No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 1.

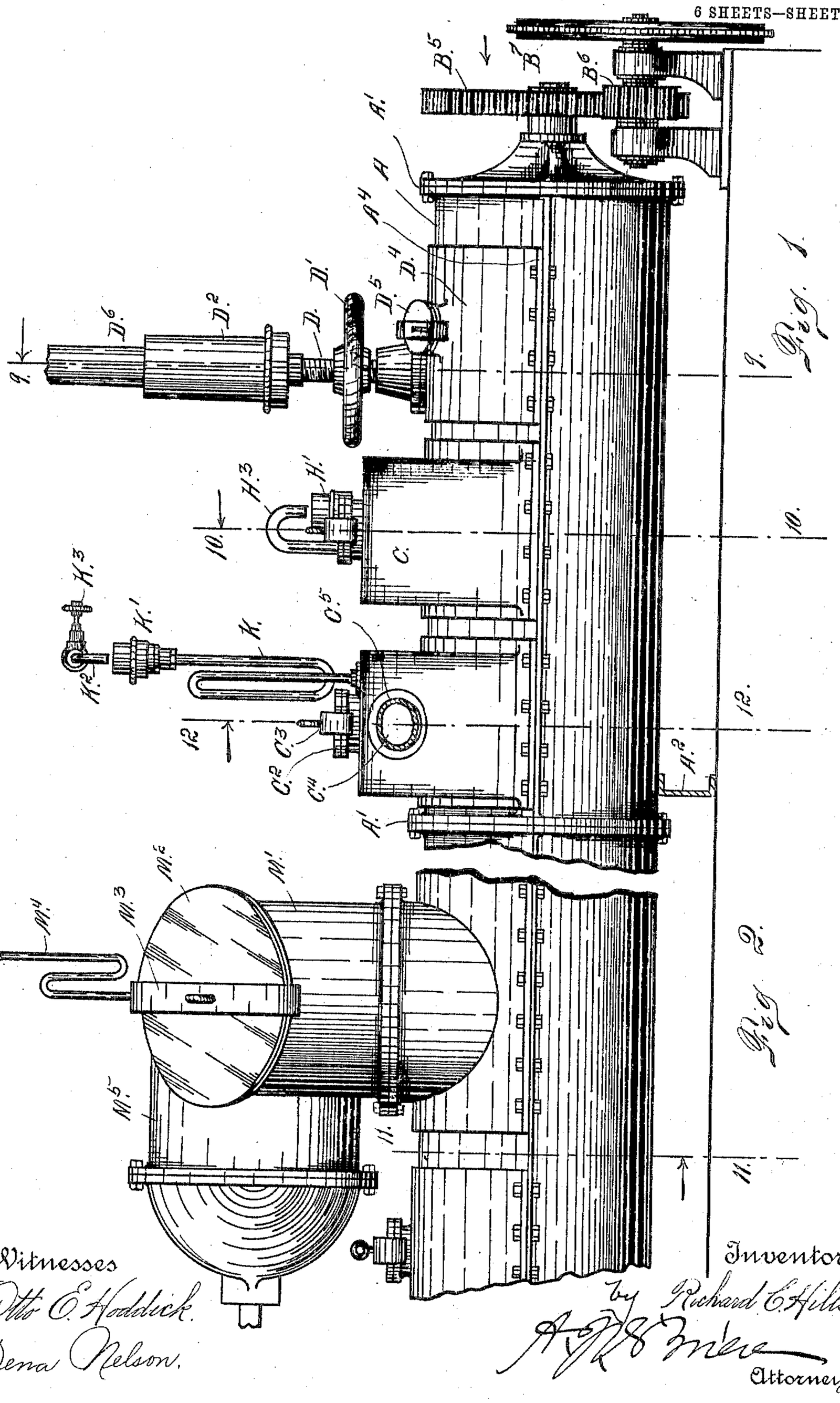


Fig. 1.

Fig. 2.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
Richard C. Hills.
by Richard & Brien
Attorney

No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 2.

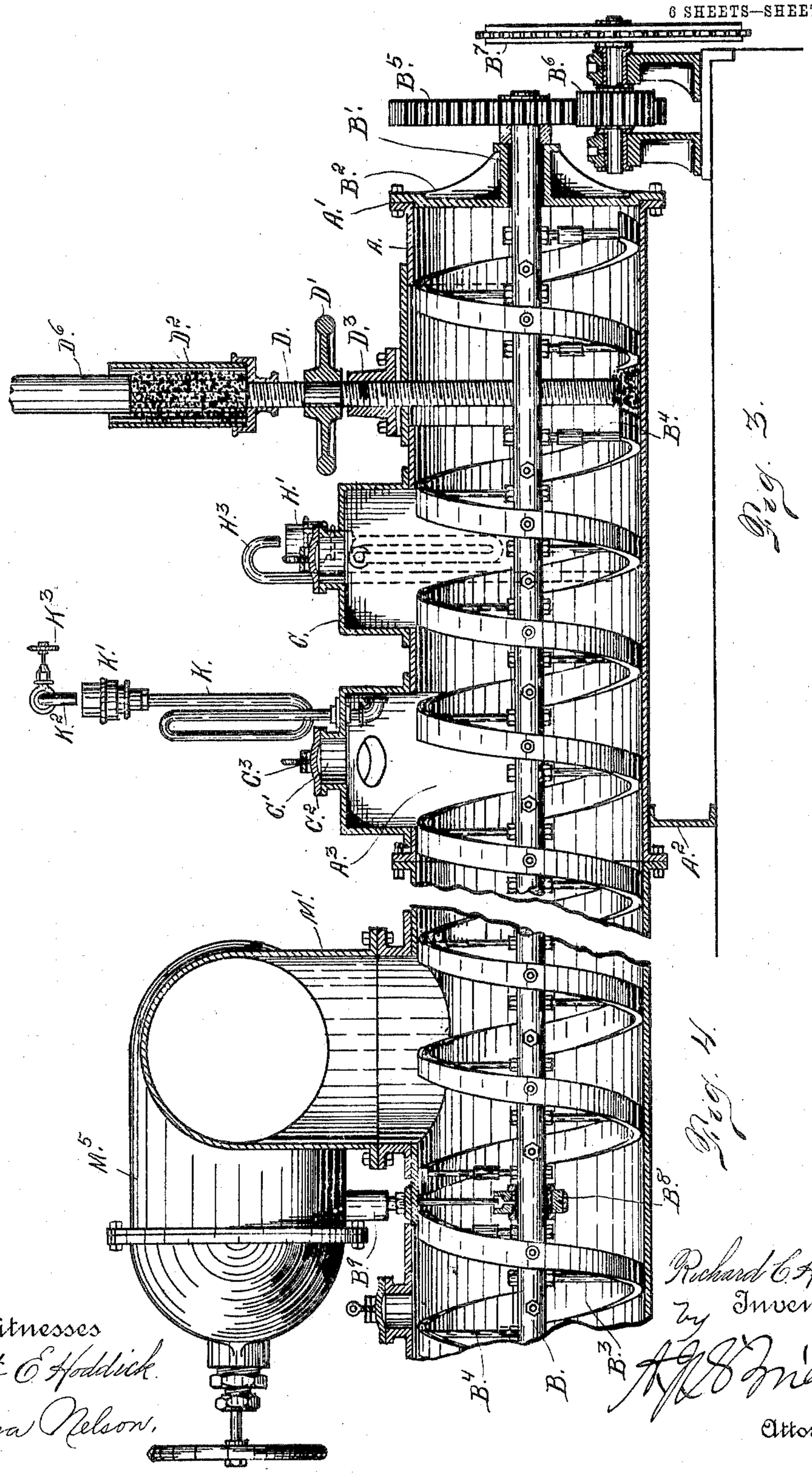


Fig. 2.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Richard C. Hills.
by Inventor
H. C. Dodge
Attorney

No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 3.

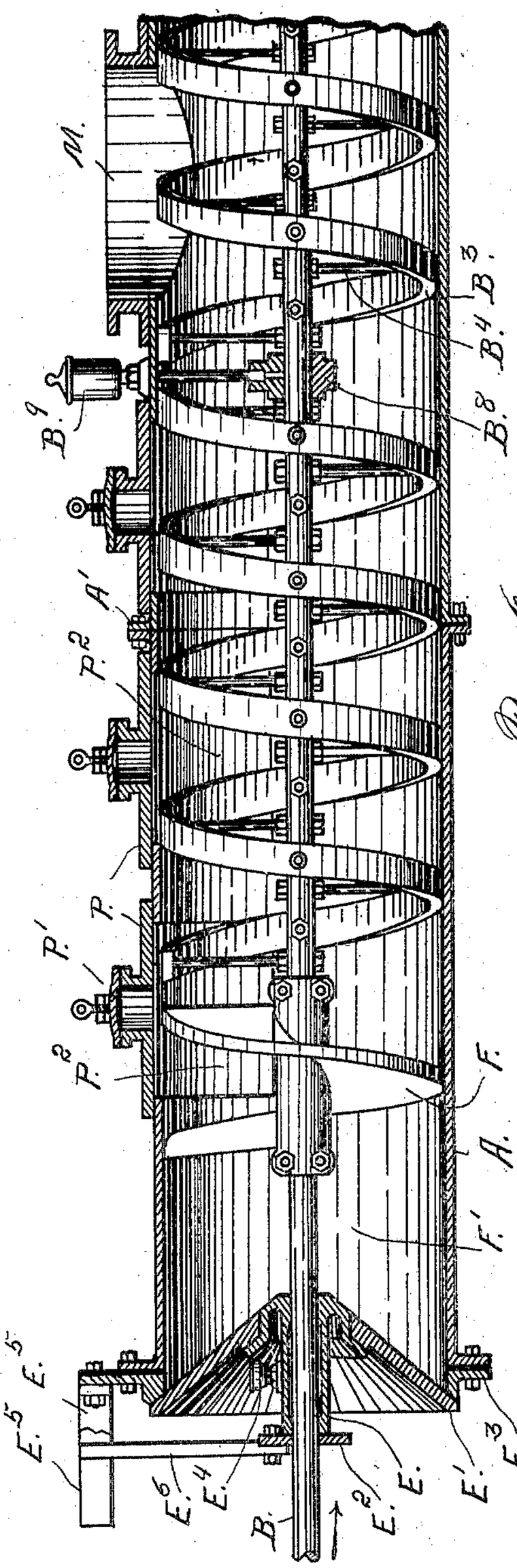


Fig. 6

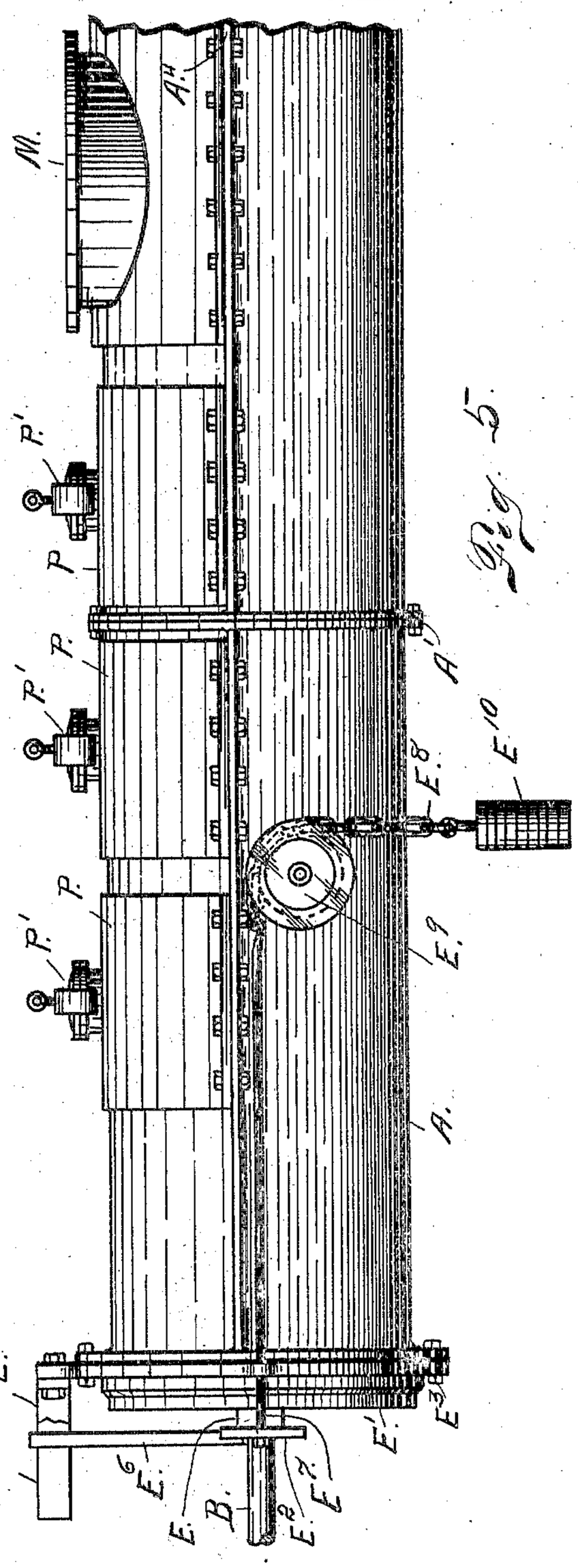


Fig. 5.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
by Richard C. Hills.
Attorneys

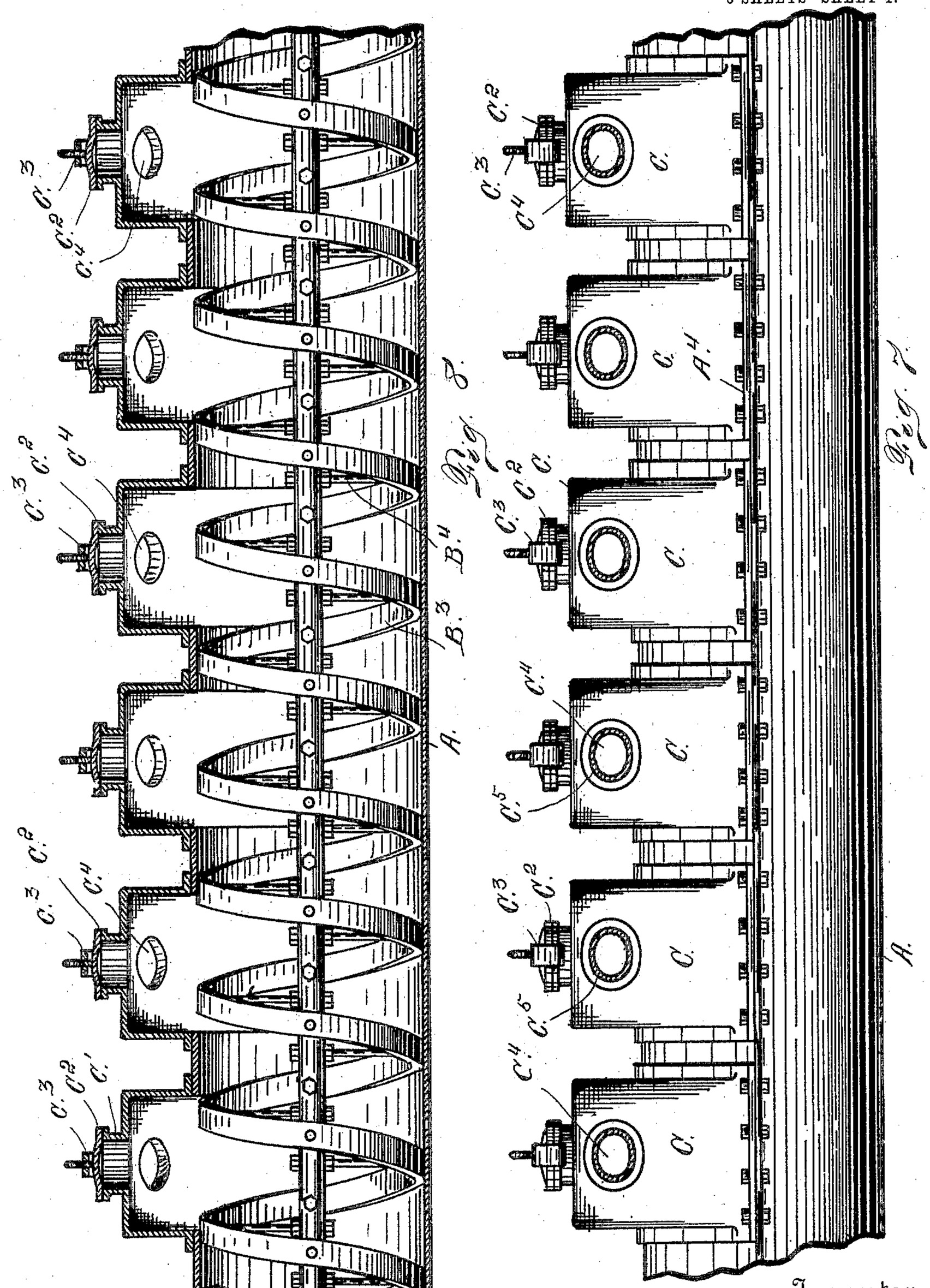
No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 4.



Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
by Richard C. Hills.
R. K. O'Brien
Attorney

No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 5.

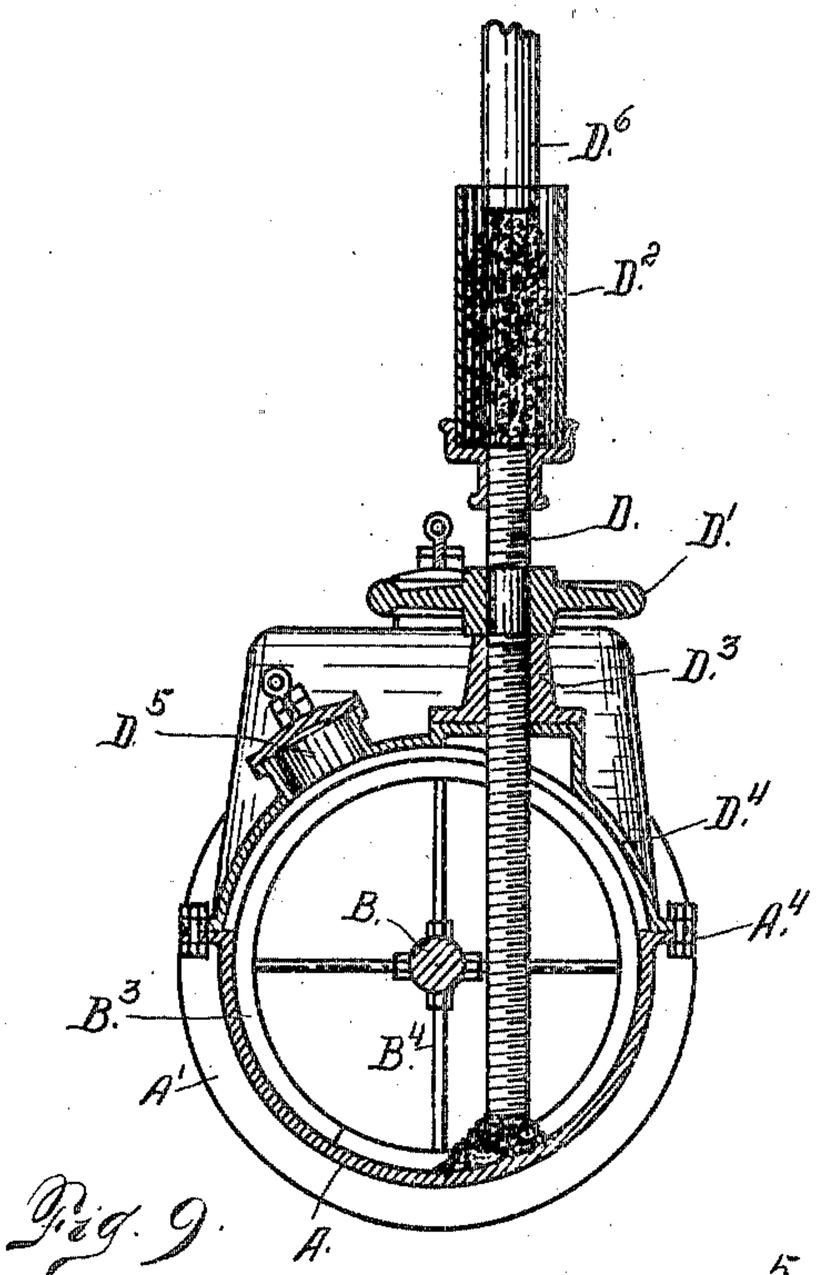


Fig. 9.

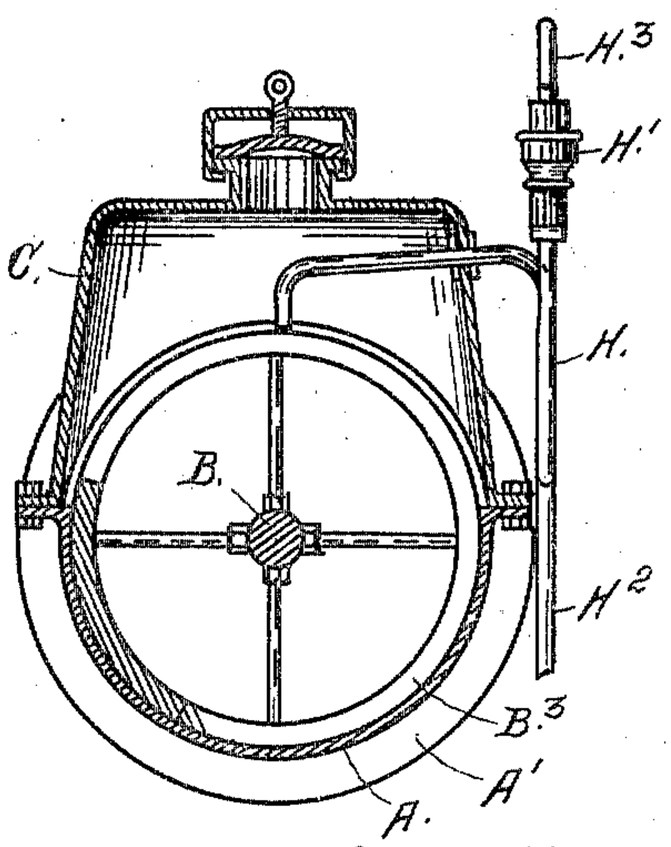


Fig. 10.

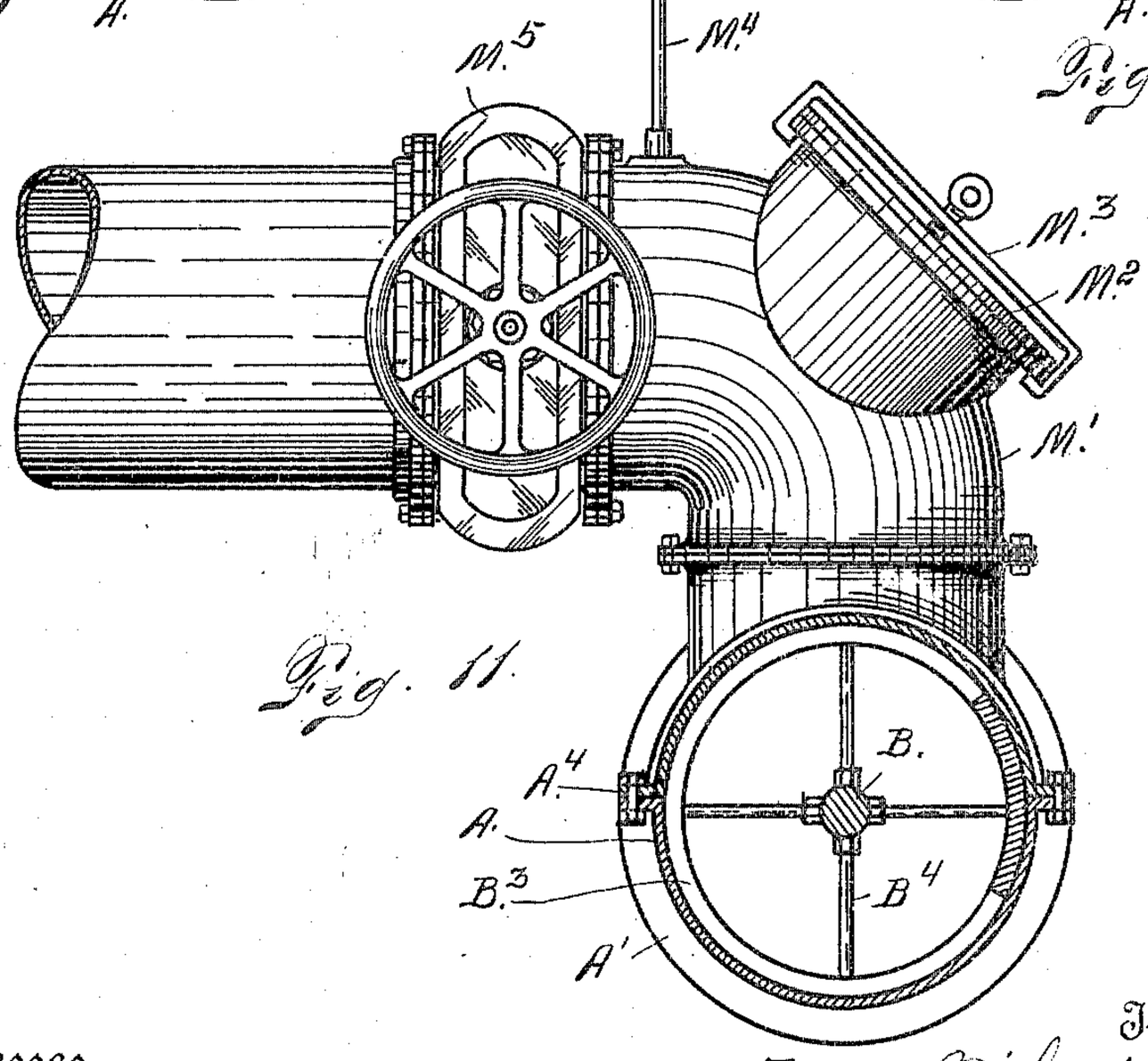


Fig. 11.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
Richard C. Hills.
by Wright Brown & Quinby
Attorney

No. 817,115. PATENTED APR. 3, 1906.

R. C. HILLS.

CONVEYER.

APPLICATION FILED JULY 3, 1905.

6 SHEETS—SHEET 6.

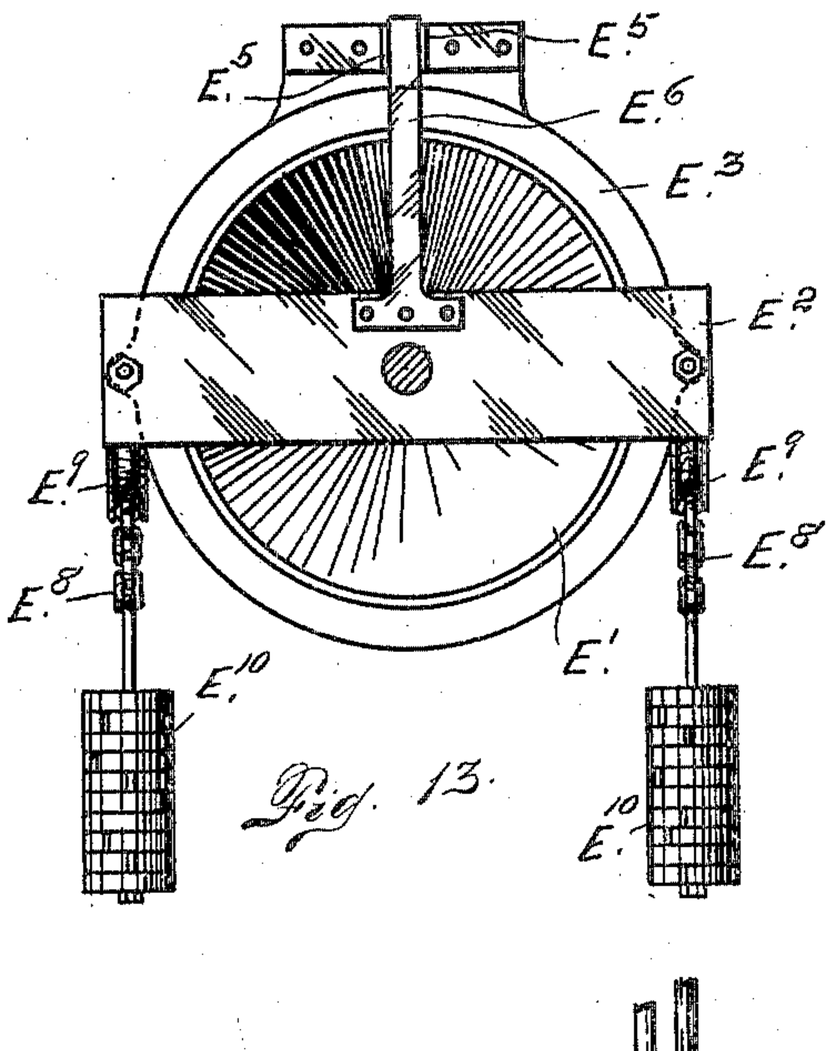


Fig. 13.

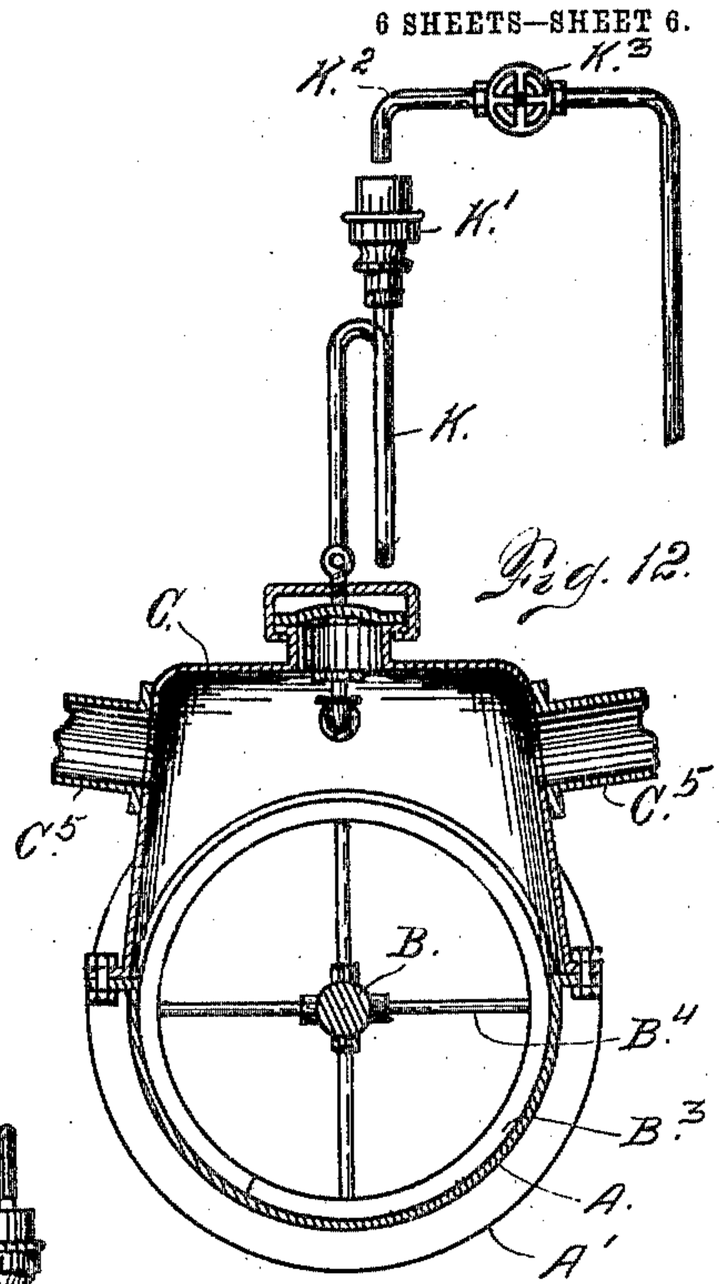


Fig. 12.

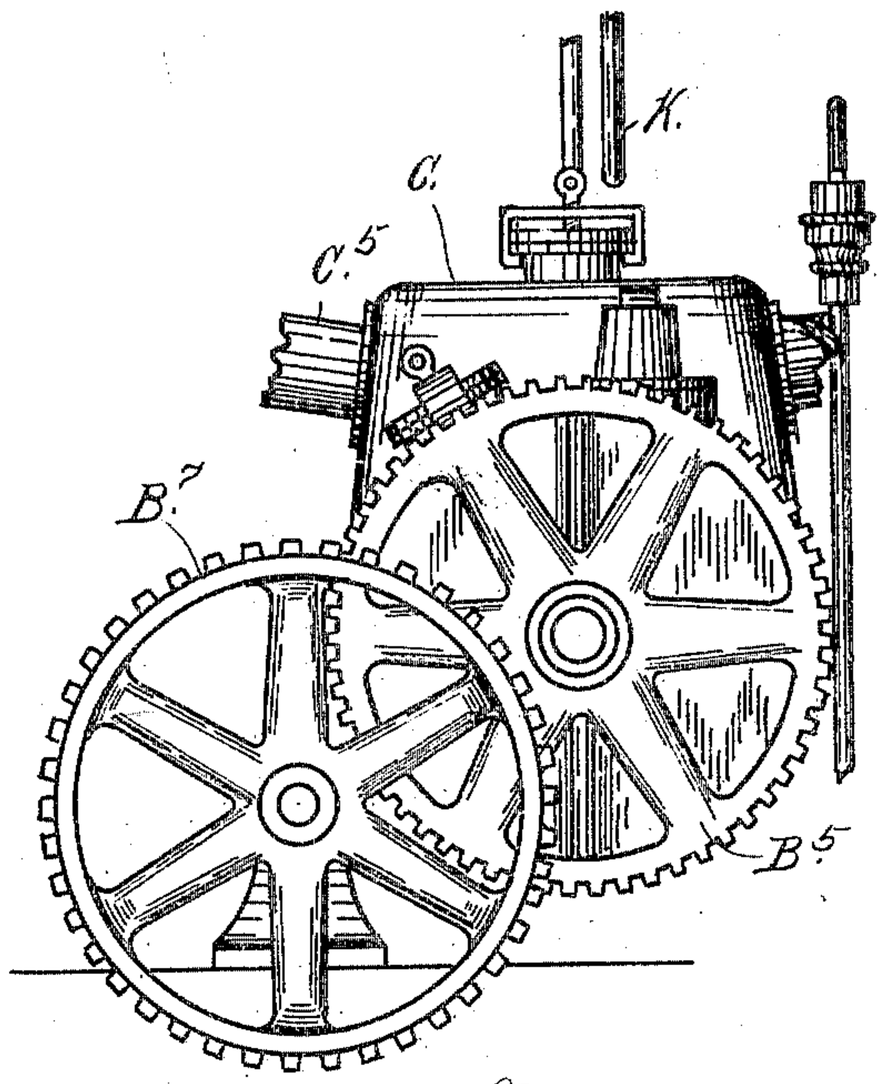


Fig. 14.

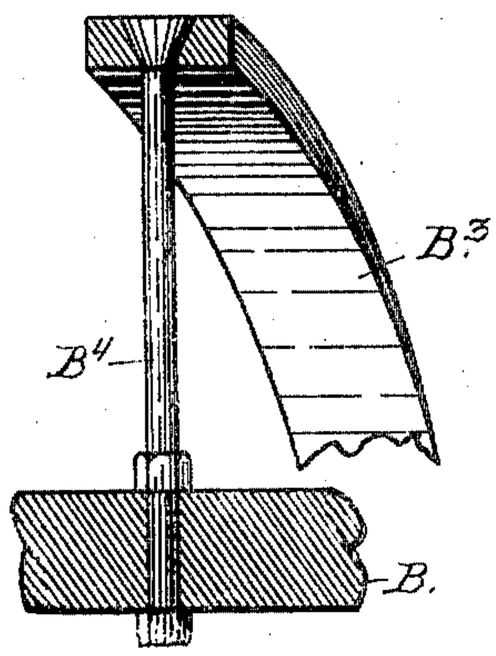


Fig. 15.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Richard C. Hills.
Inventor
by
Attorney

UNITED STATES PATENT OFFICE.

RICHARD C. HILLS, OF DENVER, COLORADO.

CONVEYER.

No. 817,115. Specification of Letters Patent. Patented April 3, 1906.

Application filed July 3, 1905. Serial No. 268,259.

To all whom it may concern:

Be it known that I, RICHARD C. HILLS, a subject of the King of Great Britain, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Conveyers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, 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 conveyer in which tar is extracted from gases issuing from coal-retorts and in which the tar or pitch is mixed with material intended to be made into briquets. Hence my improved apparatus is intended to perform two functions—that is to say, the tar extracting and the mixing functions. In order to accomplish this function in a continuous manner, the following conditions must be brought about: First, the feed and discharge openings to the conveyer-cylinder must be sealed when in operation, since otherwise any variation of pressure beyond the neutral point would entail either loss of gas or the admission of air and the formation of an explosive mixture; second, a stream of water must flow continuously from a sealed opening to reduce the temperature of the hydrocarbon-vapors from the retorts and promote the condensation of soft pitch; third, where the requisite amount of tar is not supplied by the material retorted this substance also must be introduced continuously through a sealed opening; fourth, the material to be mixed with the tar must be maintained in a state of agitation to promote contact with the tarry vapors, the agitation being coupled with a forward movement toward the discharge end in order to admit continuous operation. These results are accomplished by the apparatus hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the machine near the feed end, or what I will term the "forward" extremity. Fig. 2 is an elevation of a portion near the discharge end where the gas and uncondensed vapor leaves the machine. Fig. 3 is a longitudinal vertical section taken through the portion of the structure shown in Fig. 1. Fig. 4 is a similar section taken through the portion of the structure shown in Fig. 2. Fig. 5 is an elevation of the portion of the scrubbing-cylinder extending from the point where the gas leaves the machine to the discharge end thereof. Fig. 6 is a vertical longitudinal section of the portion of the apparatus shown in Fig. 5. Fig. 7 is an elevation of the portion of the machine between Fig. 1 and Fig. 2. Fig. 8 is a longitudinal section of the portion of the device shown in Fig. 7. Fig. 9 is a cross-section taken on the line 9 9, Fig. 1. Fig. 10 is a cross-section taken on the line 10 10, Fig. 1. Fig. 11 is a similar section taken on the line 11 11, Fig. 2. Fig. 12 is a cross-section on the line 12 12, Fig. 1. Fig. 13 is an elevation of the discharge end of the mixing and scrubbing cylinder. Fig. 14 is an end elevation of the feed end of the same. Fig. 15 is a perspective view of a portion of the ribbon-screw located within the cylinder, the same being shown on a larger scale.

The same reference characters indicate the same parts in all the views.

Let A designate a long cast-iron cylinder composed of a number of sections provided with flanges A′, connected by suitable fastening devices. This cylinder is provided with channel-iron supports A^2. In the cylinder is located a shaft B, whose axis coincides with that of the cylinder. This shaft passes through a bearing B′ in the flanged disk B^2, forming the front head of the cylinder. The latter is also provided with intermediate bearings B^8, through which the shaft passes. The shaft is connected with the flights or convolutions of a ribbon-screw by pins B^4. Made fast to the shaft B at the forward extremity of the apparatus is a spur-wheel B^5, actuated by a pinion B^6, suitably journaled, the pinion being actuated by a sprocket-wheel B^7, which may be connected with any suitable motor. (Not shown.)

Flanged hoods C cover openings A^3 in the cylinder A, the said hoods being attached to the cylinder by means of bolts passing through the flanges of the hoods and the flange A^4 of the cylinder. Each hood is provided with an observation-port closed by a cover C^2, which is secured in place by a clamp C^3. The hoods are provided with openings C^4 for the attachment of the pipes C^5, leading from the retorts (not shown) to the cylinder.

At the forward extremity of the machine is located the feed mechanism consisting of an exteriorly-threaded pipe D, permanently attached to a hand-wheel D′ and supporting a permanently-attached cylindrical hopper

D^2. Bolted to the cylinder is a nut D^3, tapped to receive the thread of the pipe D, which is actuated by turning the end wheel D′, whereby the screw is raised or lowered in order to increase or diminish the amount of finely-powdered material fed to the machine from a bin (not shown) through the stationary pipe D^6, the feed being automatic and dependent on the motion of the conveyer-screw. This material blocks up and stops when the screw stops, and thereby operates as a seal.

At the opposite or rear extremity of the machine is located the discharge mechanism consisting of a sleeve E, slidably mounted on the shaft B and lubricated from an oil-cup E^4. Attached to the sleeve E is a renewable wearing-cone E′, also a cross-piece E^2, bearing an upright arm E^6, adapted to move back and forth in a bifurcated guide E^5, the latter being in turn attached to a renewable wearing-ring E^3. Rods E^7 are attached to the cross-piece E^2 on opposite sides of the cylinder. The forward extremities of these rods terminate in chains E^8, passing over sheaves E^9 and supporting weights or counterpoises E^{10}. Within the cylinder and also connected with the shaft is a force-feed screw-section F, consisting of a spiral plate mounted on the shaft and extending from the shaft to the wall of the cylinder, whereby the material in the rear of this screw-section is forced into the discharge end of the cylinder. The space within the cylinder between this screw-section F and the sliding cone is designated F′. When the apparatus is in operation, this space is full of soft briquet material packed against the cone E′, which under the pressure slides outward on the shaft B against the tension of the counterpoises E^{10} and allows the material to squeeze out in a continuous stream through the annular opening there formed between the cone E′ and the ring E^3, the cone being prevented from turning by the guide-arm E^6 and the rods E^7, which pass through openings formed in lugs on the cylinder-ring E^3. In this way a seal is established at the discharge end of the machine.

Adjacent to the feed mechanism is a U-shaped pipe H. (Shown in Fig. 10 and also by dotted lines in Fig. 3.) This pipe is attached to a larger pipe H′, which acts as a hopper and allows hot fluid tar to be fed through the pipe H^2, provided with a bent end, as shown at H^3, into the pipe H′, and thence into the cylinder through a hood C whenever it becomes necessary to add more tar to the mixture than the material in the retorts will supply. This device also forms a seal.

Adjacent to the tar-feed is a U-shaped pipe K, attached to which is a larger pipe K′, serving as a hopper. Water in a constant stream from the pipe K^2, controlled by a valve K^3, passes through the pipe K and is discharged against the inside of the hood C, the addition of the water being necessary to keep down the temperature inside the machine and promote the condensation of tar. This device also forms a seal. An opening M (see Fig. 5) is formed in the cylinder, the same being surrounded by a flange to which is bolted a special elbow M′, rendered accessible by removing a cover M^2, held in place by a clamp M^3. Attached to the elbow M′ is an ordinary U water-gage M^4 and a gate-valve M^5, the latter being intended to control the flow of gas from the machine to the other scrubbers. (Not shown.) Between the opening M (see Fig. 6) and the cone-discharge are hoods P, bolted down to the flange A^4 of the cylinder. These hoods are provided with normally closed observation-ports P′. The hoods P cover openings P^2 in the cylinder, the said openings being provided for purposes of repair in connection with the screw. The oil-cups B^9 are for lubricating the bearings B^8.

In regular operation the feed and discharge mechanism having been properly adjusted water is turned on through the conduit K. The tar is regularly supplied to the cylinder through the pipes C^5 and an extra supply, if necessary, through the pipe H. It is of course understood that the pipes C^5 are connected with the retorts. (Not shown.) The screw located within the cylinder is put in motion and the following action occurs: The dry powdered material, either in the form of coal or coke, is carried slowly forward by the screw past the intake of tar and water and becoming wet and more or less coherent much of it is raised by the screw flights and pins and rained or thrown down through the tarry vapors entering from the retorts through the pipes C^5 and being wet and comparatively cool lowers the temperature of the said vapors, so that a certain amount of condensation accrues, and the briquet material as it passes onward accumulates more and more of the condensed tarry substance and passes on with the gas to the escape-opening and out of the machine. Subsequently other scrubbers (not shown) extract the remaining tar, which after distillation leaves a pitchy residue which may be pumped up to the machine and introduced through the U-shaped pipe H. After passing the point M the briquet material ceases to accumulate tar and is soon discharged through the seal maintained by the cone E′ and the screw F.

The chief function of the machine is to facilitate the production of briquet material according to the process described in United States Letters Patent No. 678,296, and dated July 9, 1901.

Having thus described my invention, what I claim is—

1. A structure of the class described, composed of a screw conveyer provided at its discharge extremity with a normally closed yieldingly-retained head.

2. A conveyer composed of a hollow stationary cylinder, a feed-screw located therein, a normally closed yieldingly-retained head located at the discharge extremity of the cylinder, and means for sealing the discharge end of the cylinder during the exit of the material under treatment.

3. A conveyer composed of a hollow cylinder having a normally closed yieldingly-retained discharge-head, means for feeding the material to be treated, to the forward extremity of the cylinder, means for sealing the discharge extremity of the cylinder during the exit of the material therefrom, and means located between the feed and discharge for introducing the necessary binding material.

4. A conveyer composed of a cylinder having a normally closed yieldingly-retained cone at its discharge extremity.

5. A conveyer composed of a cylinder having a normally closed yieldingly-retained cone-shaped disk at its discharge end, said disk having its apex projecting into the cylinder, means for introducing the pulverized material to the cylinder at its forward extremity, means for causing the material to travel rearwardly within the cylinder, means located in the rear of the feed for introducing the necessary binding material, and means for sealing the discharge extremity of the cylinder during the exit of the treated material.

6. A conveyer comprising a hollow cylinder, a feed-screw located therein, the rear extremity of the cylinder being provided with a yieldingly-retained cone-shaped disk, means for feeding the material to be treated at the forward extremity of the cylinder, means located near the rear extremity of the cylinder for removing the gases therefrom, and means introduced between the feed and the gas exit, for introducing the necessary binding material.

7. A conveyer composed of a stationary cylinder having a normally closed yieldingly-retained head at its discharge extremity, a feed-screw located within the cylinder, feed mechanism located at the forward extremity of the cylinder for introducing the pulverized material, means located in the rear of the feed for introducing the necessary binding material at suitable intervals, and means also located in the rear of the feed for introducing water to the cylinder, substantially as described.

8. A conveyer composed of a stationary cylinder, a feed-screw located therein and composed of a shaft to which is attached a ribbon-screw thread extending the greater proportion of the length of the cylinder, and a force-feed screw-thread section located near the discharge extremity of the cylinder, feed mechanism located at the forward extremity of the cylinder, and suitable means located in the rear of the feed for introducing the necessary binding material, substantially as described.

9. A conveyer composed of a cylinder having a normally closed yieldingly-retained discharge-head at its rear extremity, a feed-screw located in the cylinder and composed of a shaft journaled in the heads of the cylinder and also in intermediate bearings supported by the cylinder, a ribbon-screw thread connected with the shaft and extending the greater portion of the length of the cylinder, a force-feed screw-thread section connected with the shaft near the discharge extremity of the cylinder, and suitable means for feeding the pulverized material to be treated, to the forward extremity of the cylinder.

10. A conveyer composed of a cylinder having a normally closed yieldingly-retained head at its discharge extremity, a feed-screw located within the cylinder whereby the material is caused to travel from the forward to the rear extremity thereof, and a feed-conduit connected with the forward extremity of the cylinder and protruding into the latter, the said conduit being vertically adjustable for the purpose set forth.

11. A conveyer composed of a cylinder, a conveyer-screw located therein, and a feed-conduit located at the forward extremity of the cylinder and consisting of a conduit exteriorly threaded and engaging a nut mounted on the cylinder, a hopper connected with the upper extremity of the conduit, the latter being provided with a hand-wheel for purposes of rotation whereby the conduit may be raised and lowered according as it is necessary to increase or diminish the quantity of material supplied to the cylinder.

12. A conveyer composed of a hollow cylinder, a feed-screw located therein, a normally closed yieldingly-retained disk located at the rear extremity of the cylinder, means connected with the forward extremity of the cylinder for feeding the pulverized material thereto, and means located in the rear of the feed and at predetermined intervals for introducing the necessary binding material to the cylinder, substantially as described.

13. A device of the class described, consisting of a cylinder provided with a conveyer-screw having a shaft, and a yieldingly-retained normally closed head slidably mounted on the screw-shaft at the discharge extremity of the cylinder.

14. A device of the class described, consisting of a cylinder provided with a conveyer-screw having a shaft, a yieldingly-retained normally closed head slidably mounted on the screw-shaft at the discharge extremity of the cylinder, and suitable means for preventing the head from rotating with the screw-shaft.

15. A device of the class described composed of a stationary cylinder, a conveyer-

screw located therein and having a shaft suitably journaled, a yieldingly-retained head slidably mounted on the screw-shaft at the discharge extremity of the cylinder, an arm rigidly connected with the said head, and a guide mounted on the cylinder and engaging the arm to lock the head against rotation with the screw-shaft.

16. In a device of the class described, the combination of a cylinder, a conveyer-screw located therein, a cone-shaped disk slidably mounted on the screw-shaft at the discharge extremity of the cylinder and adapted to close the same, weights connected with the said disk whereby the latter is normally held in the closed position, a cross-piece attached to the disk and slidable therewith on the shaft, an arm connected with the cross-piece and projecting outwardly from the shaft, and a guide attached to the cylinder and arranged with reference to the arm to prevent the disk from rotating with the shaft.

17. A device of the class described, comprising a cylinder, a conveying-screw located therein and provided with a shaft, one extremity of which passes beyond the rear extremity of the cylinder, a cone-shaped disk slidably mounted on the shaft and adapted to close the rear extremity of the cylinder, a cross-piece secured to the said disk, rods connected with the cross-piece and engaging guides with which the cylinder is provided, chains connected with the rods, and pulleys over which the chains pass, the latter being provided with weights whereby the cone-shaped disk is normally held in the closed position.

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

RICHARD C. HILLS.

Witnesses:
DENA NELSON,
A. J. O'BRIEN.