No. 674,353. Patented May 14, 1901.

F. C. DURANT.

CONVEYER.

(Application filed Jan. 17, 1898.)

(No Model.)

3 Sheets—Sheet 1.

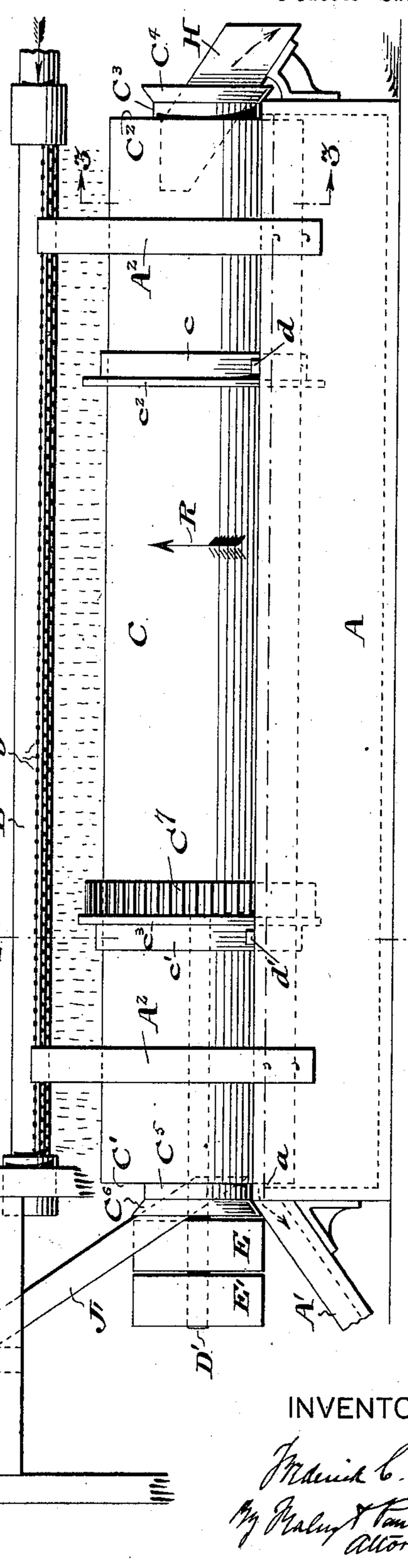

FIG. 1.

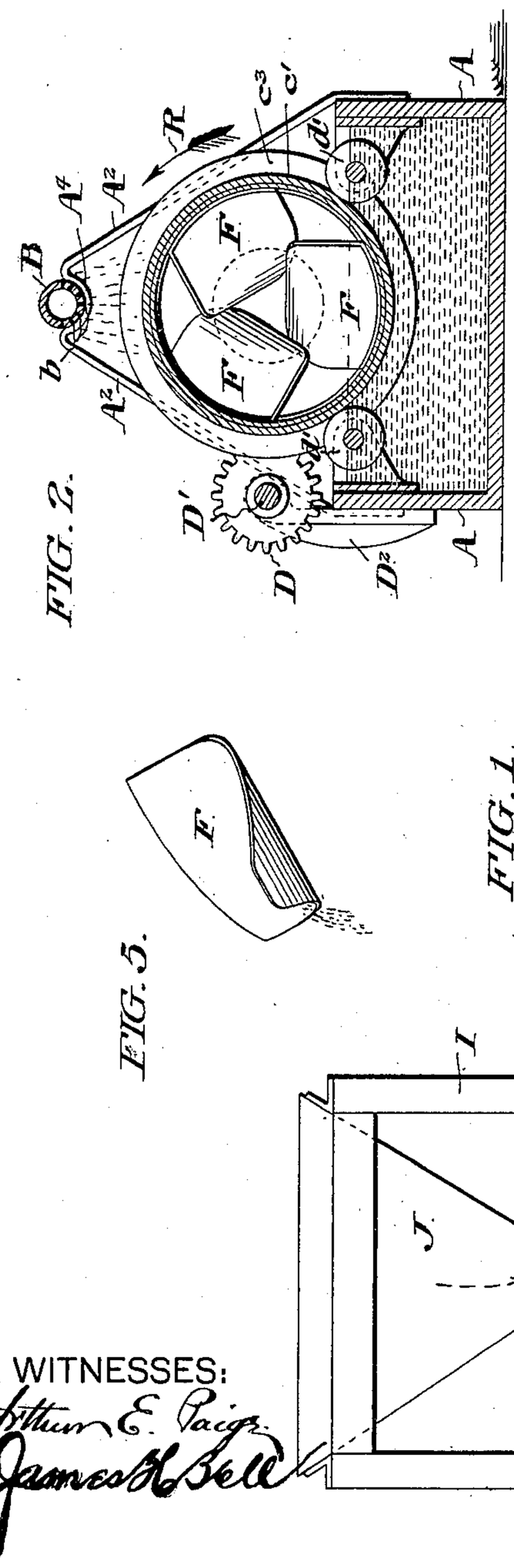

FIG. 2.

FIG. 5.

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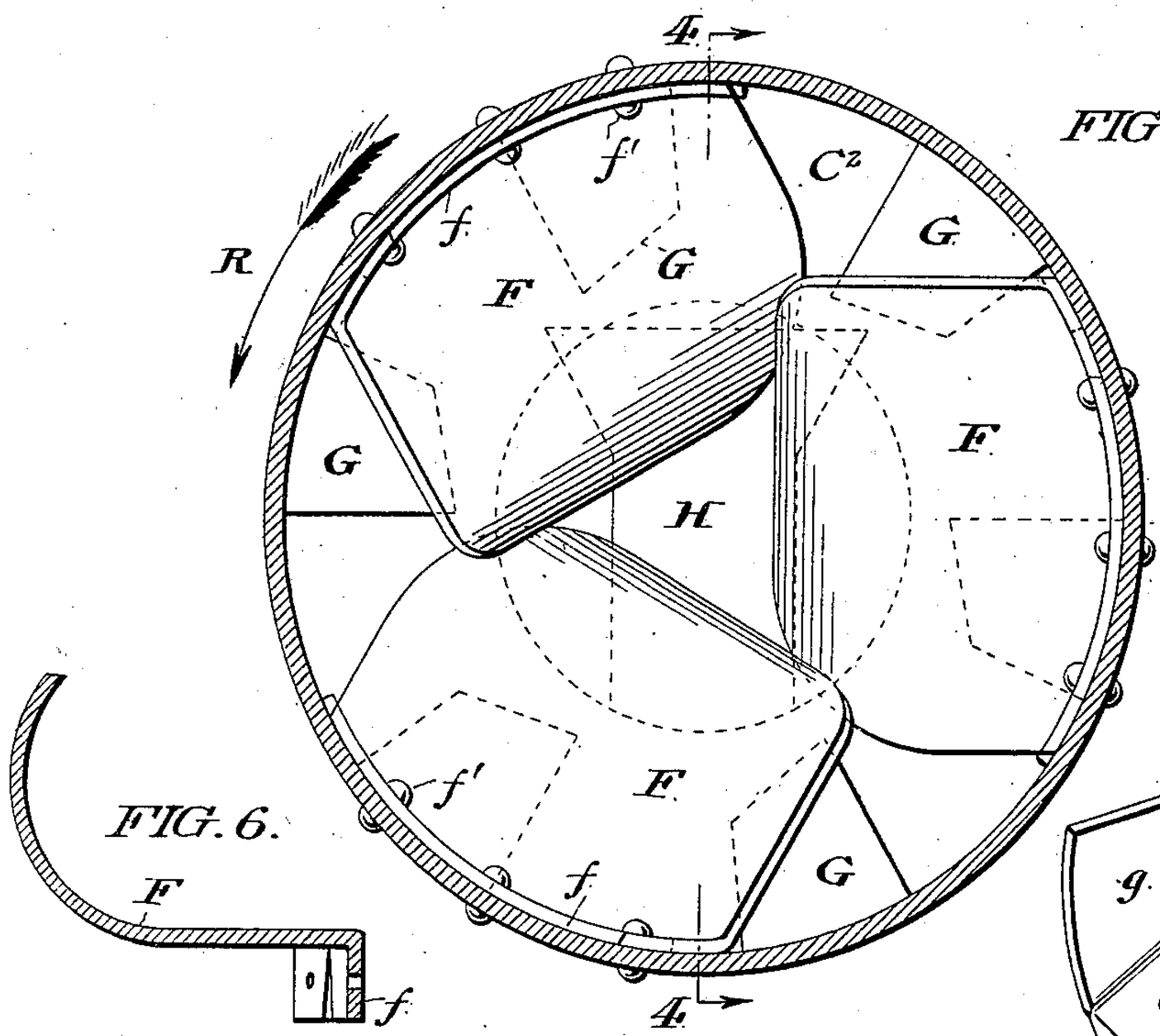

FIG. 3.

FIG. 7.

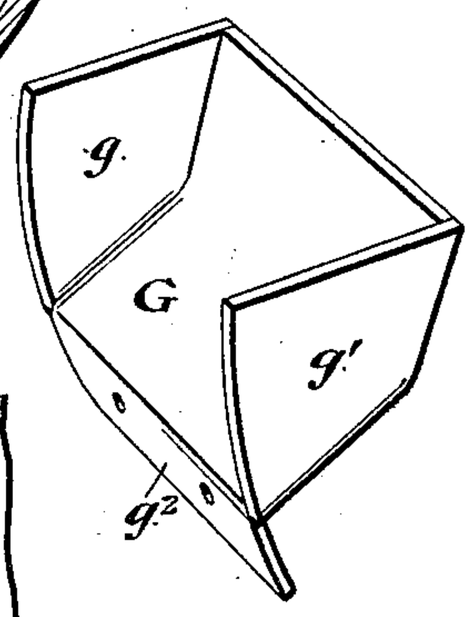

FIG. 6.

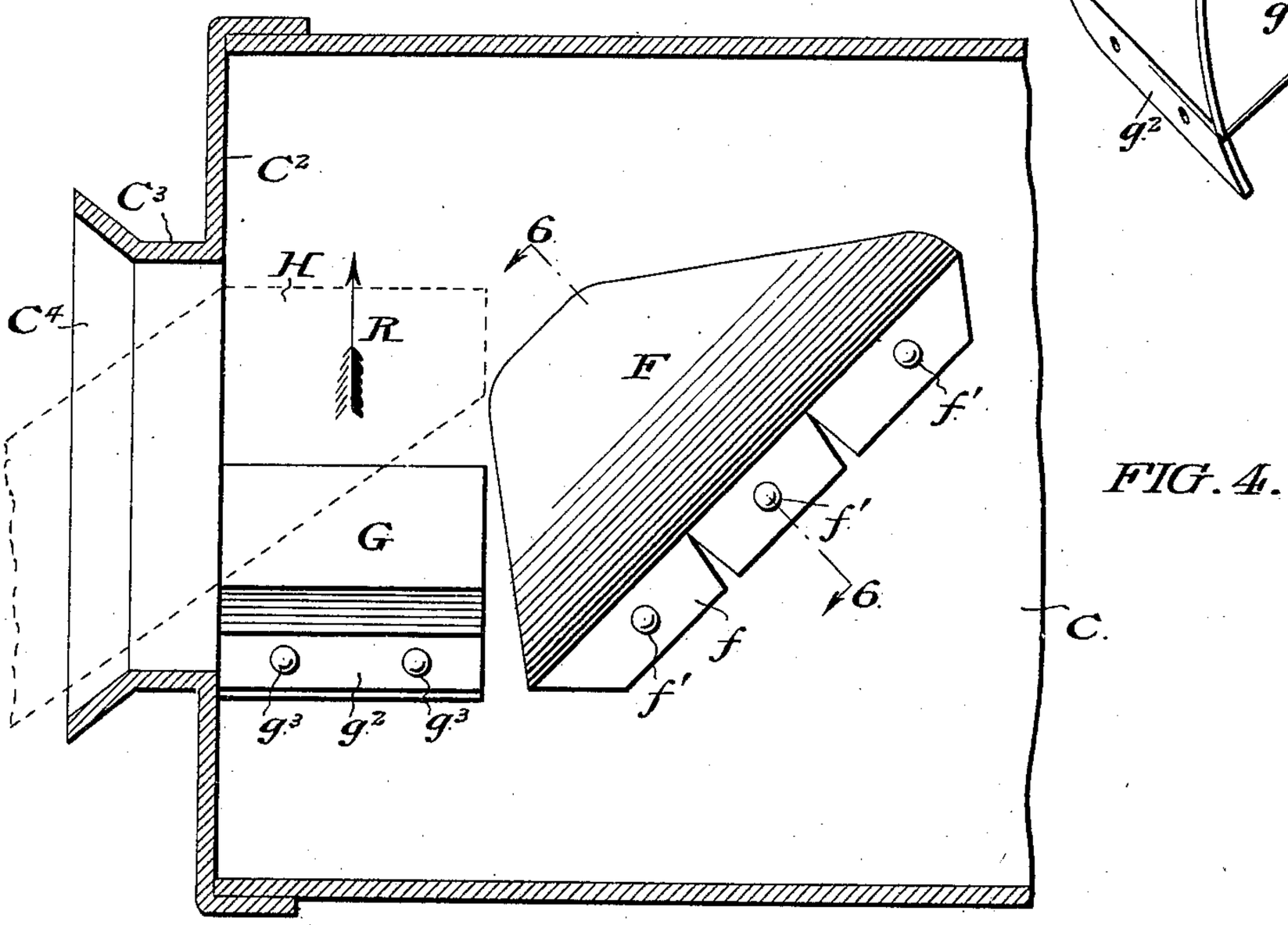

FIG. 4.

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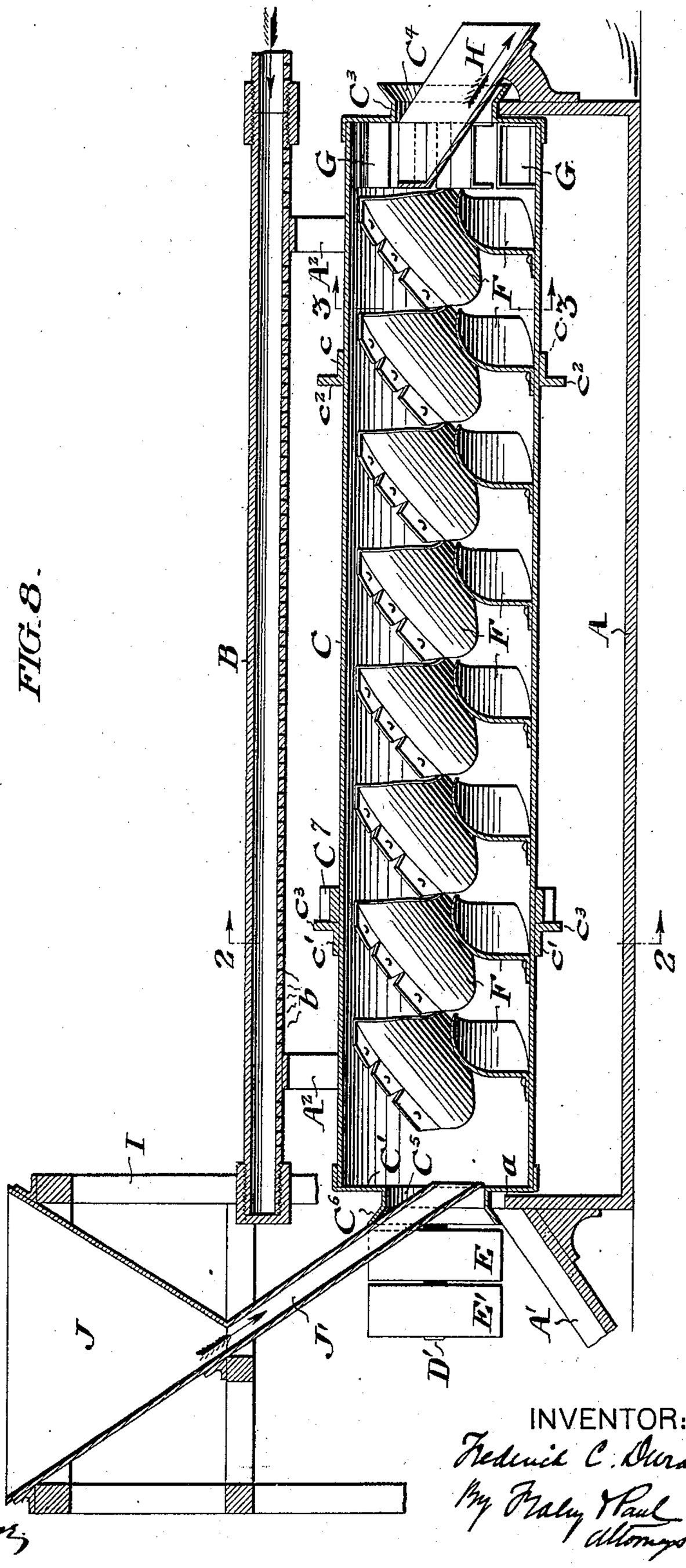
(Application filed Jan. 17, 1898.)

(No Model.)

3 Sheets—Sheet 3.

FIG. 8.



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UNITED STATES PATENT OFFICE.

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CONVEYER.

SPECIFICATION forming part of Letters Patent No. 674,353, dated May 14, 1901.

Application filed January 17, 1898. Serial No. 666,860. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK C. DURANT, a citizen of the United States, residing at Colorado Springs, Colorado, have invented certain new and useful Improvements in Conveyers, whereof the following is a specification, reference being had to the accompanying drawings.

The purpose to which my invention is primarily addressed is the conveyance of hot ore as it comes from the roasting-furnace to a given point where subsequent treatment is to be applied, the apparatus being such that it does not require the ore to be cooled previous to its transportation and is not dependent upon any difference in level between the point of introduction into the conveyer and of its discharge therefrom. Incidentally a certain amount of cooling action is effected during the conveying operation, which adjunctive feature is in itself desirable, though not an essential characteristic of the apparatus considered merely as a conveyer. The possibility of thus conveying hot ore from one point to another relatively distant upon substantially the same level is often of great importance under the conditions found in some plants of this class, and the apparatus constructed in accordance with my invention not only accomplishes this purpose efficiently, but minimizes the destructive action of the hot ore upon the exposed parts and is highly economical.

Referring to the drawings, Figure 1 represents a view in side elevation of an apparatus embodying my invention, the longitudinal proportions, however, being somewhat reduced as compared with the height of the other parts for convenience of illustration. Fig. 2 is a vertical transverse section of the same on the line 2 2 of Fig. 1 looking toward the discharge end of the conveyer and showing in perspective the backs of the series of inclined shelves, or "scoops," as I prefer to term them, which directly handle the ore in its transmission through the main portion of the apparatus. Fig. 3 is a similar transverse section on the line 3 3 of Fig. 1 also looking in the same direction, the scale being considerably enlarged. Fig. 4 is a partial longitudinal section on the line 4 4 of Fig. 3 and on the same scale as the latter figure. Fig. 5 is an interior view in perspective of one of the scoops, the scale of the figure being the same as that of Fig. 2. Fig. 6 is a transverse section through one of said scoops on the line 6 6 of Fig. 4, the scale being similar to that of Fig. 4. Fig. 7 is a view in perspective of one of the group of discharge-scoops which are the last in the series. Fig. 8 is a longitudinal vertical section on the line of the axis of the conveyer.

Referring to the general view in Figs. 1 and 2, A indicates an elongated water-tank having an overflow at one end at the level indicated at *a*, adjacent to which is a discharge-spout A′. Inwardly-inclined supports A^2 A^2 rise at intervals from each side of this tank and unite in downwardly-curved portions A^4 above the center line of the tank, supporting a longitudinal water-pipe B, supplied from any convenient source and having its lower surface perforated with a number of discharge-orifices *b*, by means of which a continuous shower of water can be discharged. Running longitudinally with the tank and partly immersed therein is the conveying-cylinder C, preferably formed of heavy sheet-iron and having its ends partly closed by deep annular flanges $c^2 c'$, respectively. The radial extent or depth of each flange is such as to always maintain the lowest point of the inner periphery above the water-level corresponding with the depth of immersion of the cylinder in the tank. These flanges are respectively provided at the openings formed by their inner peripheries with outwardly-projecting cylindrical necks C^3 and C^5, having flaring mouths C^4 and C^6, respectively, the flaring portions of said mouths projecting beyond the ends of the tank, as shown. At convenient points the cylinder C is provided with external annular bands *c c′*, having radial flanges c^2 c^3, respectively, said bands forming bearing-surfaces, which rest upon rollers *d d′*, projecting inwardly from the sides of the tank. The flanges c^2 c^3 are oppositely faced, as shown, and engage with

the sides of their respective supporting-rollers, so as to prevent the cylinder from shifting longitudinally, while permitting free rotation. Adjacent to one of these flanges and preferably integral therewith is a circular rack C^7, engaging with a pinion D, mounted upon a shaft D′, suitably supported upon uprights D^2 upon the side of the tank and provided with fast and loose pulleys E E′ or other convenient means for effecting rotation. The cylinder C may thus be axially rotated while submerged to the desired extent in the water of the tank and its unsubmerged surface be at the same time showered with water by means of the perforated pipe B. The direction of rotation is indicated by the arrows R. The cylinder C carries upon its interior surface a plurality of inclined shelves or scoops F. These scoops are constructed in the form illustrated in the perspective and sectional views of Figs. 5 and 6 and are secured to the inner face of the cylinder, at an angle to the axis thereof, by means of the flanges *f*, suitably notched at intervals to admit of their proper adaptation to the curvature of said surface, said flanges being held by rivets *f′*. The inclination of these scoops is toward the discharge end C^4 of the cylinder, and they are arranged in the instance shown in three spiral lines, those of each spiral forming a series whose individual members coact without reference to the adjacent series. The members of each series are so arranged as with relation to each other that the material discharged from the tail end of any given scoop shall fall upon the bottom of the cylinder within the range of the front end of the next scoop. The material of course tends to fall backward against the rotation of the cylinder and will therefore be taken up by the next scoop as the latter rises in rotating. This action is repeated upon discharge from that scoop, and thus the material is transferred from scoop to scoop throughout the whole series. Hence I term these scoops the "transferring-scoops," and as there are three series thereof there are, so to speak, three independent lines of simultaneous travel through the cylinder. Immediately adjacent to the discharge end of the cylinder is a group of scoops G, (in this instance six in number,) which are constructed differently from the other scoops of the series, as shown in the detail view of Fig. 7. These scoops G, which I term the "discharging-scoops," instead of being attached in a direction inclined to the axis of the cylinder may have their bottom surfaces parallel to said axis and are provided with inclosing ends *g g′*. They are attached to the surface of the cylinder by means of the flanges g^2 and rivets g^3. The discharging-scoops G are arranged within the region of delivery of the last of each series of the inclined transferring-scoops F, and of course face or receive and deliver in the same direction with reference to the rotary movement as do the other scoops in order to pick up the material discharged upon said region. Their function is to carry said material upward until a point at or near the zenith of rotation is reached, whereupon the material falls vertically from them. An inclined discharging-spout H projects within the mouth of the discharging end of the cylinder in such relation to the scoops G as that the latter in rotating shall entirely clear the inwardly-extending end of said spout, but so as to be beneath the point of delivery of said scoops as they successively turn upward and reach a position corresponding with the discharge of their contents. Said spout H leads to a point convenient for the reception of the conveyed material. A hopper J and supply-spout J′ are mounted upon a frame I at the receiving end of the cylinder, the inner end of said supply-spout projecting within the flanged mouth C^6 thereof, so as to discharge the material at a point within the range of rotation of the first of the transferring-scoops F in each series.

The operation of the device is as follows: The hot ore introduced by means of the spout J′ falls upon the bottom of the cylinder C at a point which is for the time being submerged below the water-level. As the cylinder rotates said material falls into the first transferring-scoop of a series, is carried upward thereby, and slides along the inclined face thereof until a position is reached which causes it to fall from the discharging end of the scoop onto the bottom surface of the cylinder, where it is again received by the next scoop and again discharged at a farther point, this operation being repeated by the successive scoops until the region of the discharging-scoops has been reached, when the material is lifted by said scoops and finally falls therefrom into the discharge-spout H. It will be noted that those portions of the cylinder upon which the material successively falls in its passage are at the time of such fall in direct contact with the water of the tank, and consequently receive the maximum amount of protection due to its cooling effect. The unsubmerged surface of the cylinder is, however, kept cool by the water-shower, and since they are the least-heated portions for the time being they are properly supplied with the coolest water, thus maintaining an economical application of the water. As there are no working parts of a character to be injured by the heat the apparatus is long-lived, and of course the buckets can be individually removed and replaced as they become worn.

I have shown the cylinder as constructed in a single section longitudinally; but obviously this detail may be modified either for convenience of construction or to permit renewal of any given section. It is also obvious that a series of such conveyers and tanks could be used where the total distance of conveyance is too great to admit of construction in a single length.

I have specified as the typical use of the above-described apparatus the conveyance of hot ore; but it must be understood that I do not limit my claim to such use of the apparatus. The tank and water-cooling appliances might thus be dispensed with where the nature of the use did not require their presence.

Having thus described my invention, I claim—

1. The combination, of a cylinder provided with flanged openings at each end adapted to prevent the access of water; a series of transferring-scoops mounted within the interior of the cylinder and arranged with relation to each other, substantially as set forth; a discharging-scoop arranged in the described relation to the last scoop of the transferring series; a supply-spout extending into one end of the cylinder and arranged to deliver material within the region of delivery of the discharging-scoop; means substantially as set forth for supplying water to the exterior surface of the cylinder; and means substantially as set forth for supporting and rotating said cylinder.

2. The combination, of a water-tank having an overflow at a definite level; a cylinder having a portion of its periphery submerged below the water-level, said cylinder being provided with end openings arranged with relation to the water-level, as set forth; a perforated water-pipe arranged above said cylinder; a series of transferring-scoops mounted within the interior of the cylinder and arranged with relation to each other, substantially as set forth; a discharging-scoop arranged in the described relation to the last scoop of the transferring series; a discharge-spout arranged within the region of delivery of said discharging-scoop; and means, substantially as set forth, for supporting and rotating said cylinder.

3. The combination with a water-tank, of a horizontally-disposed conveyer-cylinder supported with its lower side in the tank below the water-level and having its inlet and outlet ends partially closed to prevent the entrance of water into the cylinder, and means for rotating the cylinder, substantially as described.

4. The combination with a water-tank, a horizontally-disposed conveyer-cylinder supported with its lower side in the tank below the water-level, and having its inlet and outlet ends partially closed to prevent the entrance of water into the cylinder and means for rotating the cylinder, of a water-supply discharging upon the upper side of the cylinder, substantially as described.

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