

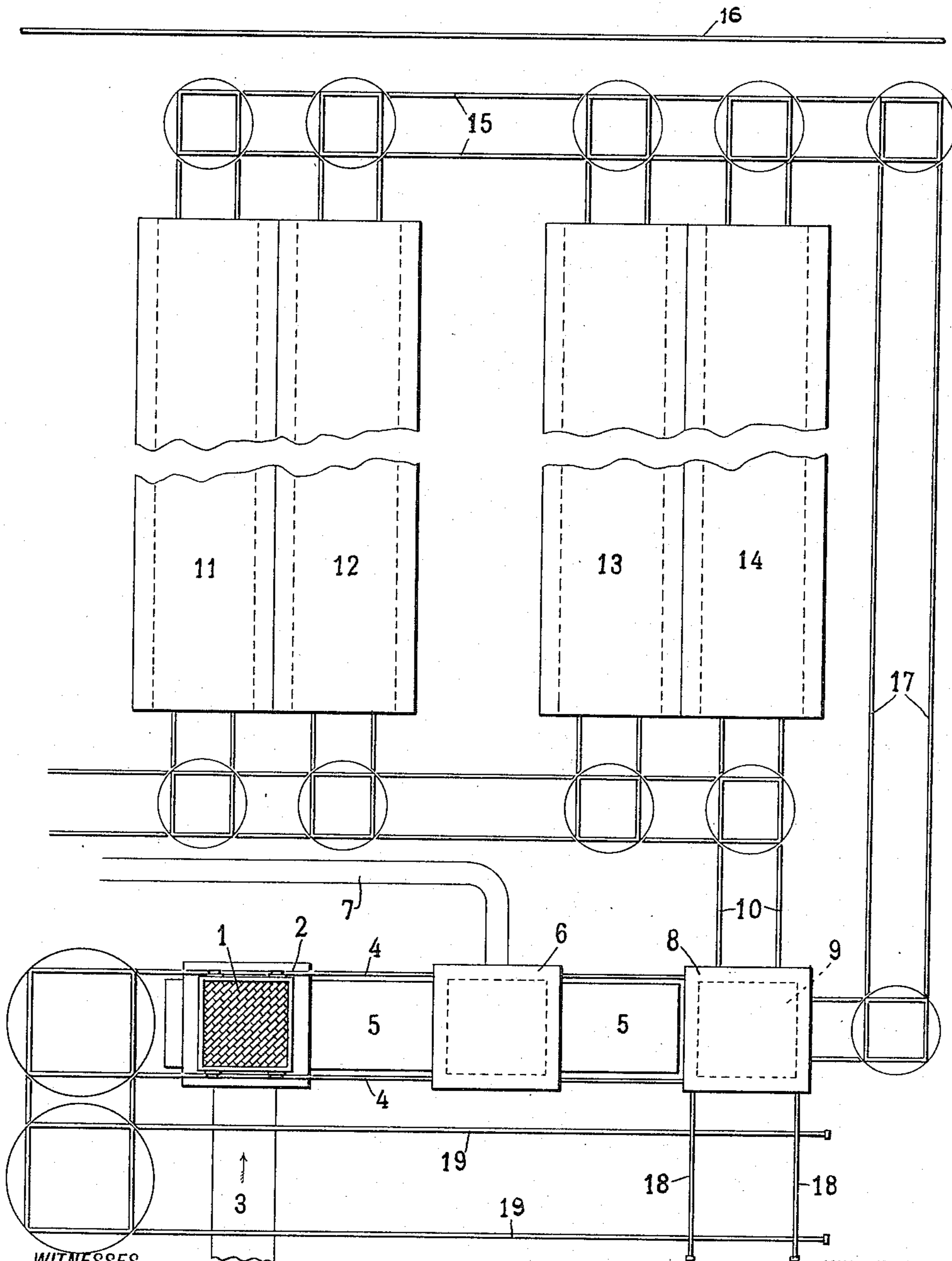
C. E. HERRMANN.
BRIQUETING ORE CONCENTRATES.
APPLICATION FILED APR. 22, 1911.

1,155,311.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

J. P. Schuyler
A. P. Goeller

INVENTOR

Charles E. Herrmann,

[Signature]
ATTORNEY

C. E. HERRMANN.
BRIQUETING ORE CONCENTRATES.
APPLICATION FILED APR. 22, 1911.

1,155,311.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 2.

Fig. 2.

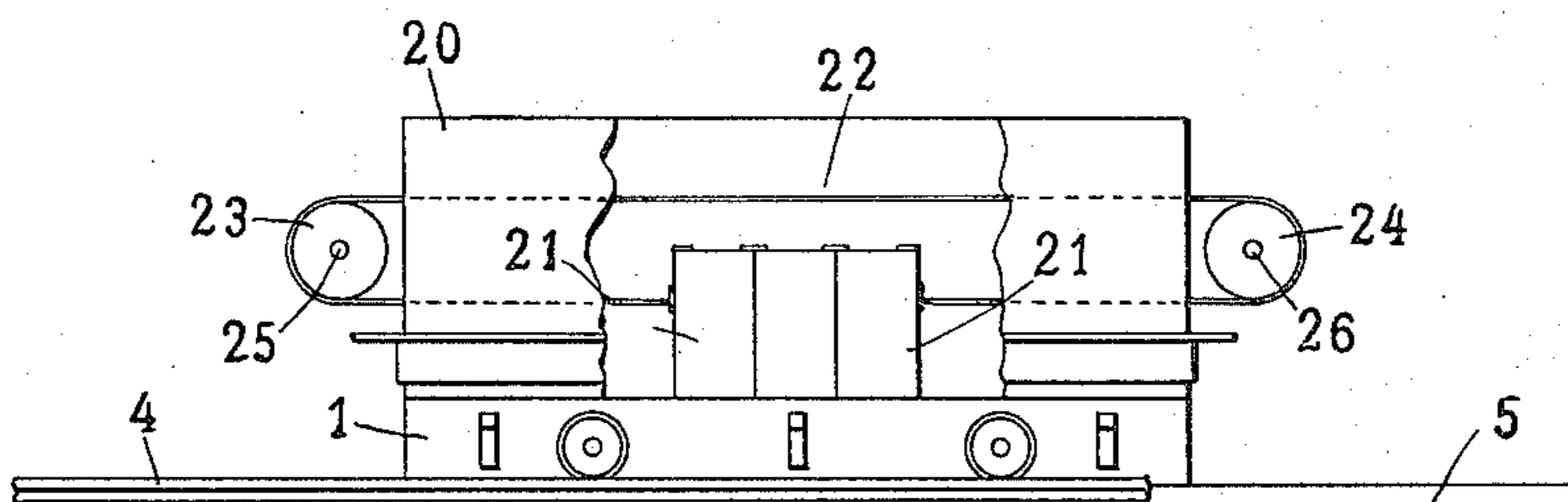
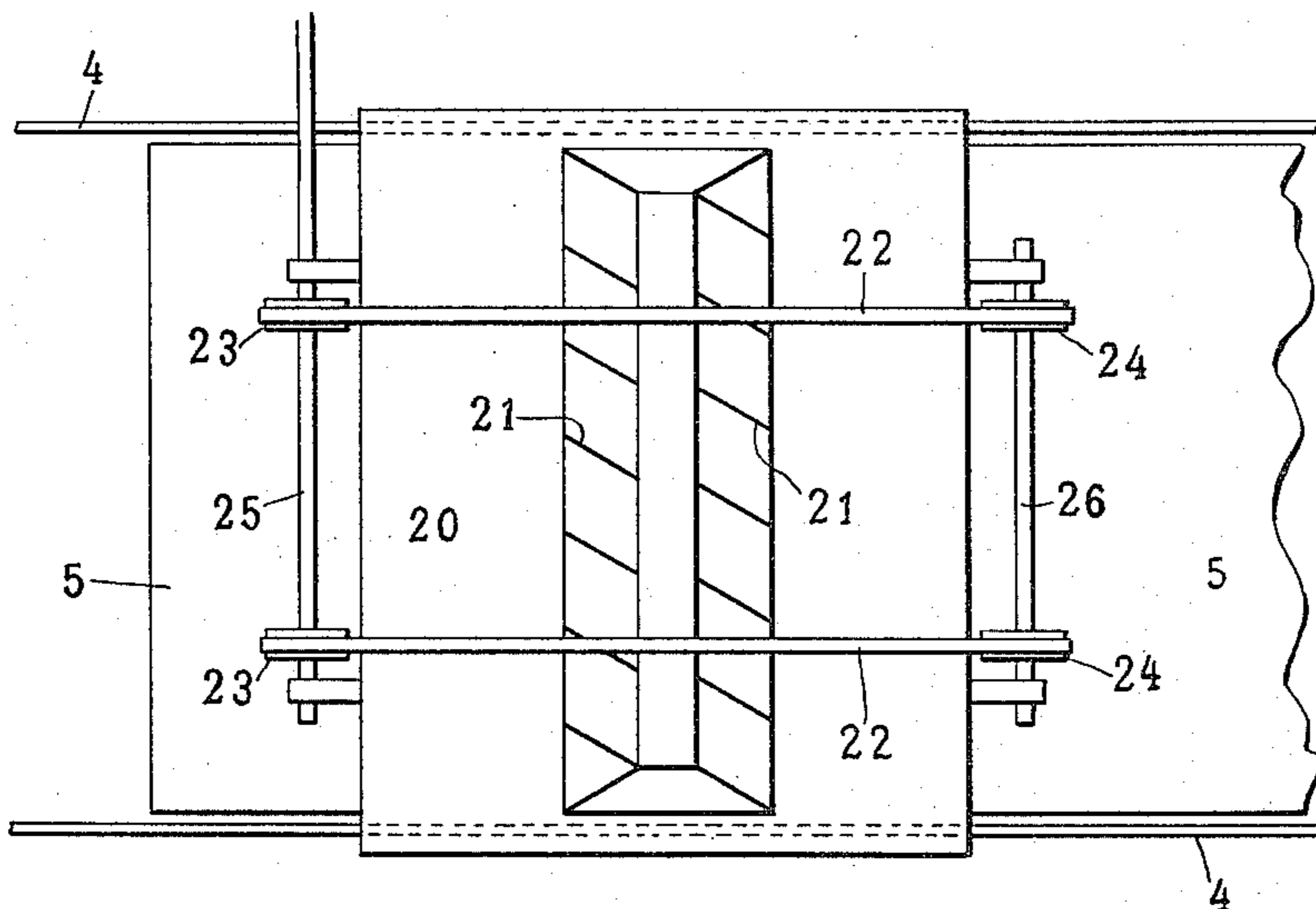


Fig. 3.



WITNESSES

J. C. Gentry
A. P. Goeller

INVENTOR

Charles E. Herrmann,

BY

R. H. Miller
ATTORNEY

C. E. HERRMANN.
BRIQUETING ORE CONCENTRATES.
APPLICATION FILED APR. 22, 1911.

1,155,311.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 3.

Fig. 4.

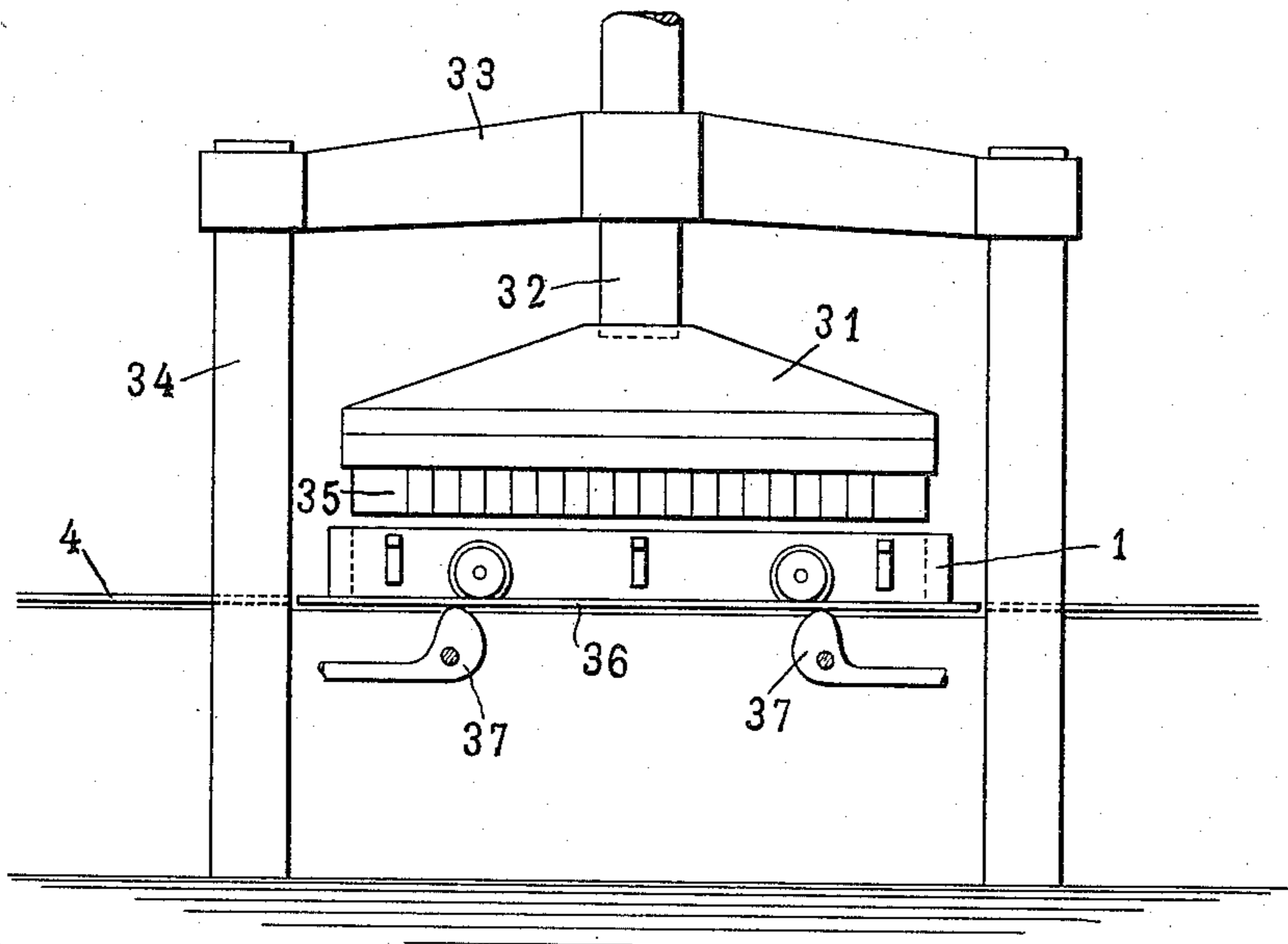
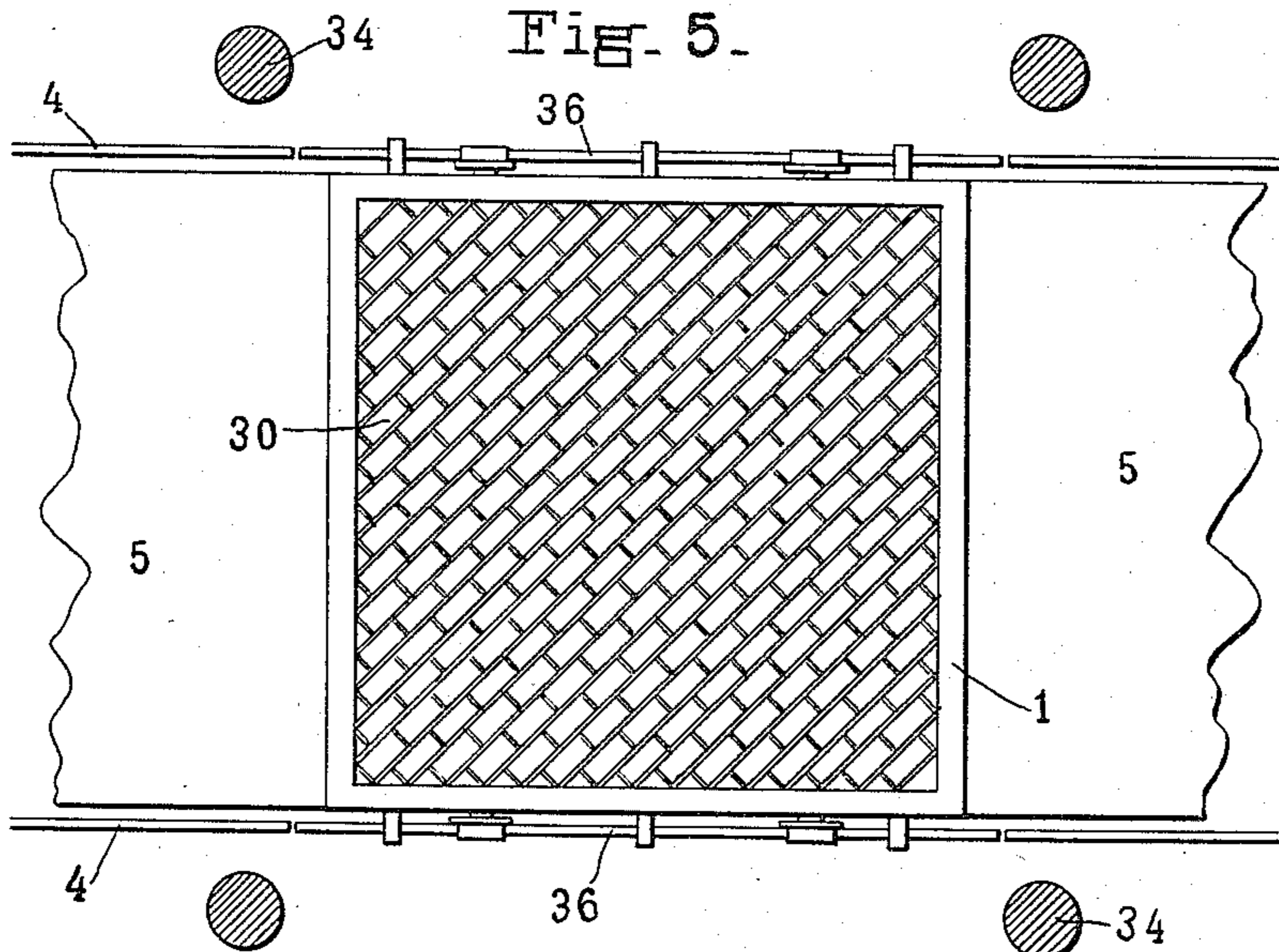


Fig. 5.



WITNESSES
J. C. K. K. K.
W. C. K. K.

INVENTOR
Charles E. Herrmann.
BY *J. C. K. K.*
ATTORNEY

C. E. HERRMANN.
BRIQUETING ORE CONCENTRATES.
APPLICATION FILED APR. 22, 1911.

1,155,311.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 4.

Fig. 6.

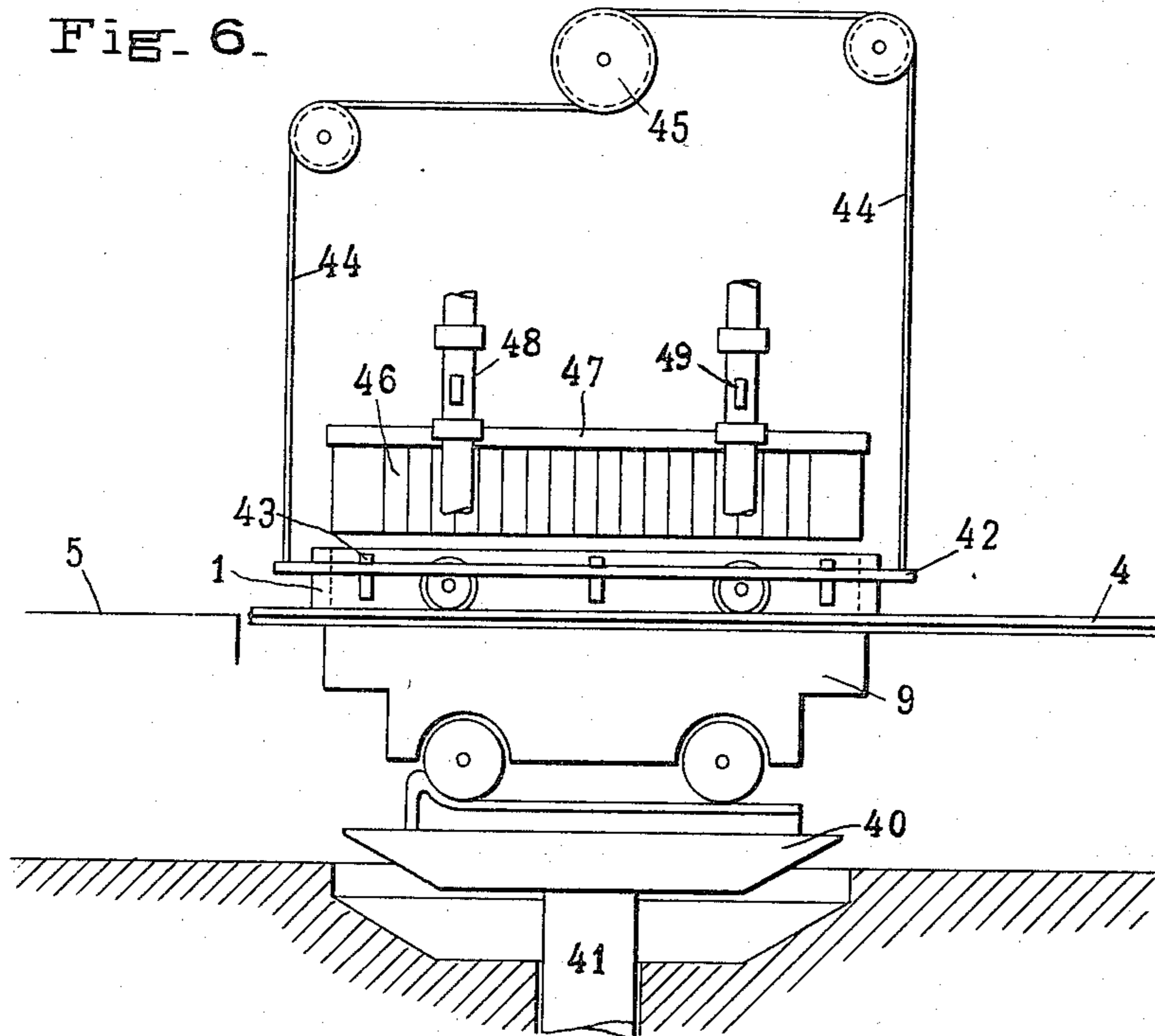
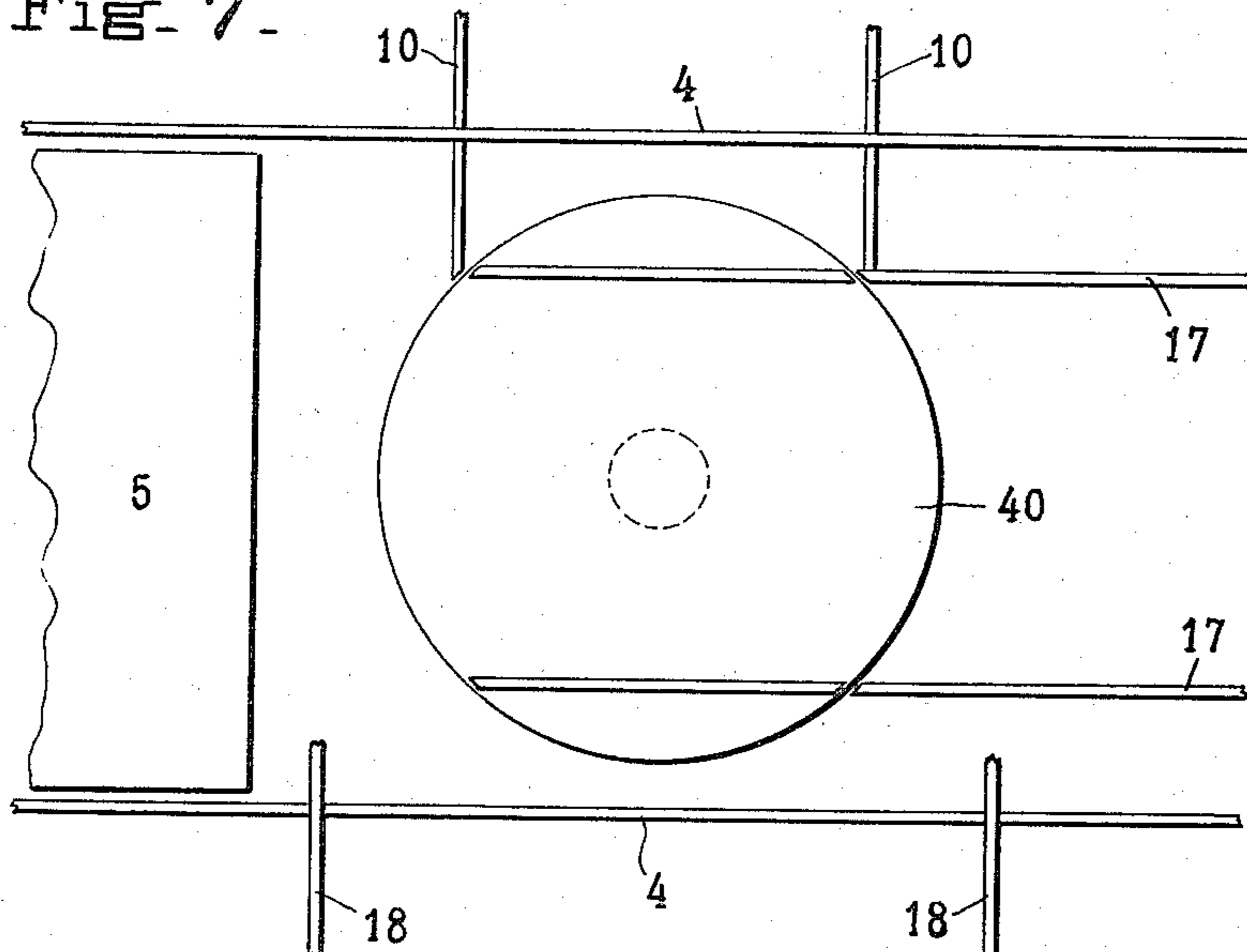


Fig. 7.



WITNESSES

J. A. Ripley
A. P. Goulet

INVENTOR

Charles E. Herrmann,

BY [Signature]
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES E. HERRMANN, OF SCARSDALE, NEW YORK, ASSIGNOR TO MOOSE MOUNTAIN, LIMITED, OF SELLWOOD, ONTARIO, CANADA, A CORPORATION OF ONTARIO.

BRIQUETING ORE CONCENTRATES.

1,155,311.

Specification of Letters Patent.

Patented Sept. 28, 1915.

Application filed April 22, 1911. Serial No. 622,708.

To all whom it may concern:

Be it known that I, CHARLES E. HERRMANN, a citizen of the United States, and resident of Scarsdale, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Briqueting Ore Concentrates, of which the following is a specification.

This invention relates particularly to the art, method or process of forming briquets from iron ore concentrates and the apparatus for carrying the process into effect in a commercial way.

The usual practice followed in briqueting wet iron ore concentrates without a binder has been first, to drain the material in large settling tanks to a state of comparative dryness or until all but about eight or ten percent. of the moisture has been removed. The material has then to be transported to the presses. The semi dry material has always proven difficult to convey because of its peculiar consistency. The presses used in forming the briquets have been capable of forming only one or two at a time and the briquets then have to be transferred by hand from the press platform to the kiln cars on which they are carried through the kiln where they are roasted. This transfer has to be made with great care lest the briquets fall to pieces as they are very unstable before burning when made from the comparatively dry material. The necessity of transferring by hand one briquet at a time has been a very unfavorable factor in the development of various processes for the utilization of low grade iron ores by briqueting.

The within described invention presents a method of forming a large number of briquets of wet iron ore concentrates simultaneously preparatory to passing the briquets so formed through kilns of the channel type. By this method material carrying a varying amount of moisture may be briqueted without being drained and dried in settling tanks to a state of comparative dryness. The apparatus includes a means for feeding the wet concentrates into molds or die boxes, means for pressing and dewaterizing the material so that it assumes a form and consistency proper for its further handling and means for stacking the briquets upon the kiln cars in position for being properly burned during the passage

of the cars through the kiln. The capacity of each kiln is increased by this method of briqueting as compared with former practice for two reasons. First by using material with the excess of water contained as it comes from the concentrating mill, say about twenty percent., a firmer and more stable brick is obtained. This makes it possible to pile the briquets three or four high on the kiln cars instead of being limited to two high as has been the case with briquets made of dry material because the latter would not bear the weight of more than one additional layer. Second, by mechanically placing the briquets on the car it is possible to obtain a closer and more regular placement than is possible when transferring them manually. This increases the number that may be placed on one car and hence adds to the capacity of the kiln.

Figure 1, is a diagrammatic view of a briqueting plant for carrying out my invention. This shows the feeding, pressing and loading apparatus in combination with numbers of kilns. Fig. 2, is a front view of the apparatus for filling a multiple mold box. Fig. 3, is a plan view of the same. Fig. 4, is a front view of the briquet forming press. Fig. 5, is a plan view showing a mold box. Fig. 6, is a front view of the briquet ejecting and loading apparatus. Fig. 7 is a plan view of parts of the same.

Fig. 1 is a diagrammatic view showing the general lay out of the plant for carrying out my invention, and showing some of the details for purposes of reference. A mold box 1 is shown in position for filling which position is indicated by the reference numeral 2. The wet concentrates are fed in by any suitable form of conveyer indicated diagrammatically by the chute 3. The mold box is preferably arranged on wheels to travel on the track 4. The platform 5 is provided which serves as a floor for the mold box and which extends under the press indicated by the reference numeral 6. The details of construction will be understood later. The excess of water forced out by the press is taken off by the drain 7. The reference numeral 8 indicates the station for ejecting the briquets from the mold and loading on the kiln car 9. The car is adapted to be moved on the track 10 and fed into any one of the kilns such as 11, 12, 13 or 14.

After passing through the kilns the cars are transferred along the track 15. The briquets may be unloaded from the kiln cars and transferred, for instance, to any line of transportation, as for instance, on the track 16. The empty kiln cars are brought back to position for reloading by passing around on the track 17. The empty molds are picked up by a suitable hoist and telpher system operating on the overhead tracks 18. The molds are deposited from the telpher on the tracks 19 and transferred around to the filling station #2. For the purpose of filling the mold boxes each box in turn is passed beneath the feed box 20. In Figs. 2 and 3 I have shown details of the mechanism for filling the mold box. The wet concentrates from the chute or conveyer 3 are deposited in the feed box 20. A series of scrapers such as 21, 21 arranged preferably at an angle as shown in Fig. 3 are carried by a chain or carrier 22. This carrier extends around the pulleys or drums 23 and 24 on the shafts 25 and 26 respectively. Any number of these chains or carriers may be provided and I have shown two in Fig. 3. The shaft 25 is rotated by any suitable means in one direction so as to move the scrapers 21, 21 to one end of the mold box. The shaft 25 is then reversed and the scrapers move to the opposite end of the mold box. This action is continued until the concentrates have been evenly distributed over the surface of the mold box. The mold box is then pushed out of the way by a following mold box so that the operation of filling can be continuous.

In Figs. 4 and 5 I have shown a press for compressing the wet concentrates in the mold box. The mold box has a large number of compartments such as 30 formed by suitable partitions. The size of these compartments is determined by the size of the briquets desired, the compartments being somewhat deeper than the desired briquet in order to hold enough material so that when the material is compressed the briquets will be of the desired size. The compartments are preferably laid out along diagonal lines as shown in Fig. 5. The head 31 of the press is carried by a suitable plunger 32 in a suitable guide frame 33 supported by suitable supports 34. The head 31 carries a number of plungers such as 35 to correspond in size and location with the compartments 30 in the mold box. In order to insure a tight joint between the mold box 1 and the floor 5 beneath the press, I preferably mount the sections of the track 36 which are inside the limits of the press so that they may be depressed as for instance, by the cams 37, 37. When the press is to be operated the cams are operated so as to depress the sections 36 of the track and permit the mold box to be supported wholly by

the floor 5. The head of the press being forced downward by hydraulic or other pressure, compresses the wet concentrates in the compartments 30 and drives out the excess of water. After the briquets have thus been compressed the cams 37, 37 are operated to lift the section 36 of the track back to the level of the main portion 4. The mold box is thereupon moved toward the right with its load of briquets and another mold box moves into position for the compression of the contents.

In Figs. 6 and 7 are shown details of the mechanism for removing the briquets from the mold box and placing them in layers on the kiln cars. The track 4 extends over the track 10 on which the kiln car 9 rests. The platform 5 terminates just to the left of the position of the kiln cars shown in Fig. 6. The briquets which have been formed by the action of the press adhere in the mold so that the mold box can be moved out over the top of the kiln car without the use of any floor or platform beneath the briquets. A part of the track 10 is mounted upon a movable platform 40 which is supported by the piston of plunger 41. The kiln car is then raised by the action of the plunger 41 until the top of the car touches the bottom of the mold box. Apparatus is then brought into play to remove the mold box and leave the briquets on the kiln car. A rod 42 is arranged on each side of a mold box 1 at the loading station. These rods are adapted to be placed beneath the hooks 43, 43 on the sides of the mold box. The rods are carried by a suitable form of hoist such as chains 44, 44 connected to drum 45. A series of plungers such as 46 similar to the plunger 35 in the press of Fig. 4 are carried by a head 47 and adapted to be let down into the top of the mold box until the plungers rest upon the top of the briquets. These plungers are then held in position while the hoist 45 is operated to lift the mold box and strip it from the briquets which then rest upon the top of the kiln car. The hoist is then moved along the track 18 shown in Fig. 1 to deposit the mold box on the track 19 and another mold box is brought over into position. While the new mold box is being brought into position, the platform 40 and the kiln car 9 are depressed and partially rotated so as to bring the top of the layer of deposited briquets into position beneath the new mold when it is brought into place above the kiln car. The briquets in this new kiln car are then ejected in the same manner as before upon the bottom layer of the briquets on the kiln car. This may be loaded with two or more layers. When the kiln car is loaded it is transferred to one or another of the kilns for roasting in the usual manner.

The head 47 may be held in alinement by guides such as 48 and catches such as 49 may

be employed to hold the head elevated. The details of construction have not been fully illustrated herein and the right to claim the apparatus is reserved for other applications.

5 The particular advantages of the invention are that the process enables me to handle concentrates having a high percentage of water, the installation for a plant of given capacity is relatively inexpensive compared to the old methods, the plant is more compact and requires less ground area, the cost of operation is less and the output of the kilns is increased, and the quality of the product improved.

15 What I claim is:—

1. The process of forming briquets from wet ore concentrates which comprises charging the ore concentrates into a bottomless mold box having a plurality of compartments while said mold box is over a support forming a temporary bottom to the mold, transferring the charged bottomless mold to a discharging station, positioning a kiln car beneath the mold box at the discharging station to form a bottom to the mold, ejecting the briquets from the mold compartments directly onto the kiln car and moving said kiln car without disturbing the briquets deposited thereon into a kiln for firing the briquets.

2. The improvement in the art of forming briquets from wet ore concentrates which comprises charging the wet concentrates having at least 20% of water into a multiple compartment mold, removing the excess water from the concentrates so as to form individual briquets in the mold, separating the mold from the briquets and leaving the briquets in spaced apart relation, then transporting and heating the briquets while in said spaced apart relation.

3. The improvement in the art of forming briquets from wet ore concentrates, which comprise filling the wet ore concentrates into a bottomless mold having a large number of compartments while said mold is over a stationary floor which temporarily forms a bottom to the mold, compressing the concentrates in the compartments of the mold while the mold is over a stationary floor forming a temporary bottom to the mold to remove surplus liquid and compact the concentrates into briquets, bringing the mold with its contents over a kiln car and so relating the mold and the car that the car will constitute a bottom to the mold, discharging the briquets from the mold directly onto the kiln car and moving the kiln car without disturbing the briquets deposited thereon into a kiln for firing the briquets.

4. Apparatus for forming briquets comprising a mold box having a plurality of compartments and arranged for travel from a filling station to a press, means for filling the mold box, a multiple headed press, strip-

ping plungers, a kiln car adapted for placement beneath the stripping plungers, means forming a bottom to the mold box in its passage from the filling means to the press and up to the point of entry beneath the stripping plungers whereby displacement of the contents of the mold box will be prevented up to the time the mold box passes beneath the stripping plungers and means operating the stripping plungers to strip the unsupported briquets in the mold compartments onto the kiln car.

5. Apparatus for forming briquets from wet ore concentrates comprising the combination of a feed box, a press having a multiple headed press member, an ejecting member having corresponding plungers, a kiln car and track beneath said ejecting member, a multiple compartment mold box, a platform running beneath the feed box and the press member and forming a floor for the mold box, a track for the mold box running beneath the ejecting member and a hoist for lifting the mold box from the briquets.

6. Apparatus for forming briquets comprising a mold box having a plurality of compartments, a stationary floor, means for filling the mold box, a track for the mold box, a multiple headed press, said floor and track leading from the filling means to and beyond said press, a kiln car and a track therefor intersecting the line of said mold box track at a point beyond the press and stripping plungers and lifting mechanism for the mold box located at said point of intersection.

7. The improvement in the art of forming briquets from wet ore concentrates, which comprises depositing the wet ore concentrates at a loading station in a mold box having a plurality of compartments, compressing the concentrates in the compartments of the mold box to thereby remove surplus liquid and form the concentrates into briquets, ejecting all of the briquets simultaneously from the mold box onto the kiln car, and returning the stripped mold box back to the loading station.

8. Apparatus for forming briquets, comprising in combination, a bottomless mold box having a plurality of compartments, means for filling the mold box, means for ejecting the briquets from the mold compartments, a platform extending from the mold filling means to the ejecting means, forming a floor for the mold box in its passage from the filling means to the ejecting means, a trackway extending beneath the ejecting means and a kiln car traveling on said trackway and arranged to receive the briquets ejected from the compartments of the bottomless mold.

9. The improvement in the art of forming briquets from wet ore concentrates which comprises charging the wet concentrates into

a multiple compartment mold, removing the excess water from the concentrates to thereby form individual briquets in the mold, moving the mold and briquet to a new position, separating the mold from the briquets while supporting the briquets on a kiln car, then transporting the briquets in their position as originally deposited on said kiln car into a kiln and heating the briquets while in the position as originally deposited on the kiln car.

10. Apparatus for forming briquets comprising a multiple compartment mold, means

for filling said mold, means for removing excess water from the material in the mold, means for separating the mold from the briquets, a kiln, a trackway extending from beneath said mold separating means into said kiln and a kiln car on said trackway traveling from the point beneath the mold separating means into the kiln. 15 20

CHARLES E. HERRMANN.

Witnesses:

W. H. ALLYN,
E. BRADFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."