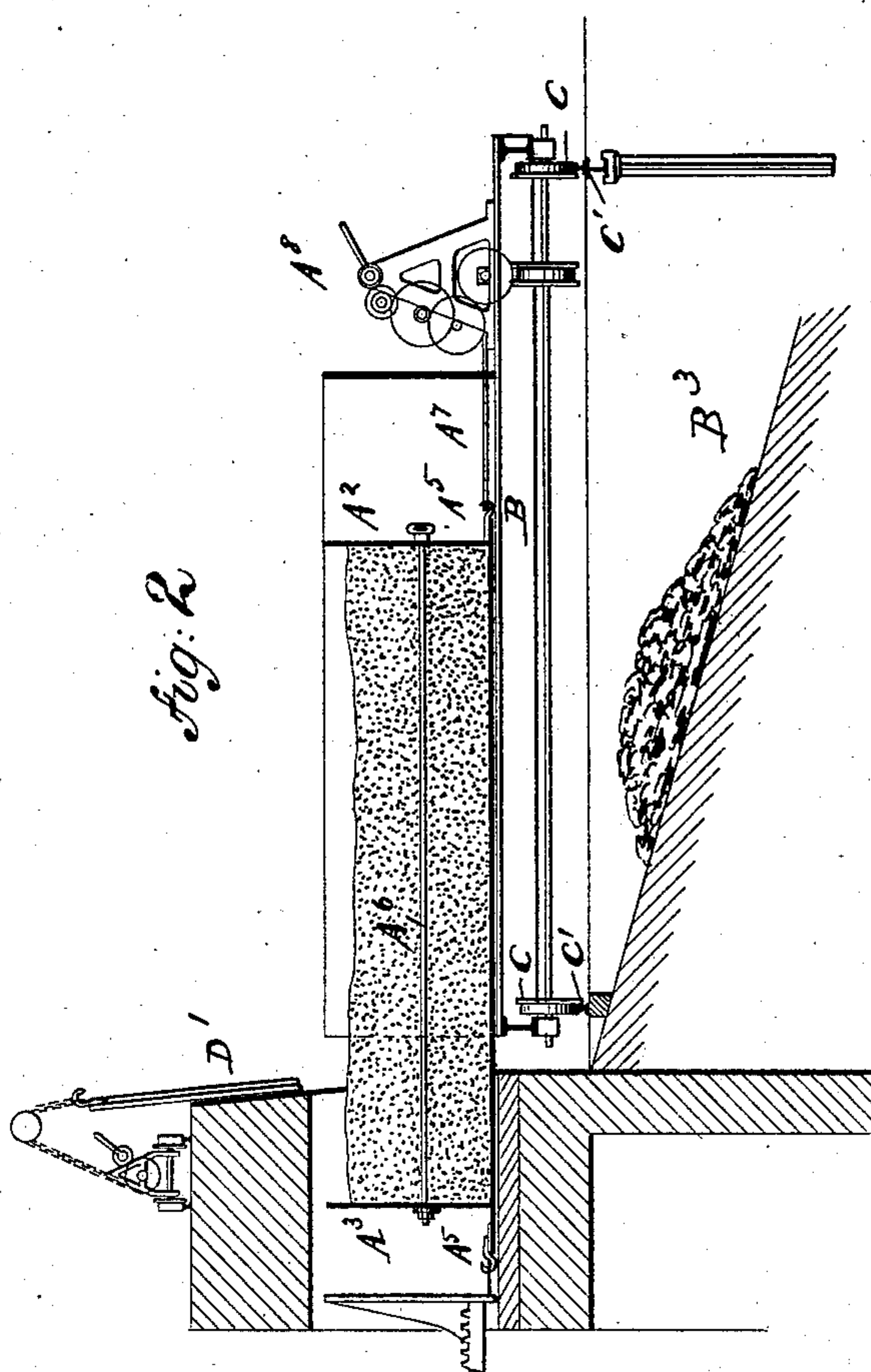
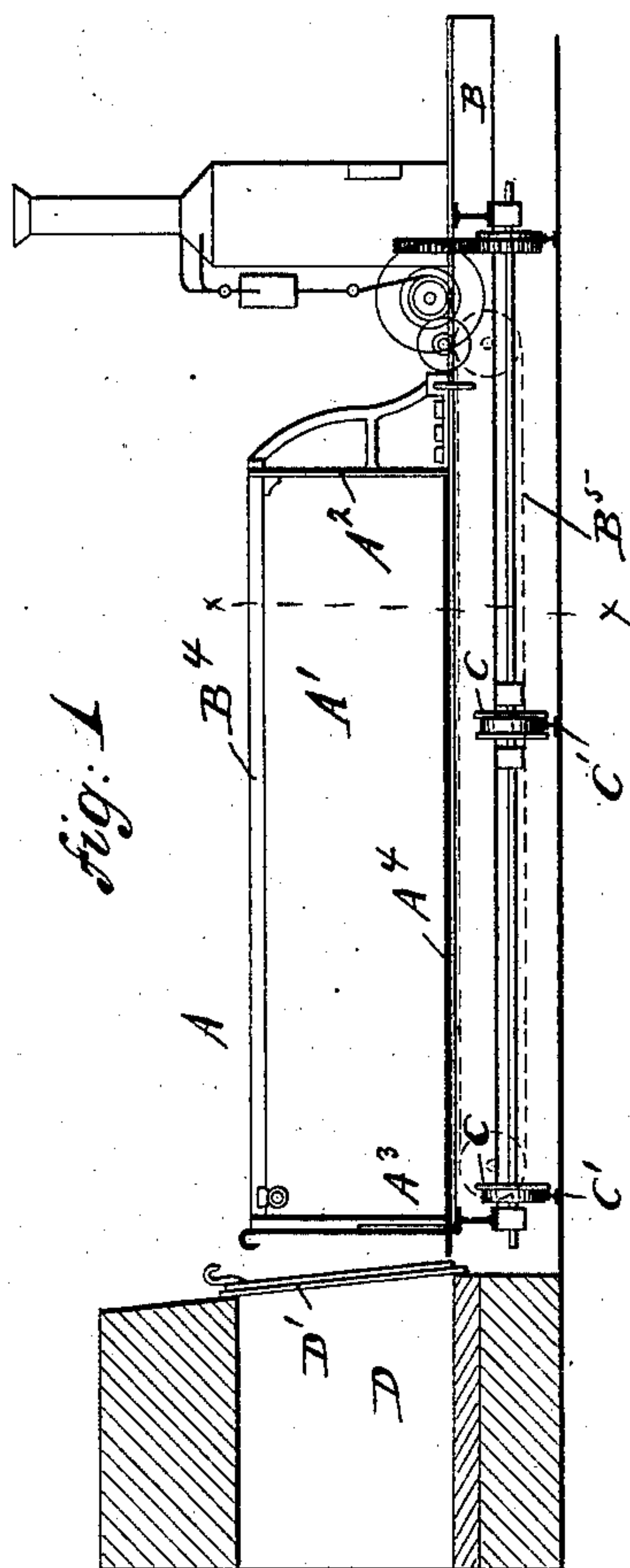
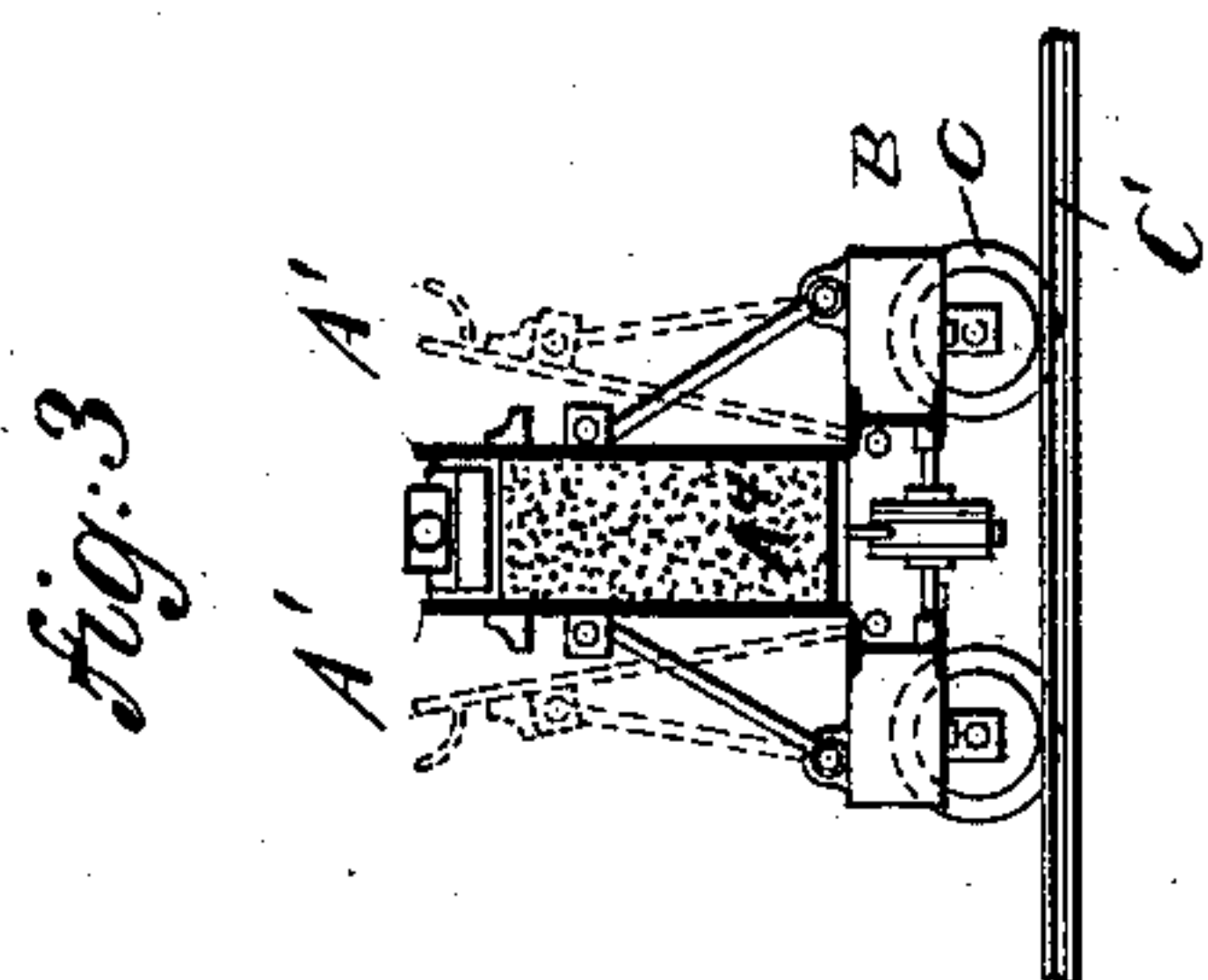
6 Sheets—Sheet 1.

J. QUAGLIO.

APPARATUS FOR COMPRESSING COAL AND INTRODUCING THE SAME INTO  
COKE OVENS.

No. 365,489.

Patented June 28, 1887.



WITNESSES:

A. Schehl.  
Sidney Warrner

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Gospek & Raegner  
ATTORNEYS

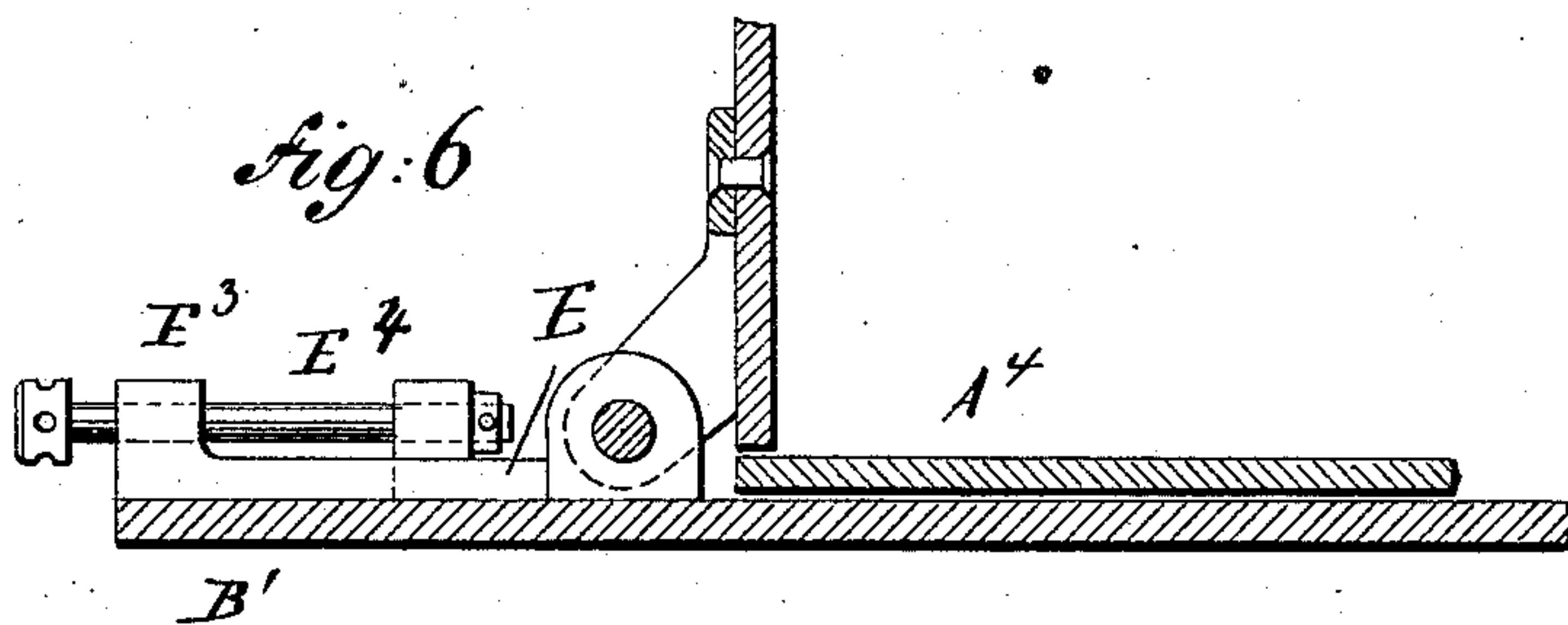
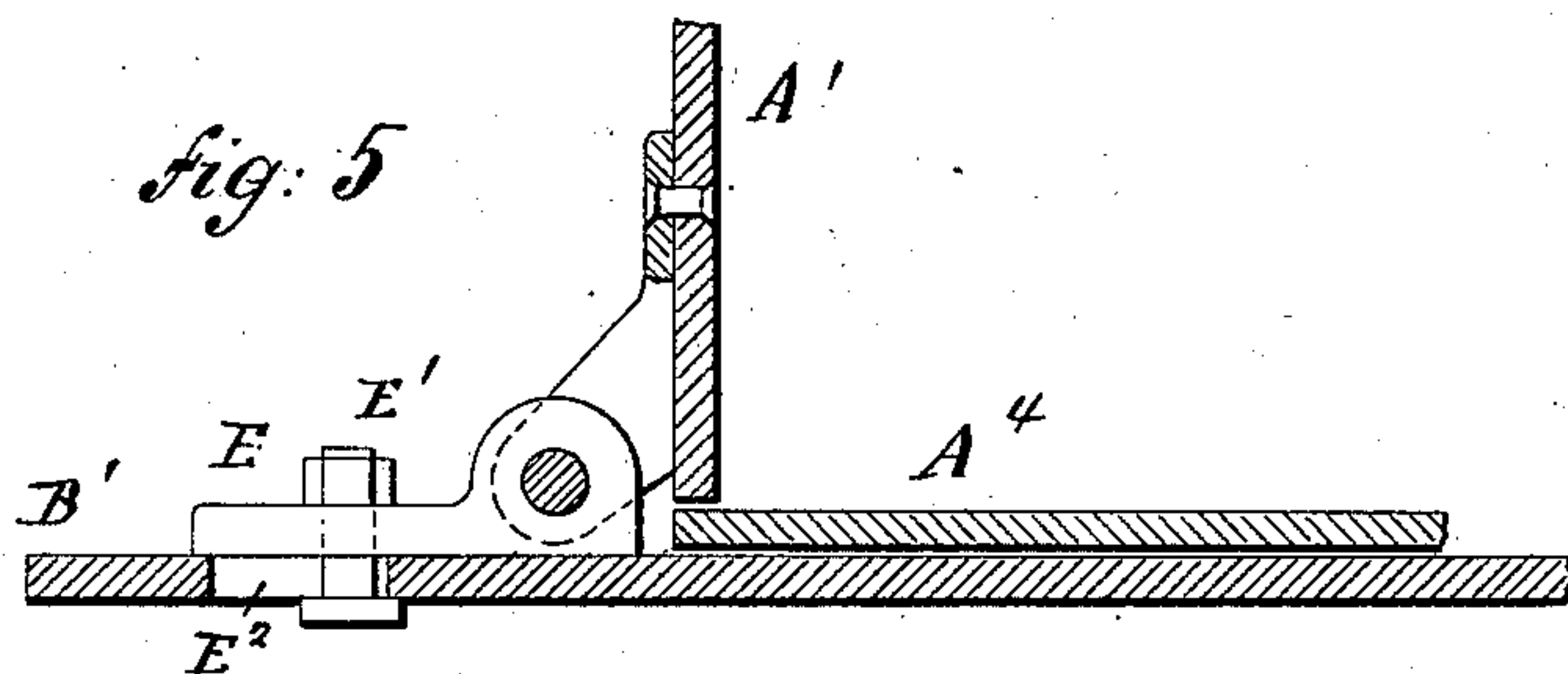
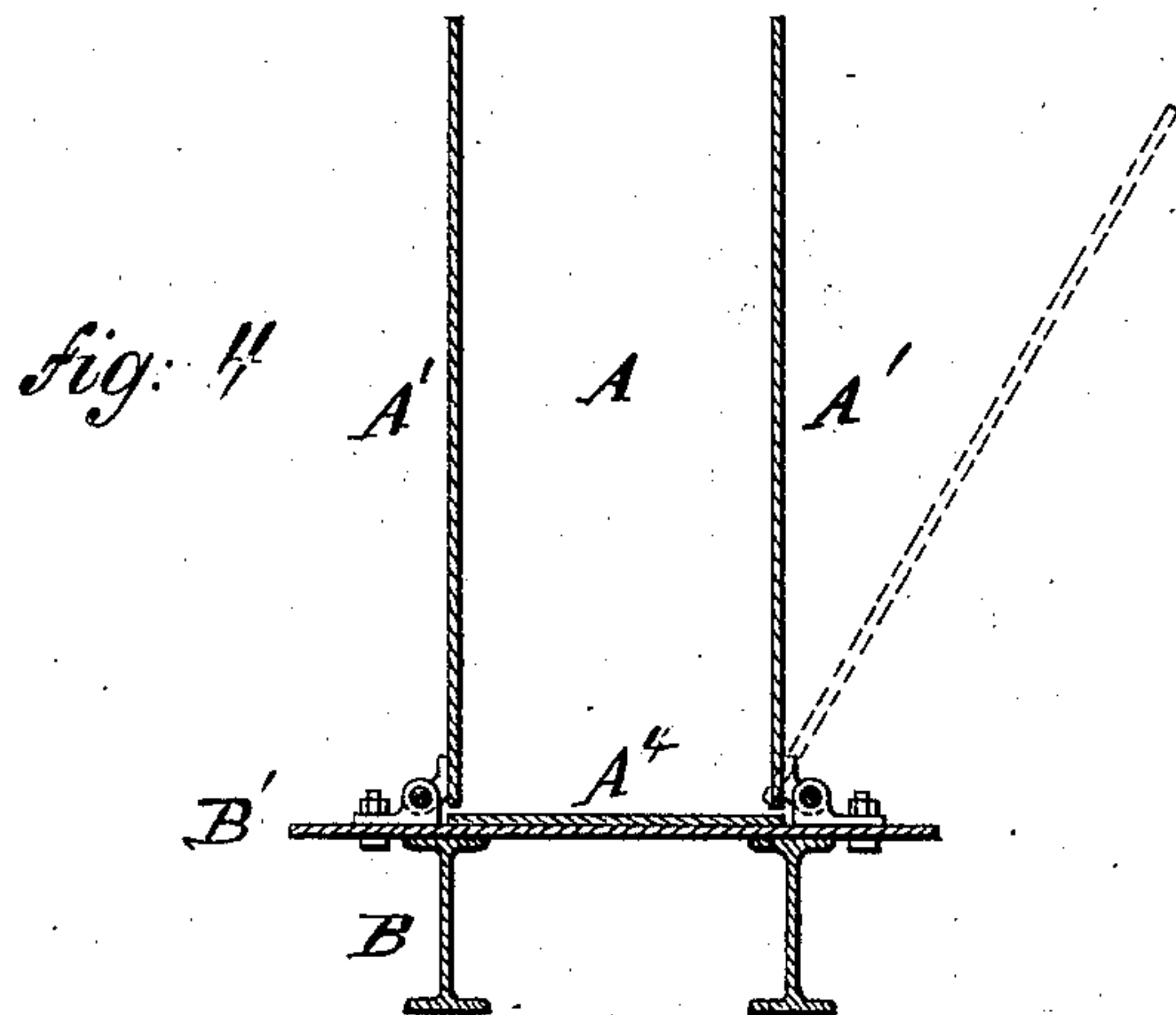
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No. 365,489.

Patented June 28, 1887.



WITNESSES:

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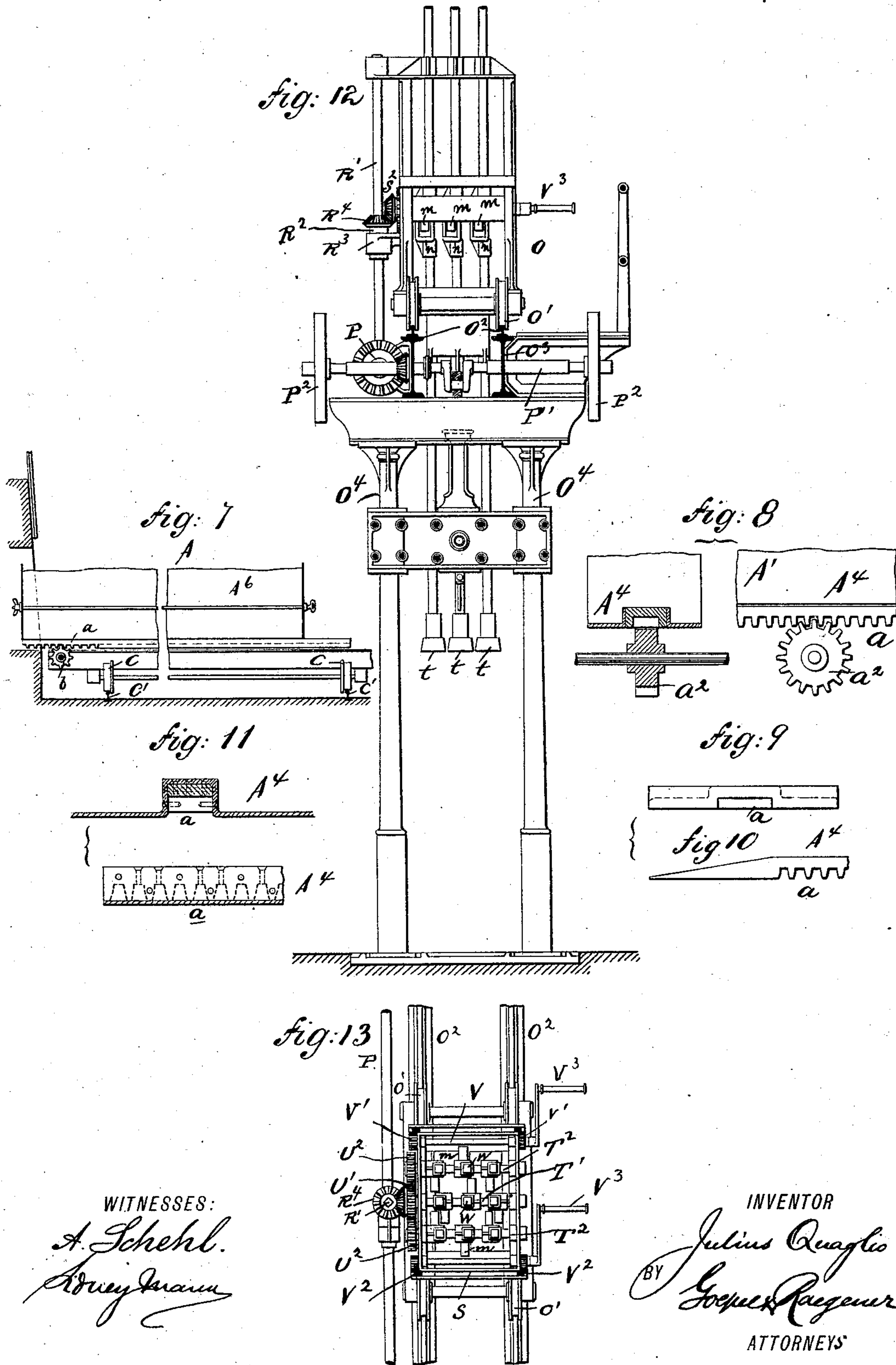
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No. 365,489.

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WITNESSES:

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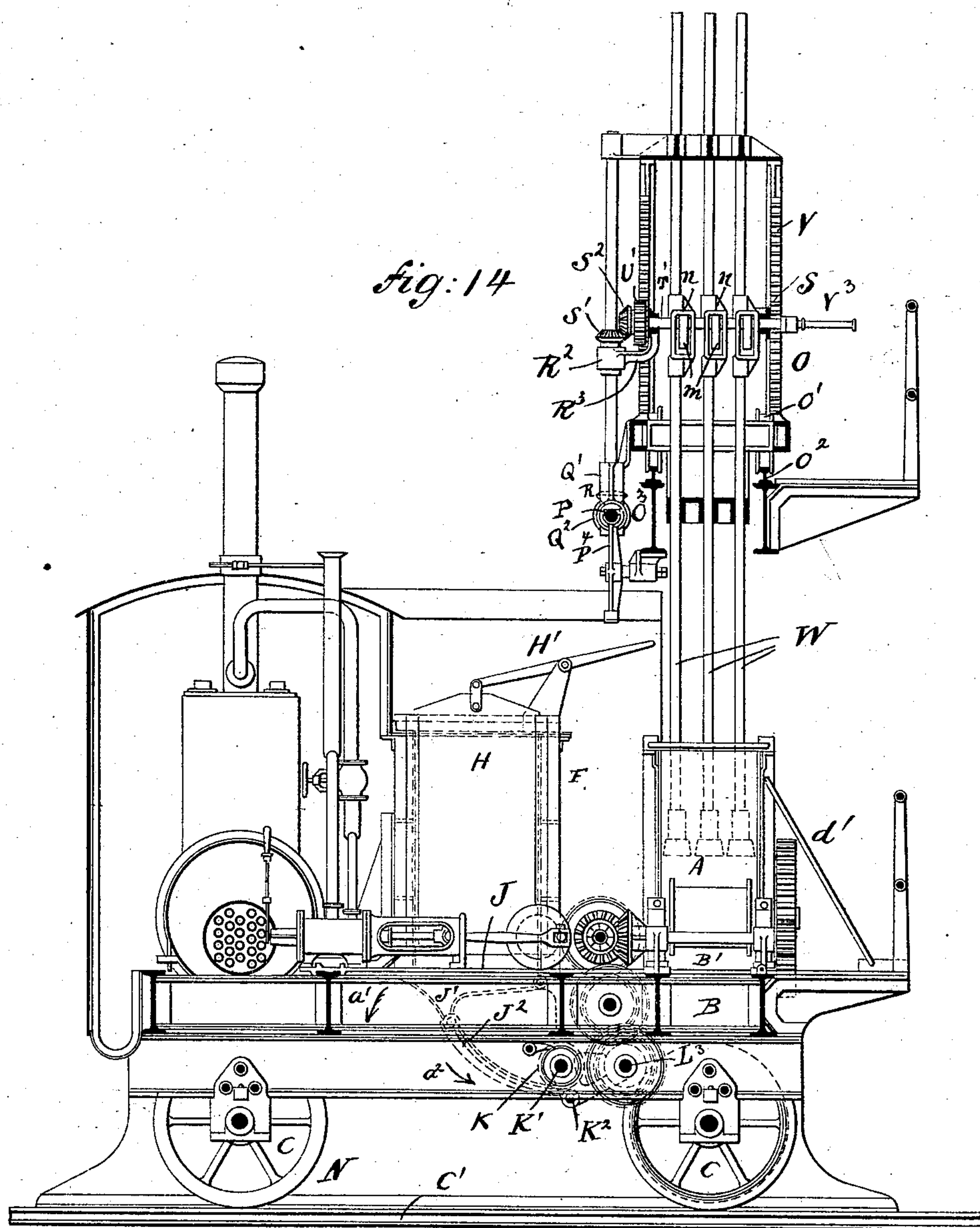
(No Model.)

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J. QUAGLIO.  
APPARATUS FOR COMPRESSING COAL AND INTRODUCING THE SAME INTO  
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No. 365,489.

Patented June 28, 1887.



WITNESSES:

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(No Model.)

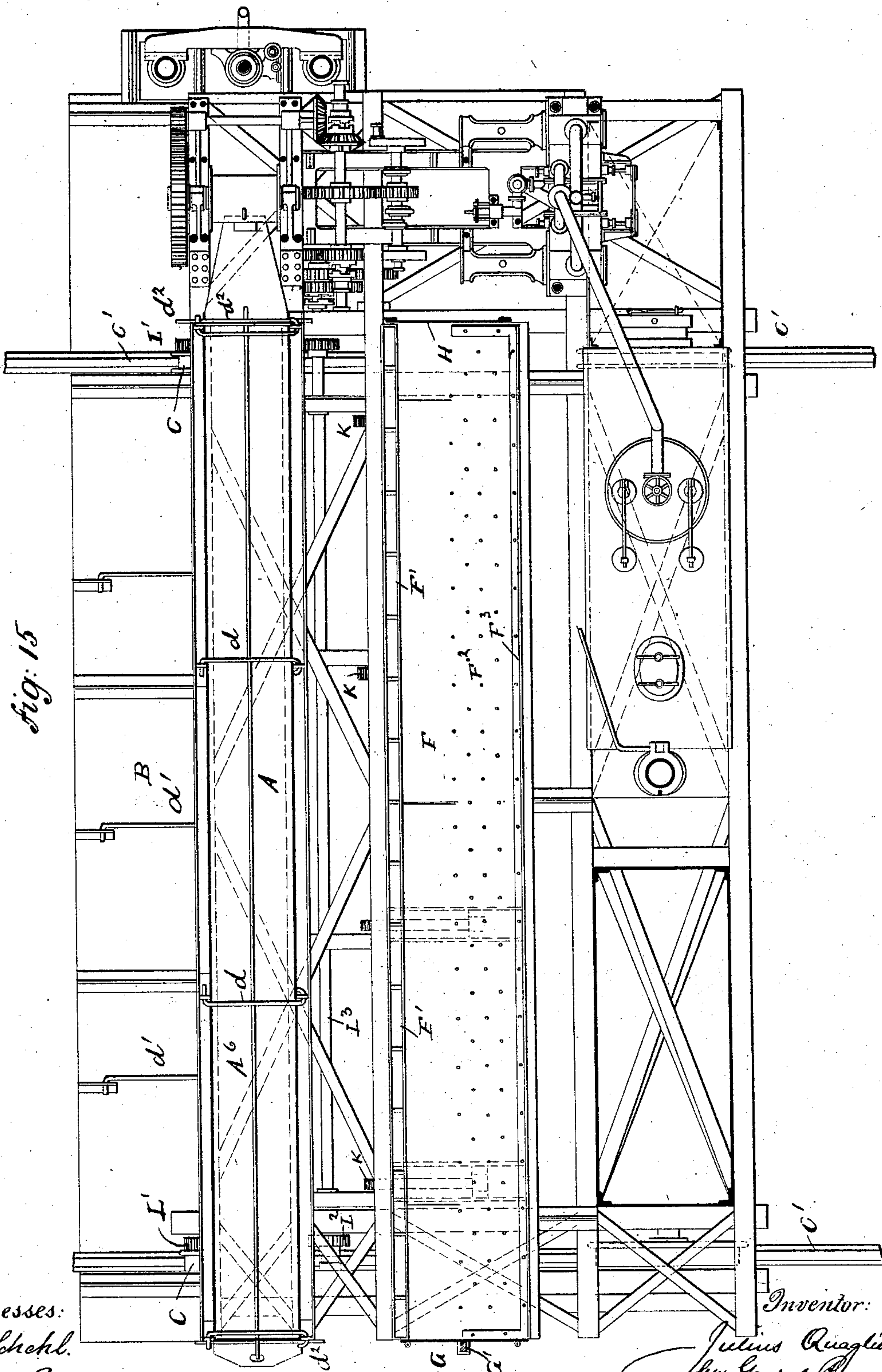
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COKE OVENS.

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Patented June 28, 1887.



Witnesses:

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(No Model.)

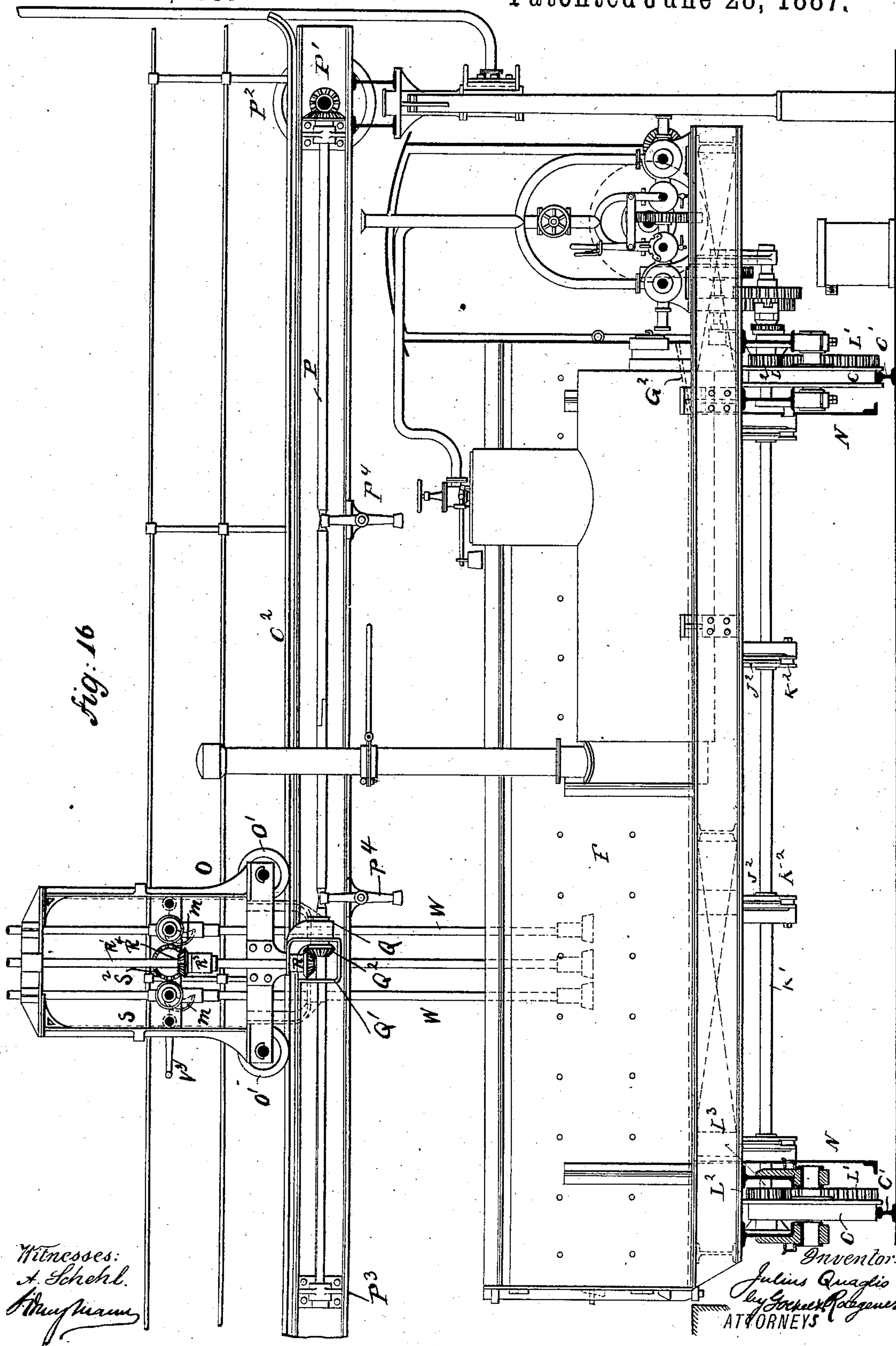
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J. QUAGLIO.

APPARATUS FOR COMPRESSING COAL AND INTRODUCING THE SAME INTO  
COKE OVENS.

No. 365,489.

Patented June 28, 1887.



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Inventor:  
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ATTORNEYS



# UNITED STATES PATENT OFFICE.

JULIUS QUAGLIO, OF BERLIN, GERMANY.

APPARATUS FOR COMPRESSING COAL AND INTRODUCING THE SAME INTO COKE-OVENS.

**SPECIFICATION** forming part of Letters Patent No. 365,489, dated June 28, 1887.

Application filed July 3, 1886. Serial No. 207,018. (No model.) Patented in Germany August 29, 1885, No. 36,097; in France September 1, 1885, No. 170,963; in Belgium September 1, 1885, No. 70,092, and October 19, 1885, No. 70,586; in England September 3, 1885, No. 10,432, and in Austria-Hungary January 25, 1886, No. 33,255 and No. 69,938.

*To all whom it may concern:*

Be it known that I, JULIUS QUAGLIO, a subject of the King of Bavaria, German Empire, residing at the city of Berlin, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Apparatus for Compressing Coal and Introducing the Same into Coke-Ovens, (for which Letters Patent have heretofore been granted to me in the following countries: Germany, No. 36,097, dated August 29, 1885; England No. 10,438, dated September 3, 1885; France, No. 170,963, dated September 1, 1885; Belgium, No. 70,092, dated September 1, 1885, and No. 70,586, dated October 19, 1885, and Austria-Hungary dated January 25, 1886, No. 33,255 and No. 69,938,) of which the following is a specification.

The object of my invention is to provide a new and improved apparatus for compressing broken or pulverized coal or culm into suitable blocks and introducing the same into an oven in which the said broken or pulverized coal or culm is converted into coke.

My invention consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of my improved apparatus for compressing coal and introducing the same into coke-ovens, the apparatus being shown in front of said coke-oven. Fig. 2 is a longitudinal sectional view showing a modification, the block or cake of compressed coal being introduced into the oven. Fig. 3 is a cross-sectional view on the line  $x x$ , Fig. 1. Fig. 4 is a cross-sectional view of the coal-receptacle or stamping-chest. Fig. 5 is a detail sectional view showing the hinge of one of the sides and a device for adjusting the sides a greater or less distance from each other. Fig. 6 is a cross-sectional view of a modified device for adjusting the hinged sides. Fig. 7 is a longitudinal sectional view of part of the apparatus and the coal-receptacle or stamping-chest, parts being broken out, and a modified construction of mechanism for pushing the stamping-chest into the oven being shown. Fig. 8 is a detail side view and

cross-section of the rack and pinion used in the construction shown in Fig. 7 for the purpose of moving the compressed coal into the oven. Fig. 9 is an end view of the bottom plate provided with a rack. Fig. 10 is a side view of one end of the rack. Fig. 11 is a cross-sectional view of a modified construction of the bottom plate and the rack. Fig. 13 is a plan view of the same. Fig. 14 is a cross-sectional view of the apparatus, the coking-chamber and the coal-receptacle or stamping-chest of the same, and of the stamping apparatus above the carriage. Fig. 15 is a plan view of the carriage and the machinery of the same. Fig. 16 is a side view of the car, the stamping apparatus, and the elevated frame on which the stamping apparatus moves, parts being broken out and others in section.

Similar letters of reference indicate corresponding parts.

The coal-receptacle or stamping chest A is formed of two side walls, A', hinged at the bottom edges to the floor A<sup>2</sup> of a carriage, B, having wheels for running on rails C', extending transversely to the longitudinal axes of a series of coke-ovens, D, in front of said oven, which are provided with the sliding doors D' and suitable mechanism for raising or lowering the said doors. The stamping-chest or coal-receptacle A is also provided with the two removable end walls, A<sup>2</sup> and A<sup>3</sup>, and a removable bottom plate, A<sup>4</sup>, resting on the floor B' of the carriage or car B. The bottom plate, A<sup>4</sup>, is provided at each end with a hook, A<sup>5</sup>. The end walls, A<sup>3</sup> and A<sup>2</sup>, of the stamping-chest are connected by a central longitudinal tie-rod, A<sup>6</sup>. The dimensions of the stamping-chest are slightly less than those of the oven D, into which it is to be forced. The pulverized or broken coal or culm is filled into the stamping-chest in layers and stamped down firmly, and when the receptacle is filled the carriage is brought to one of the coke-ovens, the door of which is open. The side walls, A', are swung down or removed, and that end of the bottom plate, A<sup>4</sup>, of the coke-chest nearest the door of the coke-oven is connected with an apparatus of any suitable kind working in the coke-oven and operated from the opposite end of the same, by means of which apparatus



the bottom plate of the stamping-chest is drawn into the coke-oven, the side walls,  $A'$ , remaining on the carriage-floor. Then the tie-rod  $A^6$  is disconnected, the end walls,  $A^2$   $A^3$ , are removed, the door of the coke-oven is lowered, and the outer end of the bottom plate,  $A^4$ , is connected with the chain  $A^7$ , which is connected with the drum of a steam-windlass or hand-winch,  $A^8$ , on the carriage  $B$ , by means of which the bottom plate,  $A^4$ , is withdrawn from the oven, so that only the cake of broken or pulverized coal or culm remains in the oven. The carriage returns to the filling-station, where the stamping-chest is again filled. After the coking has taken place, the coke is forced out by means of the same apparatus that was used for drawing the cake of coal into the oven and drops upon the coke ramp or chute  $B^3$ . (Shown in Fig. 2.) In case no coke ramp or chute is employed on which the glowing coke can be quickly slaked and removed, an iron coke case of the same size as the coke-chamber is placed on the carriage  $B$ , or on a separate carriage, and the whole coke cake is pushed into the said coke-case and slaked by means of water and steam. The coke may be pushed out of this case by the coke of the next chamber to be emptied, the coke cake entering the coke-case at one end and leaving it at the other, or, if desired, the coke case may be provided with a hinged bottom, as will be described hereinafter.

Where room is scarce, the emptying-machine may be united with the charging-machine, as shown in Fig. 1. In this case the end plates must be made stronger and must be connected at the top by a stay,  $B^4$ , Fig. 1.

Instead of drawing the cake or block of coal into the oven, it may be moved into the same by means of an endless chain, as shown in dotted lines at  $B^5$  in Fig. 1, which chain is operated from a suitable engine and is connected with the bottom plate, or the bottom plate may be moved by means of a rack and pinion, as shown in Figs. 8, 9, 10, and 11. The rack  $a$  is formed in the under surface of the bottom plate,  $A^4$ , as shown in Fig. 8, and the pinion  $a^2$  mounted on a shaft journaled in the carriage and operated by an engine or by hand. The entering end of the bottom plate,  $A^4$ , is preferably beveled, as shown in Fig. 10. As shown in Fig. 11, the bottom plate may be provided with a longitudinal inverted-U-shaped ridge, in which the teeth are fastened by rivets.

It may be necessary in some cases to adjust the sides  $A'$  of the coal-receptacle or stamping-chest according to the size of the coke-oven, and to permit of such adjustment the hinged block  $E$  of the hinges by which the side plates,  $A'$ , are held on the floor  $B'$  of the carriage are provided with locking-bolts  $E'$ , passed through transverse slots  $E^2$  in the floor of the carriage. The hinge-blocks  $E$  can be loosened, the side walls,  $A'$ , moved a sufficient distance from each other, and then said hinge-

blocks can be locked in place by drawing up the nuts on the bolts  $E'$ , or the sliding hinge-blocks may be connected to the screw  $E'$ , passed through a threaded aperture of the fixed lug  $E^3$  on the bottom plate,  $B'$ , so that by turning the screw in one direction or the other the hinge-blocks  $E$  and the side walls,  $A'$ , connected with the same, are moved a greater or less distance from each other.

I will now describe the construction of the carriage and the coking-chamber and stamping-chest on the same. The stamping-chest  $A$  and the coke-chamber  $F$  are located side by side and parallel on the carriage  $B$ , on which carriage are also placed a water-tank, a steam-boiler, and an engine and windlass. During the stamping process the side walls of the coke-chamber are held together by braces  $d$ , and one of the side walls is braced by rods  $d'$ . (Shown in Fig. 14.) While stamping, the end plates are held at the bottom by braces  $d^2$ . After stamping, and before the lump of stamped coal is discharged into the oven, all the tie-rods and braces are removed. The coke-case  $F$  has double side walls,  $F'$ , suitably braced, and a cover,  $F^2$ , provided with numerous apertures. The walls of the coke-case are made hollow, and preferably connected with each other and a water-tank, which contains cooling-water, water being also poured on the perforated cover  $F^2$ , said cover  $F^2$  having a rim,  $F^3$ , to prevent the water flowing off too rapidly. That end of the coke-case adjacent to the opening of the oven is closed by two laterally-swinging doors,  $G$ , which can be locked by a bolt,  $G'$ . The outer end is closed by a vertically-sliding door,  $H$ , operated by means of the lever  $H'$ , pivoted on the case and connected with said door. This door is mounted to slide, for the purpose of allowing the attendant to push down the pieces of coke lying on the inclined bottom piece,  $G^2$ , at the inner end of the coke-case.

The bottom of the coke-case is composed of trap-doors  $J$ , made of sheet-iron, and strengthened inside by cast-iron plates riveted on, and on the outside by angle-irons or any other suitable means. On each door hinge-pieces  $J'$  are fastened on the under side, to which hinge-pieces are pivoted the toothed sector-pieces  $J^2$ , engaging with cog-wheels  $K$ , mounted on the shaft  $K'$ , below which cog-wheels the rollers  $K^2$  are provided, on which the bottom smooth-curved edges of the sector-pieces run. The shaft  $K'$  is revolved by means of suitable intermediate gearing from the engine, and when said shaft is coupled to the engine and the cog-wheels  $K$  revolved the sector-pieces  $J^2$  are moved in the direction of the arrow  $a^2$  and run on rollers  $K^2$ , below the wheels  $K$ , as shown in Fig. 14, and the bottom gates of the coke-case swing down, as indicated by the arrow  $a'$ , Fig. 14. The wheels  $C$  of the carriage are connected with the cog-wheels  $L'$ , engaging the pinions  $L^2$  on the shaft  $L^3$ , which can also be coupled with the gearing driven by the en-



gine, whereby the carriage can be propelled on its rails C'.

For the purpose of protecting the wheels of the carriage from being injured by the coke dropping out of the coke-case, guard-plates N are secured on the bottom of the carriage at the sides of the wheels, as shown in Fig. 14.

I have shown different clutches and couplings for operating the different parts from the engine—that is, for revolving the windlass-drum by which the bottom plate of the stamping-chest is moved or drawn to the oven, or opening the trap doors in the bottom of the coke-case, or for driving the carriage.

The stamping mechanism consists of a carriage, O, having wheels O', running on tracks O<sup>2</sup>, supported on a platform or bridge, O<sup>3</sup>, on posts O<sup>4</sup>. A square shaft, P, is journaled on the bridge parallel with the same, and is driven by means of suitable gearing from the shaft P', having the fly-wheels P<sup>2</sup>. The shaft P has its ends journaled in fixed bearings P<sup>3</sup>, and between the ends in rocking bearings P<sup>4</sup>. A sleeve, Q, having a square aperture, is journaled in a downward extension or box, Q', of the carriage O, through which square aperture the shaft P is passed, and with said sleeve a beveled cog-wheel, Q<sup>2</sup>, is connected, also having a square aperture. The cog-wheel Q<sup>2</sup> engages with a cog-wheel, R, on the lower end of the vertical squared shaft R', journaled on the carriage O, which squared shaft passes through the sleeve R<sup>2</sup>, having a bevel cog-wheel, R<sup>4</sup>, provided with a square aperture and mounted on the end of the arm R<sup>3</sup> on the frame S, which can travel vertically in the frame of the carriage O. The bevel cog-wheel R<sup>3</sup> engages with the beveled cog-wheel S<sup>2</sup>, mounted on the central cam-shaft, T', which also carries the cog-wheel U', engaging with the cog-wheels U<sup>2</sup>, Fig. 13, on the other two cam-shafts T<sup>2</sup>.

The frame S, Fig. 14, in which the cam-shafts are journaled, is provided at the ends with the shafts V, Fig. 13, on which are mounted the pinions V', engaging with the vertical racks V<sup>2</sup>, Fig. 14, on the frame of the carriage O. The shafts V are provided at the ends with the crank-handles V<sup>3</sup>, Fig. 13, so that by turning the said crank-handles the pinions V' are revolved and the frame S of the carriage raised or lowered, as may be desired, the sleeve R<sup>2</sup>, Fig. 14, and cog-wheel R<sup>4</sup> ascending or descending with the frame S. The cams m, Fig. 13, which can act on the tappets n, Fig. 14, of the vertical rods w, Fig. 13, are guided by suitable openings in the top and bottom of the frame of the carriage, on the lower ends of which rods w the iron stamping-shoes t are secured.

The pulverized or broken coal or culm is spread in layers in the stamping-chest, and is stamped by means of the iron shoes, by which it receives many quickly-succeeding but not too strong blows. The stamping mechanism can easily be raised as the height of the quan-

tity of the coal in the chest increases. The pulverized or broken coal can be mixed with water and formed into bricks or large cakes, and the packing or pressing of the cakes or bricks be accomplished in the stamping-chest.

Experiments have shown that poor coal not otherwise adapted to be coked produces close and compact coke when made in the manner described.

I am aware that it is not new to coke pulverized or broken coal or culm by compressing the same and introducing the stamped coal or culm into a coke-oven; that a chest for pressing coal, consisting of a bottom plate and two hinged side plates, is not new; and I am also aware that it is not broadly new to arrange an engine, press, or stamping device for the purpose of stamping the pulverized coal in a chest.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A chest for pressing coal, consisting of a bottom plate to which two side plates are hinged and of an additional removable bottom plate resting loosely on the plate to which the sides are hinged, substantially as shown and described.

2. A chest for pressing coal, consisting of a bottom plate and two hinged side plates, the hinges of said plates being held adjustably on the bottom plate, substantially as shown and described.

3. The combination, with a carriage, of a chest on the same for receiving and pressing coal and a coke-receiving case on the said carriage, substantially as shown and described.

4. The combination, with a carriage, of a chest for receiving and pressing coal, a case for receiving the coke, and a hinged bottom on said coke-case, substantially as shown and described.

5. The combination, with a carriage, of a chest for receiving and pressing coal, a coke-case on said carriage, a hinged bottom on the coke-case, and gearing for swinging the hinged bottom, substantially as shown and described.

6. The combination, with a carriage, of a chest for receiving and pressing coal, a coke-case on the carriage, a hinged bottom on the coke-case, sector-shaped racks connected with the hinged bottom, cog-wheels engaging with the sector-racks, and an engine or gearing for operating said cog-wheels, substantially as shown and described.

7. The combination, with a carriage, of a chest for receiving and pressing coal, a coke-case, a hinged bottom on the same, sector-racks, an engine or gearing for operating said cog-wheel on the hinged bottom, cog-wheels engaging with said sector-racks, and rollers below and supporting said sector-racks, substantially as shown and described.

8. The combination, with a carriage, of a chest for receiving and pressing coal on the



carriage, a coke-case on the carriage, a hinged bottom on the coke-case, and an engine for propelling the carriage and operating the hinged bottom, substantially as shown and described.

9. The combination, with a carriage, of a chest for receiving and pressing coal, a sliding bottom plate in the chest, a coke-case on the carriage, a hinged bottom on the coke-case, an engine on the carriage, and a windlass opposite one end of the chest for receiving the coal, which windlass is operated from the engine, substantially as shown and described.

10. The combination, with the platform, of a carriage on the same, a vertically-adjustable frame in the carriage, cam-shafts in the vertically-adjustable frame, and stampers operated by the cam-shafts, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS QUAGLIO.

Witnesses:

A. MUHLE,

B. ROY.