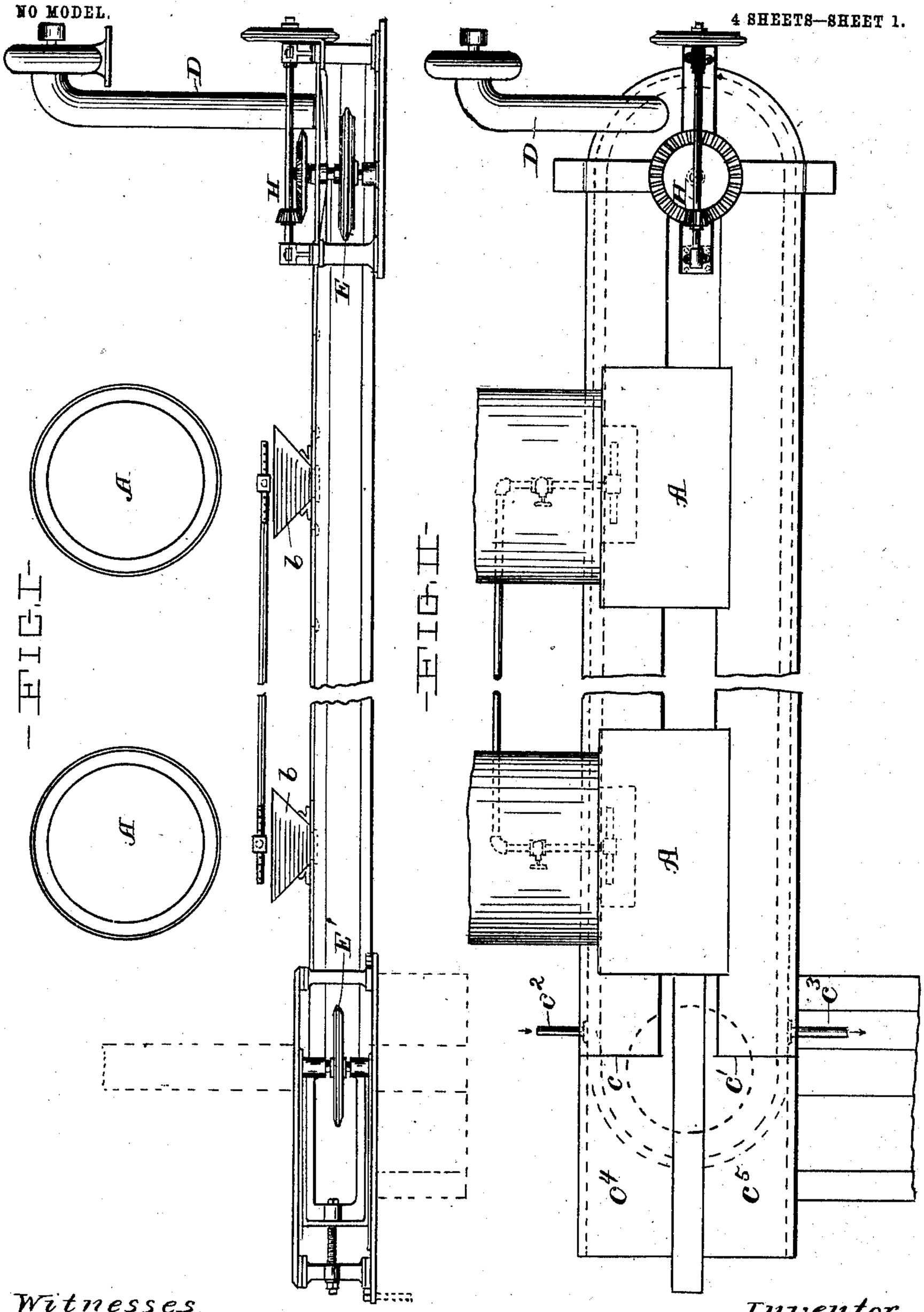
No. 719,524. PATENTED FEB. 3, 1903.

K. F. SNOW.

CONVEYING AND COOLING APPARATUS.

APPLICATION FILED JUNE 8, 1901.

NO MODEL. 4 SHEETS—SHEET 1.



Witnesses,
J. C. Turner
N. E. Merkel.

Inventor,
K. F. Snow
By
J. B. Gay Atty.

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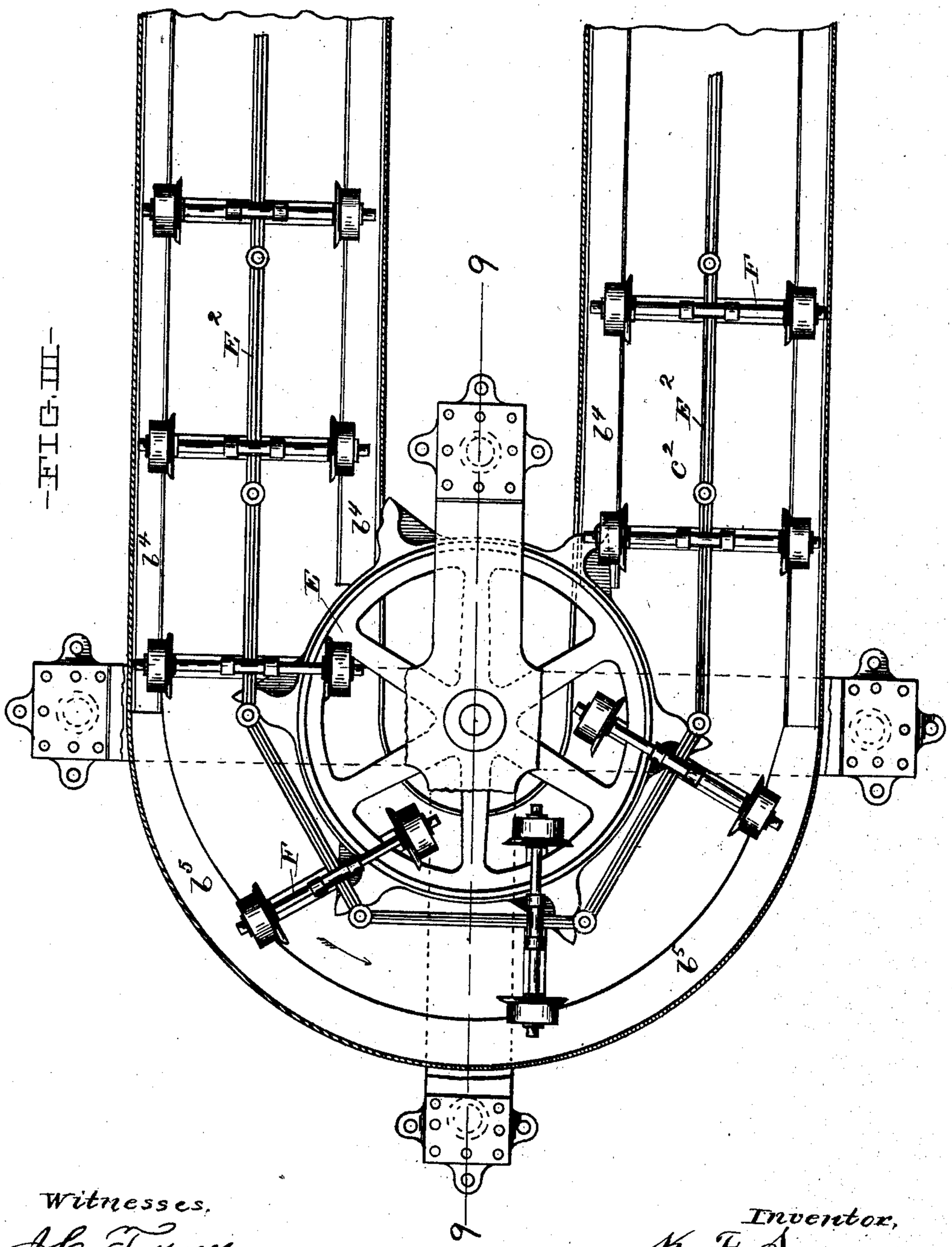
NO MODEL. 4 SHEETS—SHEET 2.

-FIG. III-



Witnesses,
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NO MODEL. 4 SHEETS—SHEET 3.

FIG. IV.

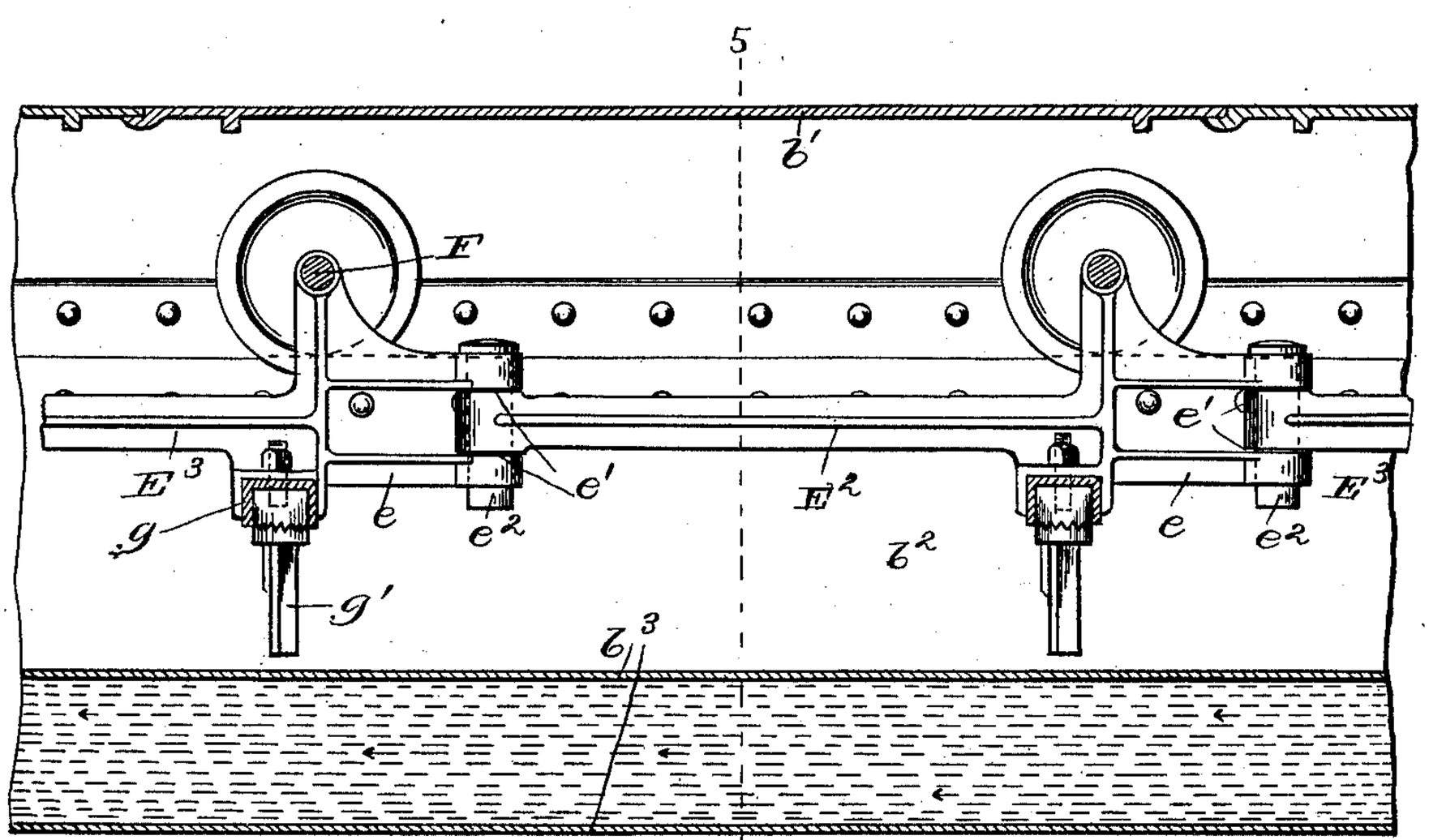


FIG. V.

FIG. VI.

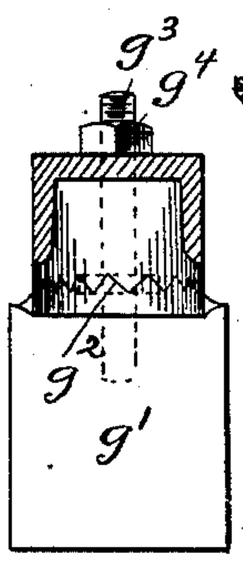


FIG. VII.

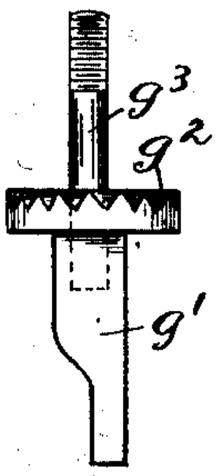
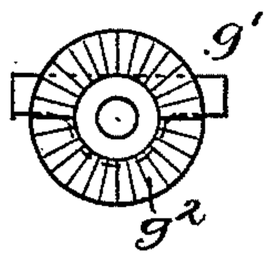
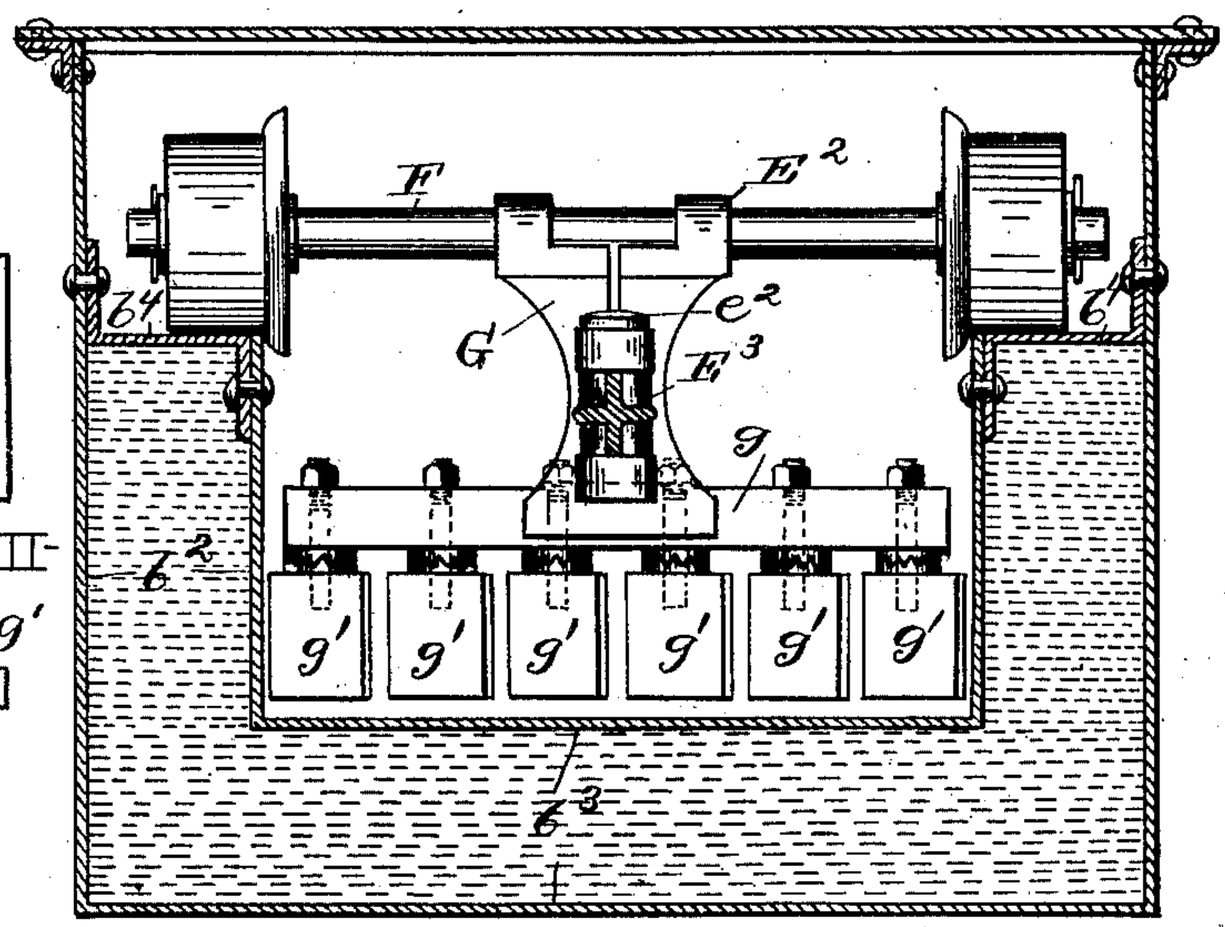


FIG. VIII.





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NO MODEL. 4 SHEETS—SHEET 4

FIG. IX

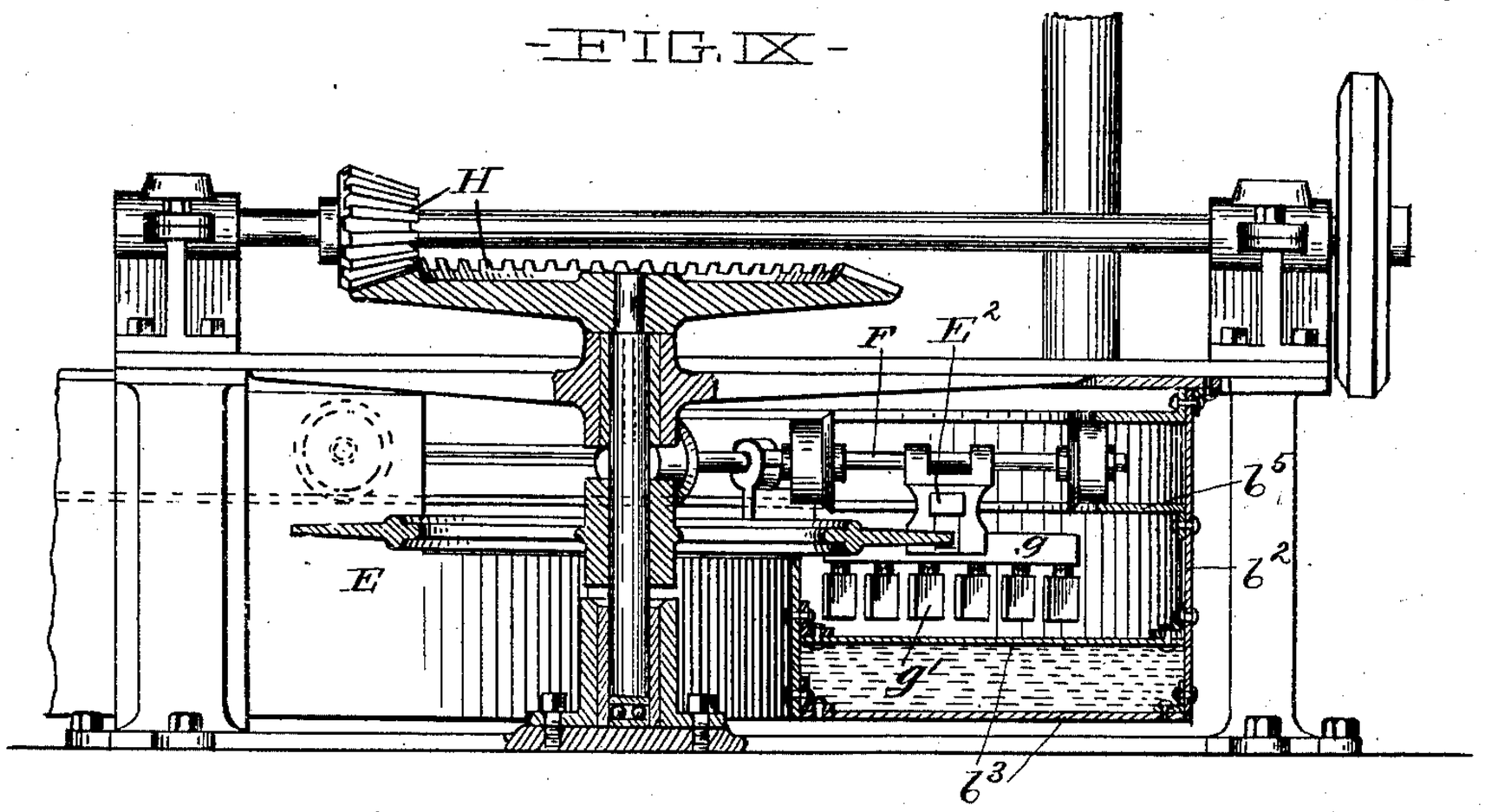


FIG. X

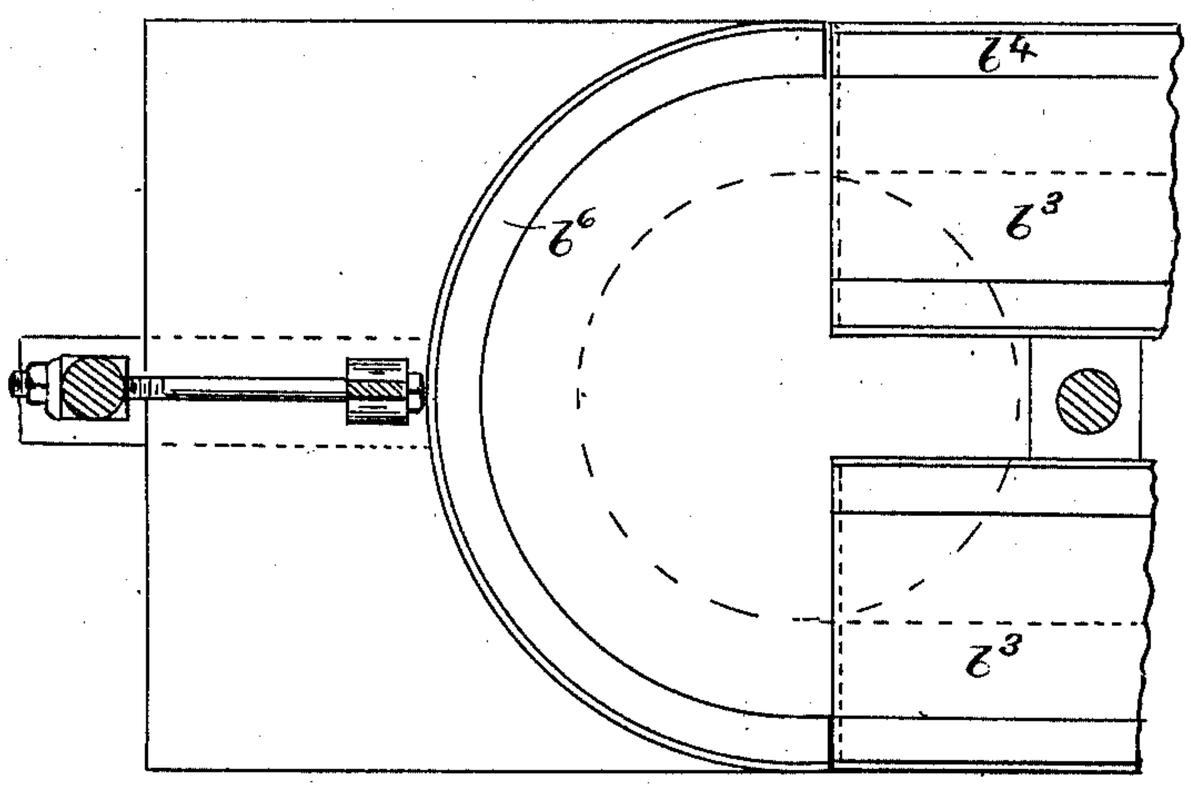
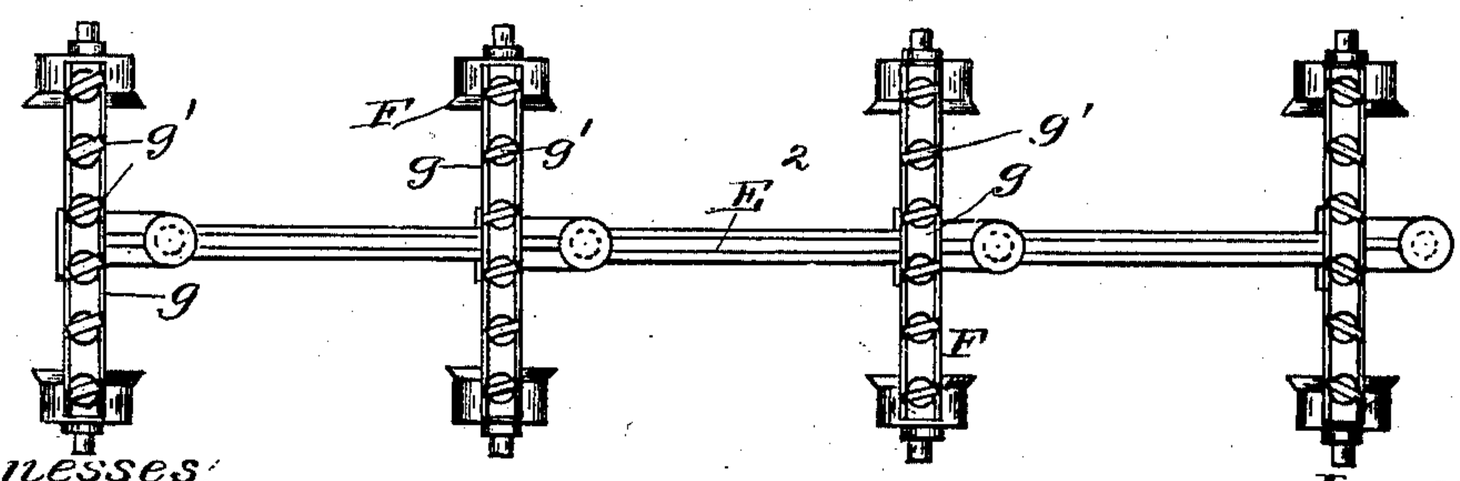


FIG. XI



Witnesses:
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A. E. Merkel

Inventor,
K. F. Snow
By J. D. Fay Atty.

UNITED STATES PATENT OFFICE.

KARL F. SNOW, OF CLEVELAND, OHIO, ASSIGNOR TO C. O. BARTLETT & COMPANY, OF CLEVELAND, OHIO, A PARTNERSHIP.

CONVEYING AND COOLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 719,524, dated February 3, 1903.

Application filed June 8, 1901. Serial No. 63,689. (No model.)

To all whom it may concern:

Be it known that I, KARL F. SNOW, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Conveying and Cooling Apparatus, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to devices for conveying and cooling hot material, such as the clinker produced in the manufacture of Portland cement as it comes from the kilns used in such manufacture, its object being to effect such cooling in a rapid, efficacious, and hence economical manner.

Said invention consists of means hereinafter fully described and specifically pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a broken side elevation of a structure embodying my invention, illustrating the positions of certain parts connected therewith in outline. Fig. II represents a broken plan view of the structure illustrated in Fig. I. Fig. III represents a horizontal section of one end of a conveyer embodying my invention, showing the interior structure in elevation therein. Fig. IV represents a vertical longitudinal section of a part of such conveyer, showing parts in elevation therein, such section being made on an enlarged scale. Fig. V represents a transverse section of said conveyer, taken upon the plane indicated by line 5 5, Fig. IV; and Figs. VI, VII, and VIII represent detail views of parts used in such conveyer. Fig. IX represents a transverse vertical section taken upon the plane indicated by the line 9 9, Fig. III, showing portions in elevation therein. Fig. X represents a detail plan view, and Fig. XI a bottom plan view, of a portion of the means for imparting movement of the material to be cooled through said conveyer, illustrating a series of groups inclined blades utilized for such purpose.

The structure illustrated in the drawings embodies the invention as particularly applied in the manufacture of Portland cement, and I shall hereinafter describe such invention as so applied. Below the series of rotary kilns A is arranged parallel therewith a series of hoppers b, one beneath each kiln. These hoppers are placed upon and communicate with the interior of a conveying-channel formed by a top wall b', double side walls b^2, and a double bottom b^3, as shown in Fig. V. These walls curve at one end of the conveyer-channel and double back, as shown in Figs. II and III, the inner shells of the double side walls, as illustrated in this particular instance, ending in both branches of the channel before curving, as shown in Figs. III and IX, such construction being merely the result of economy of construction and not of operative necessity. The inner shell above mentioned falls short of the top wall b', forming thereby a ledge b^4, which is utilized for a track, as will hereinafter appear. From the points where said inner shell ends a shell b^5, Fig. IX, is secured to the outer shell of the outer side wall, forming a continuation of the outer member of said track. A similar shelf b^6, forming an outside track member, is provided at the opposite end of the structure, as shown in Fig. X.

The opening formed between the inner and outer shells of the side and bottom walls ends at the points c and c', respectively, as shown in Fig. II, and connected with said ends, respectively, are a water-inlet c^2 and a water-outlet c^3, by means of which a stream of water may be caused to continuously flow around in said space between such shells from one end to the other, as will be readily understood.

The conveying-channel ends c^4 and c^5 are left open to communication with the atmosphere, and connected with the curved end is an air-blower D, by means of which a current of air may be caused to continuously flow from one extremity of the structure to the other through both branches of the chan-

nel, such current passing in the construction illustrated in the same direction through both branches simultaneously.

In each end of the structure and at the junction of the ends of the branches of the conveying-channel is located a horizontally-placed sprocket-wheel E and E′, around which passes a sprocket-chain E^2, each link of which is composed of a bar E^3, formed at one end with a yoke *e* for receiving the sprocket-teeth and a bearing *e′* at the opposite end, resting in the end of the yoke of the contiguous link and vertically journaled therein by means of a journal-pin e^2. Each link is suspended from a truck F, provided with two wheels, one mounted at each end of the truck-axle, running upon the track formed by the side walls and shelves. From the middle of each axle is suspended a hanger G, upon the lower end of which is secured a carrier-bar *g*, located transversely of the conveying-channel, as shown in Fig. V. Secured so as to depend from said bar is a series of blades *g′*, capable of angular adjustment relatively to their direction of movement as imparted by the chain E^2, as will appear from the following-described construction.

Each blade is formed with a toothed surface g^2, Figs. VI, VII, and VIII, which is secured to a corresponding surface formed upon or secured to the bar *g*. These two surfaces are secured to each other by means of a bolt g^3, formed upon the blade and passing into the bar *g*, and a nut g^4, screwed down upon said bar, thus fixing the angular position of each blade.

The blades comprising a group on a bar are caused to be parallel with each other and are given a position of angularity relatively to their direction of travel, the angularity being the same in a series of groups and then changing in the succeeding series of groups to the opposite direction, as shown in Fig. XI. The front surfaces of these blades form groups of conveying planes and extend downwardly into the channel to within a short distance of the bottom thereof, as shown in Fig. V.

Suitable gearing H, Fig. IX, is provided for driving the sprocket-wheels and imparting movement of the conveyer planes through the conveying-channel.

In operation of the above-described apparatus movement is imparted simultaneously with the passage of a continuous current of air through the channel and a stream of water through the water-channel, as provided and described, at bottom and sides of said conveying-channel. The hot clinker being fed into the hoppers on one branch of the conveying-channel falls into the latter and is picked up by the blades and carried along as a result of their movement. Owing to the inclination of such blades, however, the forward movement of the clinker is of less speed than that of the blades themselves, its actual movement being partly forward and partly lateral, so that the clinker moves slowly forward and toward one side of the channel during its contact with one series of blade groups, having the same direction of inclination, and subsequently toward the opposite side as a result of its contact with those blades having the opposite inclination. The clinker's path of movement is hence sinuous and of a length greater than that of the channel or that part thereof which it traverses. As a result of such increased length of path the clinker passes over an increased amount of the cooling-surface afforded by the bottom of the channel and water beneath same as compared with the amount traversed by clinker were the latter to move through the channel by the shortest path—that is, parallel with its sides. Such increase of effective cooling-surface, combined with the action of the air-current and increased length of time that the clinker occupies the cooling-channel relatively to the time of occupancy of a conveying-blade, effects a comparatively rapid and hence economical cooling operation. The cooled clinker is discharged at the open end of the channel, from whence it is conveyed in any suitable manner.

I have found it unnecessary to provide a support for the inner wheels of the trucks when passing around the curves at the ends of the apparatus. In traversing one of these curves the outer truck-wheels run upon the shelf b^5, and the truck is supported at its middle by the chain, which in turn is supported by the sprocket-tooth, which engages the yoke *e* of the chain-link in which such truck is journaled, as will be understood from an inspection of Fig. IV. The truck being thus suspended upon the chain and the latter being secured upon the sprocket-wheel, said truck is carried around the curve while being supported, as described.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a conveying and cooling apparatus, the combination of a conveying-channel surrounded by a water-channel, an endless chain operating in such conveying-channel, a series of conveyer devices secured to said chain, means for passing a current of air through said conveying-channel, and means for passing a current of water through said water-channel.

2. In a conveying and cooling apparatus, the combination of a horizontal conveying-channel, a series of conveying-blades, means for moving said blades horizontally through said channel, said blades being inclined relatively to their direction of movement, whereby they are adapted to move material in said channel laterally.

3. In a conveying and cooling apparatus,

the combination of a horizontal conveying-channel, an endless chain and means for moving same through said channel, and a series of conveying-blades secured to said chain, said blades being inclined relatively to their direction of movement, whereby they are adapted to move material in said channel laterally.

4. In a conveying and cooling apparatus, the combination of a conveying-channel, an endless chain and means for moving same, and series of oppositely-inclined groups of conveying-blades secured to said chain.

5. In a conveying and cooling apparatus, the combination of a conveying-channel, series of oppositely-inclined conveying-blades, and means for moving the latter through said channel.

6. In a conveying and cooling apparatus, the combination of a conveying-channel, series of oppositely-inclined blades, and means for moving the latter through said channel, said blades being angularly adjustable relatively to the direction of their movement.

7. In a conveying and cooling apparatus, the combination of a conveying-channel, an endless chain, series of oppositely-inclined blades secured to said chain and means for moving the latter, said blades being angularly adjustable relatively to the direction of chain movement.

8. In a conveying and cooling apparatus, the combination of a conveying-channel, a series of blades, means for moving the latter through said channel, said blades being inclined with respect to their direction of movement, and means for passing an air-current through said channel.

9. In a conveying and cooling apparatus, the combination of a conveying-channel, a series of conveying-blades, a carrier for such blades adapted to move through such channel, and means for operating such carrier, said blades being inclined with respect to the direction of carrier movement, whereby they are adapted to move material in said channel laterally.

10. In a conveying and cooling apparatus, the combination of a conveying-channel, a carrier adapted to travel through said channel, a series of groups of parallel conveying-blades supported upon such carrier, the blades of each group being inclined relatively to the direction of carrier travel, and means for operating such carrier.

11. In a conveying and cooling apparatus, the combination of a horizontal conveying-channel, a carrier adapted to move through the látter, a series of conveying-blades secured to and projecting downwardly from said carrier, said blades being inclined relatively to their direction of movement, whereby they are adapted to move material in said channel laterally.

12. In a conveying and cooling apparatus, the combination of a horizontal conveying-channel, a carrier adapted to move through the latter, and series of oppositely-inclined conveying-blades secured to said carrier.

13. In a conveying and cooling apparatus, the combination of a horizontal conveying-channel, a carrier adapted to move through the latter, and series of oppositely-inclined adjustable carriers secured to said carrier.

14. In a conveying and cooling apparatus, the combination of a horizontal conveying-channel, a carrier adapted to move through the latter, and series of downwardly-projecting oppositely-inclined conveying-blades secured to said carrier.

15. In a conveying and cooling apparatus, the combination of a sprocket-chain link, a truck mounted upon a track, said link depending from the truck-axle and provided with a transverse carrier-bar, and a series of blades depending from said bar.

16. In a conveying and cooling apparatus, the combination of a conveyer-track, a conveying-channel below and intermediate of the two sides of such track, a series of trucks mounted upon the latter, a sprocket-chain and means for supporting and driving same, each link of said chain supported upon and depending from a truck-axle, a series of carrier-bars secured to such links extending transversely of and in said channel and a series of conveyer-blades depending from each of said bars.

Signed by me this 22d day of May, 1901.

KARL F. SNOW.

Attest:
D. T. DAVIES,
A. E. MERKEL.