

(No Model.)

3 Sheets—Sheet 1.

J. C. ANDERSON.

METHOD OF MANUFACTURING OR BURNING COKE.

No. 485,904.

Patented Nov. 8, 1892.

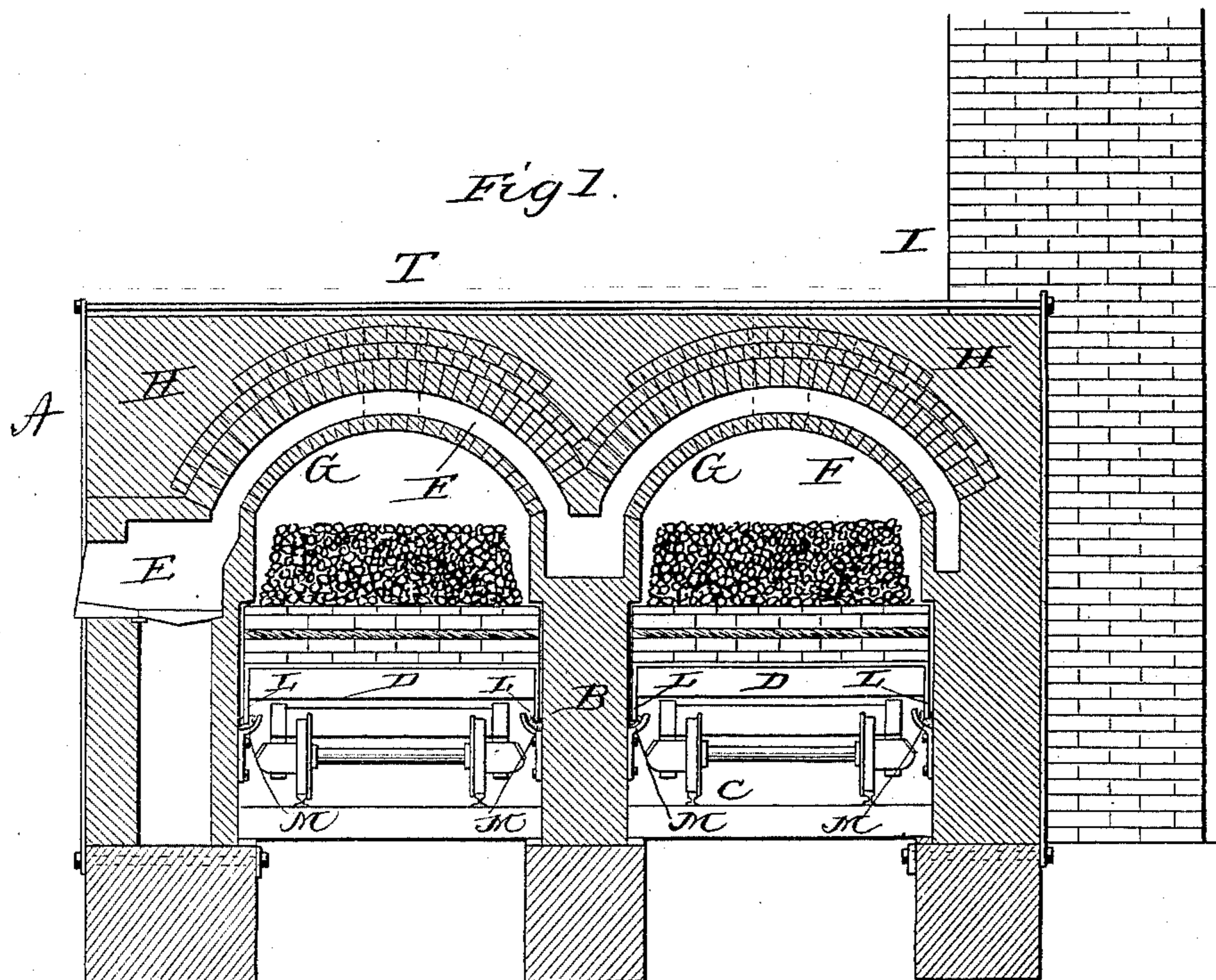
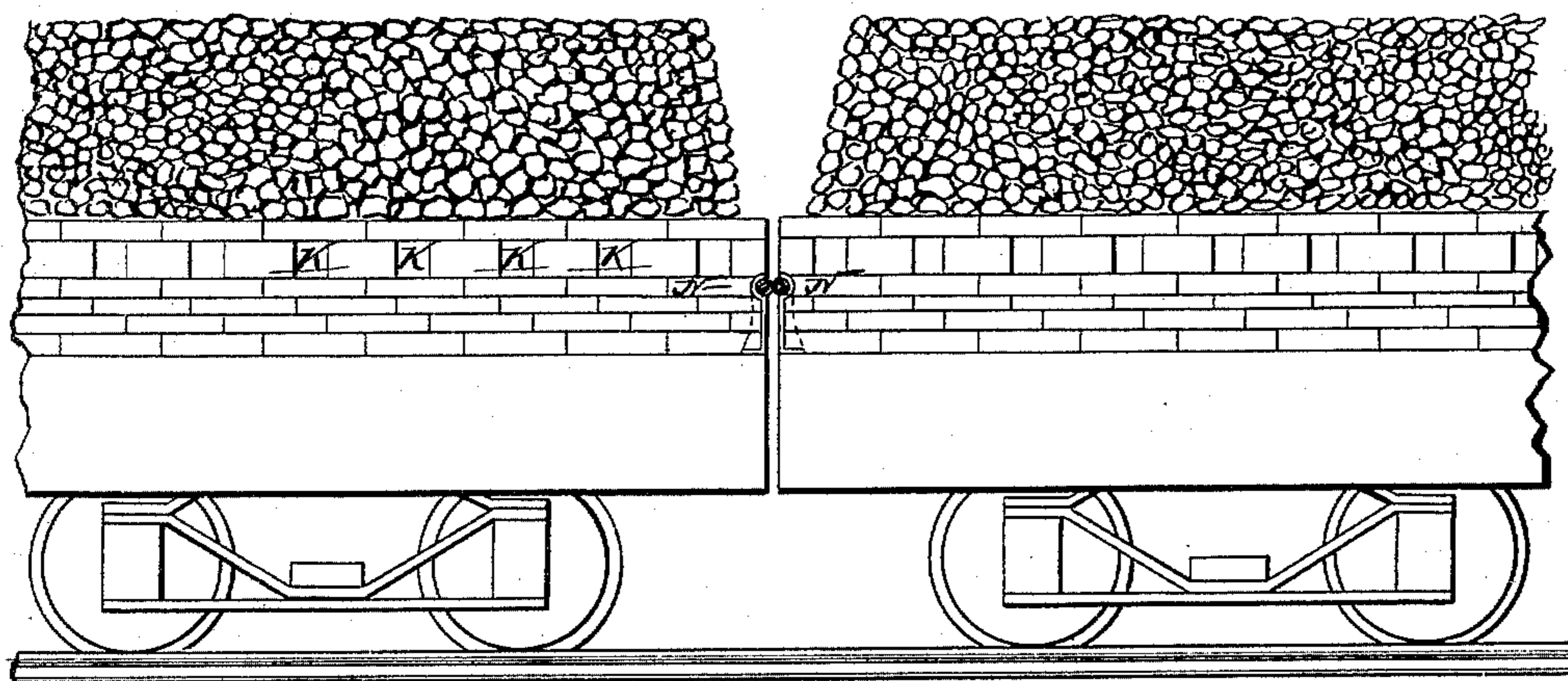


Fig. 2



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by *Edmund* Fursbaugh  
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(No Model.)

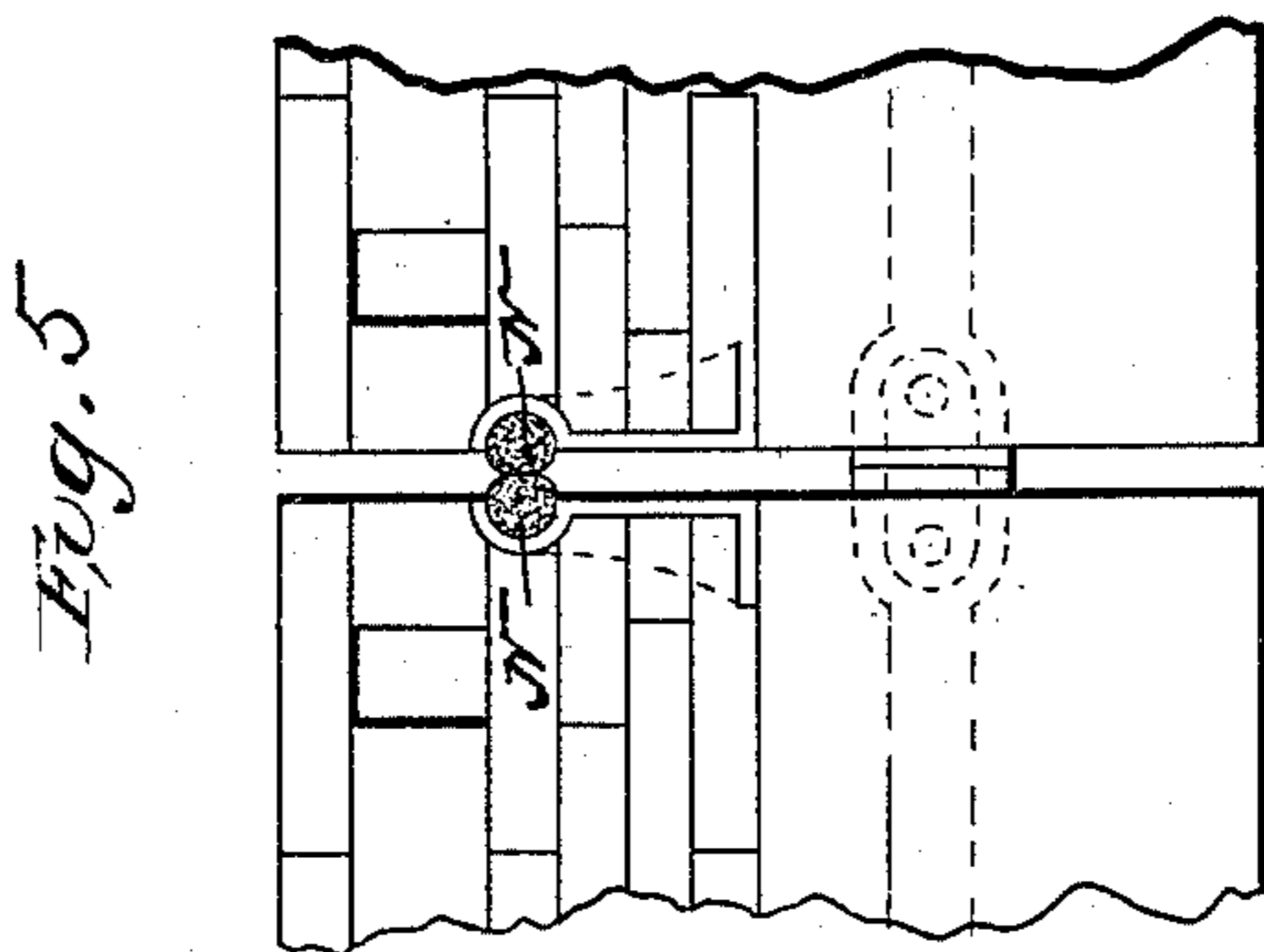
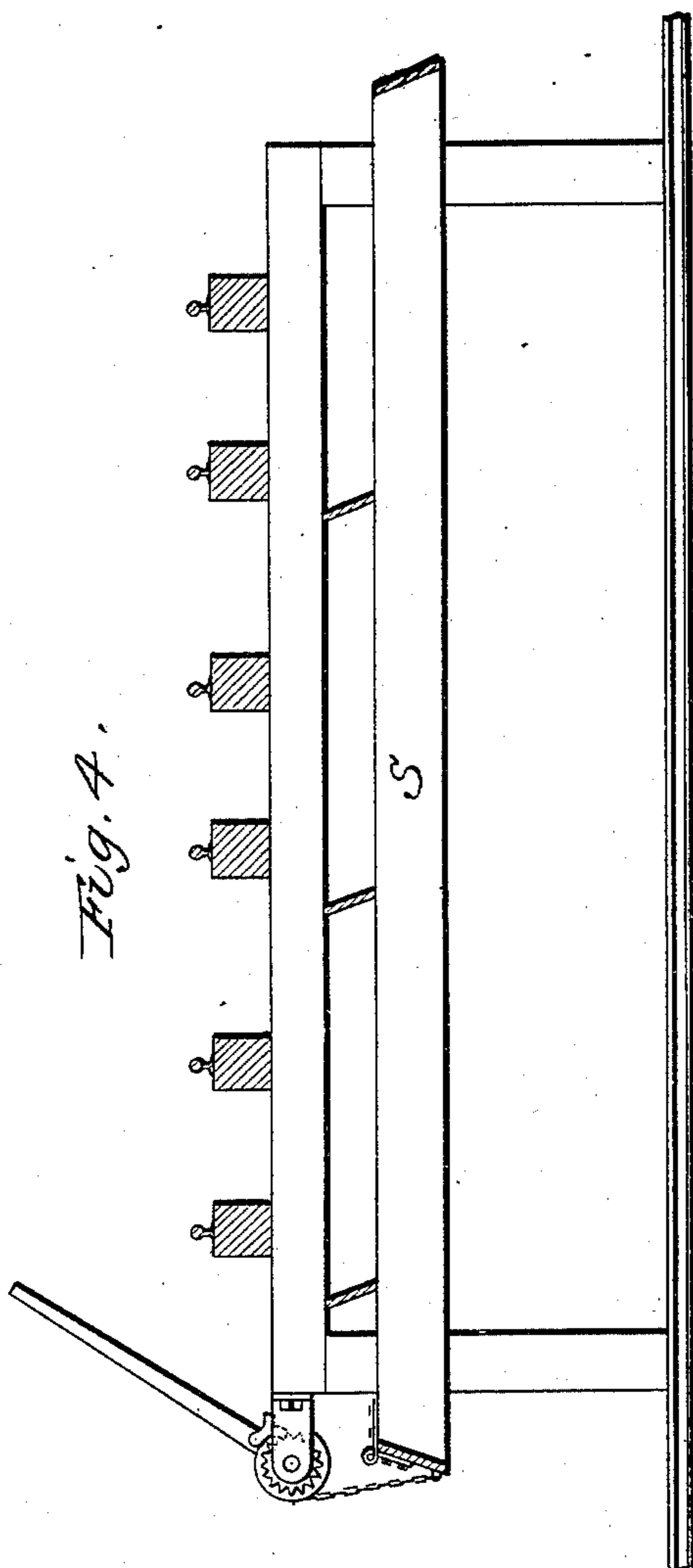
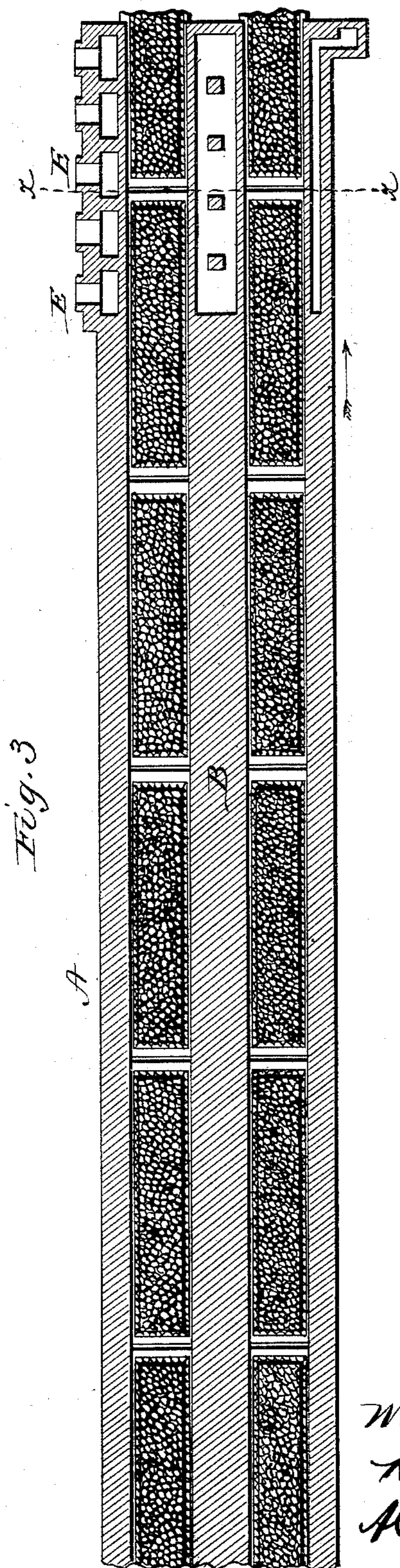
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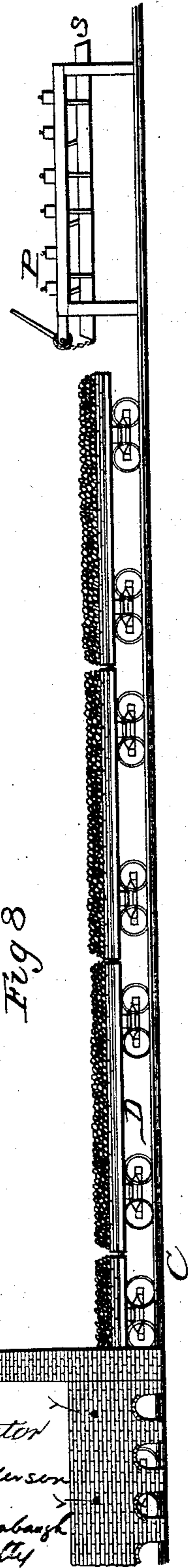
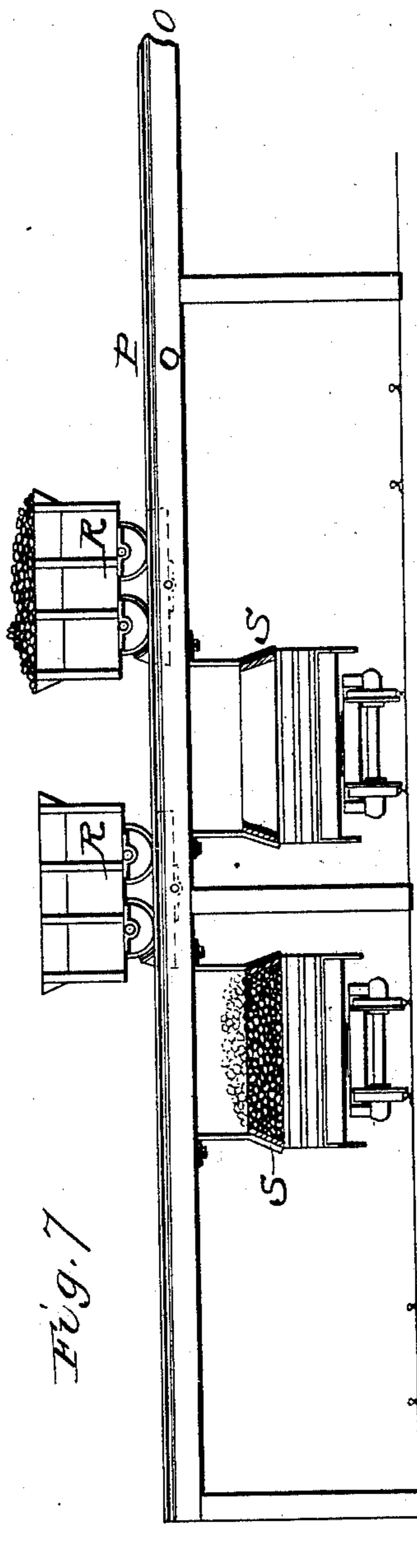
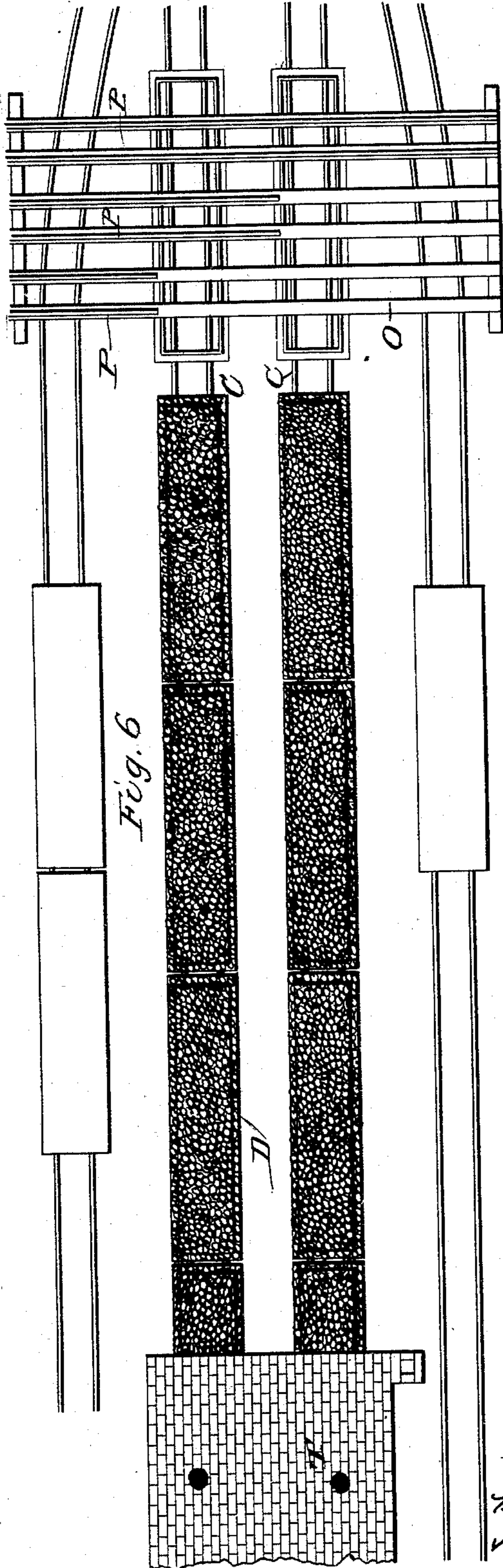
3 Sheets—Sheet 3.

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Patented Nov. 8, 1892.



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# UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF HIGHLAND PARK, ILLINOIS.

## METHOD OF MANUFACTURING OR BURNING COKE.

SPECIFICATION forming part of Letters Patent No. 485,904, dated November 8, 1892.

Application filed April 16, 1889. Serial No. 307,443. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES C. ANDERSON, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented new and useful Improvements in Methods of Manufacturing or Burning Coke; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to a new and useful method of manufacturing or burning coke.

The object of my invention is to burn coal into coke in a continuous manner and deliver the same to market without numerous handlings, as is required by the processes and apparatus now in use.

Referring to the state of the art to which this invention belongs, it will be understood that while there are many and various methods proposed and used for the volatilization of organic substances for the economical recovery of the gaseous products of such bodies which pertains in some degree to this art, yet the art of coking coal is a distinctive art, separate and apart therefrom, and practically consists of the one method, viz: a system of beehive ovens or a series of small ovens or separate compartments of conical or beehive form, which are arranged to be charged at the top at intervals and in a small way, the coal being transported thereto from a distance, a suitable time being allowed for the coking process to take place, after which the hot coke must be drawn or raked out piece by piece from each of the ovens, then quenched or cooled by water, then separate handlings and loading upon cars must take place for transportation.

By my method the coal is dumped in bulk directly out of the pit-cars from the tipples of the mine on the platforms of full-sized cars, such cars being provided with suitable fireproof floors and otherwise adapted for general railroad traffic. These cars with a full transportation-load thereon are sent into a tunnel or a system of tunnel-ways of a suitable length to coke on a large scale, and are advanced step by step through said tunnel or tunnels, emerging at the outgoing end with

the completed load of coke thereon, the transformation of the material from coal to coke having taken place automatically and without the handlings heretofore referred to, leaving the load free to be moved by rail to the point where it is to be used. My method consists, therefore, in piling the coal on cars, passing the same through a tunnel-way, the escaping gases from the coal being utilized to burn the coal into coke after the initial heating or firing has taken place.

In the drawings I have shown the devices by which I carry my process into effect, and in a separate application, filed of even date herewith, Serial No. 307,442, I have claimed these devices; but other devices may be used without departing from the spirit of my invention.

Figure 1 is a transverse vertical section of a double-tunneled kiln with loaded cars thereon, taken on the line  $xx$  of Fig. 3, looking in the direction of the arrow 1. Fig. 2 is a side view of the ends of two cars, showing the seal between the two. Fig. 3 is a longitudinal sectional view of the kiln with the loaded cars therein. Fig. 4 is a side view, partly in section, of the device used in loading the cars. Fig. 5 is a side view of the ends of two cars, showing the seal between the two on an enlarged scale. Fig. 6 is a top or plan view of the system of tracks on which the cars are loaded and run into the kiln for burning. Fig. 7 is a side view of the elevated way on which the cars from the mine are run and an end view of the tracks and cars which convey said cars into the kiln. Fig. 8 is a side view of the cars and devices for loading the same, and also a portion of the end of the kiln.

A indicates a double-tunneled kiln having a central longitudinal partition B, provided with tracks C, on which the cars D are run. One end of the kiln is provided with a series of furnaces E, having the usual grate-bars, doors, ash-pits, &c., said furnaces communicating with the flue or space F between the inner arch G and the outer arch H in both tunnels and then with the stack I, a space being left in the partition-wall for the passage therethrough of the products of combustion from the furnaces. The cars D are of the regular gondola type and are provided

with a flooring of fire-brick or other refractory material, spaces K being left underneath the upper layer of fireproof tiles, so as to allow the heat to pass through under the bottom of the pile of coal, and thus insure a thorough and uniform burning of the coal. The sides of the car are provided with depending metal strips L, which project down into troughs M, in which water is placed, so as to form a seal and prevent the heat from injuring the running-gear of the car, and also to prevent too great an influx of air to the kiln. The ends of the cars are provided with an asbestos rope N, which lies in grooves formed in the tiling of the floor, so that when the ends of the cars are brought together and firmly coupled the asbestos rope or packing will form a seal for the ends of the cars, thus preventing the heat from passing down and injuring the car-trucks.

O is an elevated way having a series of tracks P, which run at right angles to the tracks C, said elevated track being designed to receive the mine-cars R, and allow them to dump their loads on the cars D on the tracks C.

For the purpose of loading the cars so the coal will not fall therefrom I employ a frame S, which is suspended underneath the tracks P of the elevated way, one end of said frame being adapted to be raised and lowered by a windlass and chain or by any suitable means, the other end of said frame being always on the level with the top of the car.

The sides and ends of the frame S are made slanting from the bottom toward the top, and when it is desired to load one of the cars D it is run under the frame S and the front end of the frame lowered onto the bottom of the car. The coal is now dumped into the frame from the cars R and properly leveled with the top of the frame, after which the front end of the frame is raised and the car run from under it, thus leaving the coal on the car. As shown in the drawings, the coal on the cars will assume a pyramidal form, the sides and ends sloping from the bottom to the top of the pile, and in this way the coal is prevented from falling off during its passage through the kiln. The kilns are provided with openings T in the crowns of the arches for the escape of the excess of gases and with openings V in the sides thereof for admission of the requisite amount of air, both sets of openings being provided with doors or covers for closing the same when desired, and both ends of the kilns are provided with suitable doors. (Not shown.)

In the beginning of the process of burning two car-loads of coal are run into the tunnels and stopped opposite the furnaces G, the fires in the furnaces having been lighted and the inner arches of the tunnels having been raised to a red heat, which will ignite the coal on the cars and coke the same. These first cars which have been placed in the kiln having been fully heated or coked, the fires in the

furnaces are allowed to go out and the fire-holes are luted up, and afterward the process will be a continuous one, as the combustion of the volatile fumes or gases from the coal in the coking process will keep the inner surfaces of the arched walls over the cars at a continuous red heat from end to end of each of the tunnel-ways of the kiln, and the process will be perpetual, the cars with the green coal entering the kiln cold and emerging therefrom after the coking process is completed and when the coke is still at its full heat, allowing the cooling to take place in the open air, or water may be employed to cool the coke and quench the fire after the car has emerged from the kiln.

The lengths of the tunnels and the time the cars are passing therethrough are regulated to the requisite time of coking the coal.

After the cars emerge from the kiln and are cooled they are run side to side with the cars used for shipping the coke to distant markets and the coke transferred to said cars; or when the coke is to be used at not too great a distance from the kiln it is contemplated to deliver the cars directly to the place of using without further handlings of the coke; or the cars which are used in the tunnel upon which the coal was originally piled may be delivered to the distant market in the original cars directly to the place of using without further handling of the coke; or the cars which are used in the tunnels upon which the coal was originally piled may be delivered to the distant markets in the original package, thus avoiding the frequent handlings.

It is obvious that charcoal can be made by this process and with the devices herein shown and described, and such I consider within the spirit and intent of my invention. It is also obvious that the tunnel may be a single one and give practically the same results when applied to coking coal, or any number of tunnels may be used advantageously, placed side by side, the use of the multiple tunnel serving only to lessen the cost of construction as well as to utilize space and facilitate the process.

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

1. The process of coking coal, which consists in passing a train of cars loaded with coal to be coked into a tunnel-like furnace having means for heating such furnace, substantially as shown and described, subjecting the coal upon the front cars to the action of such heating until it becomes properly ignited, then cutting off or dispensing with such means of heating the furnace and firing the coal and employing and using the products of combustion furnished by the gases of the coal undergoing the process of coking, and in the meantime moving the train so loaded with coal forward through the furnace toward the point of combustion and passing

the cars out of the furnace at the end opposite that in which they entered as the coking is completed on each successively, thus constituting a continuous method of coking, substantially as set forth and described.

2. The method herein described of coking, which consists in loading the coal upon a series of cars, igniting the coal upon the initial end of the train in any well-known manner, then passing the loaded cars consecutively through a tunnel-way, utilizing the heat from the successively-burning loads to heat the

tunnel-way and ignite and coke the charges of coal on the succeeding cars, and finally passing the cars out of the tunnel-way at the opposite end to that in which they enter, thus constituting a continuous and progressive method and avoiding frequent handlings.

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

J. C. ANDERSON.

Witnesses:

C. F. MCGAHAN,

J. F. ANDERSON.