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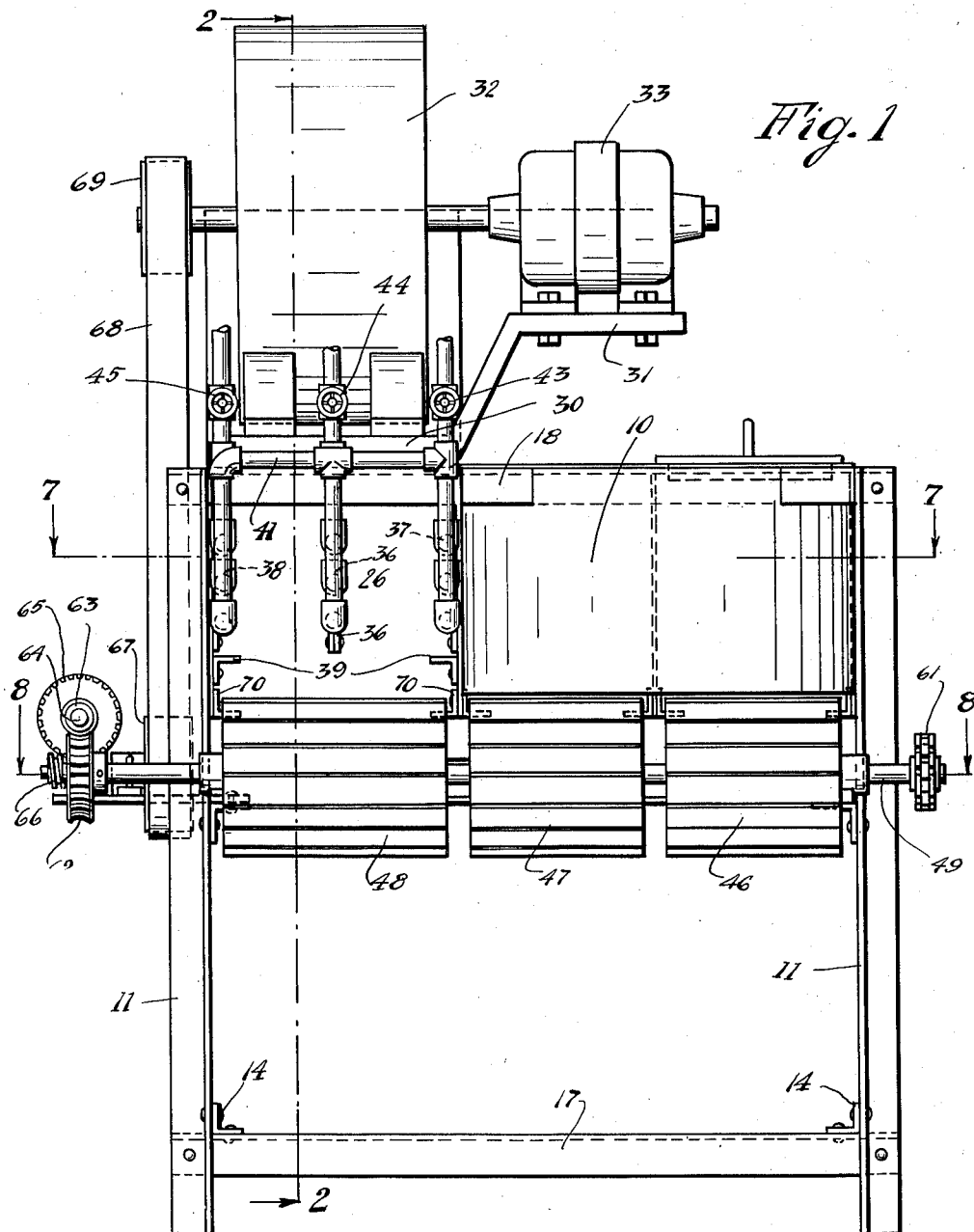
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H. D. LATHROP ET AL

COOLING APPARATUS

Filed Oct. 23, 1922

8 Sheets-Sheet 1



Witnesses:

W. H. H. H. H. H.
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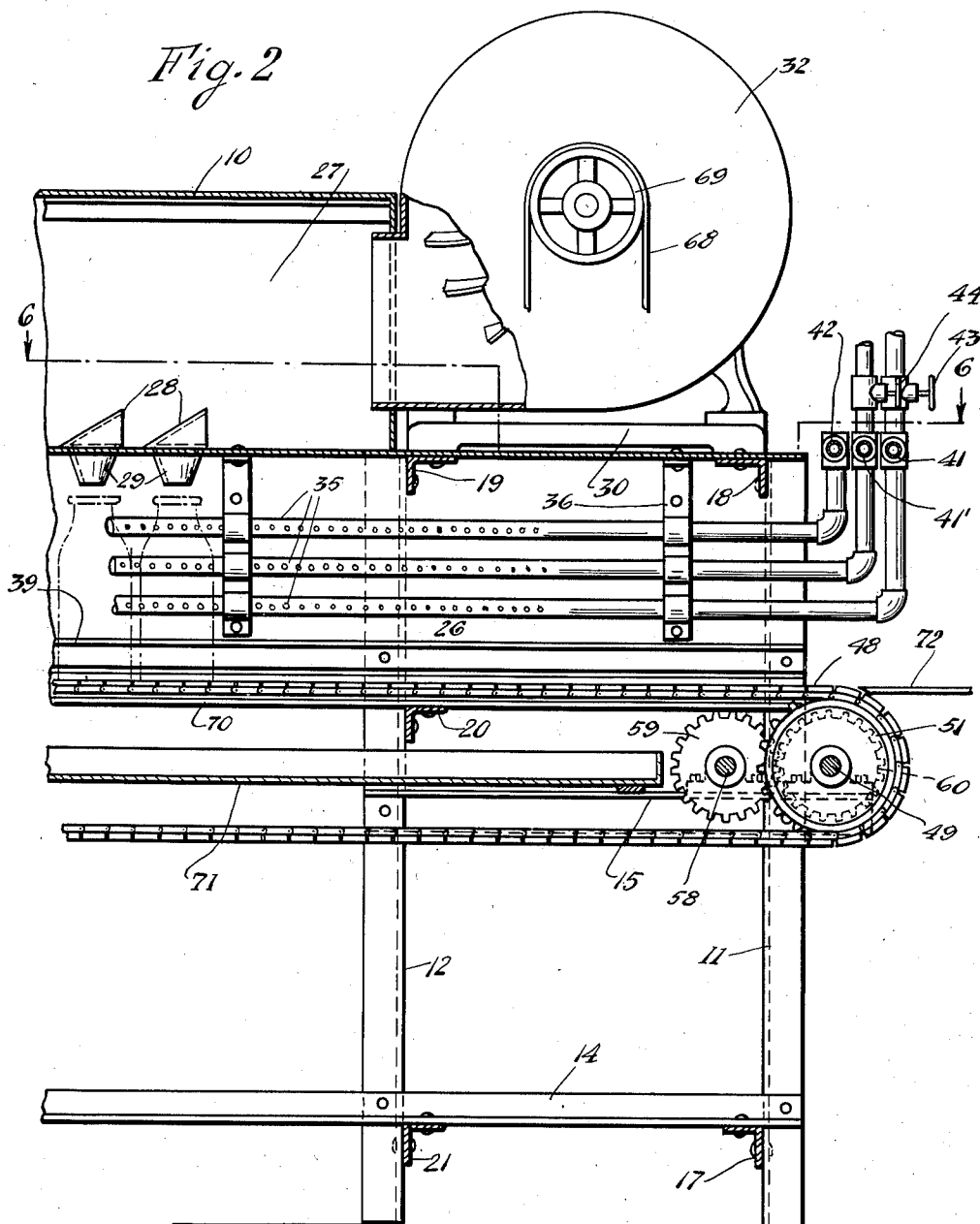
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COOLING APPARATUS

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8 Sheets-Sheet 2



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8 Sheets-Sheet 3

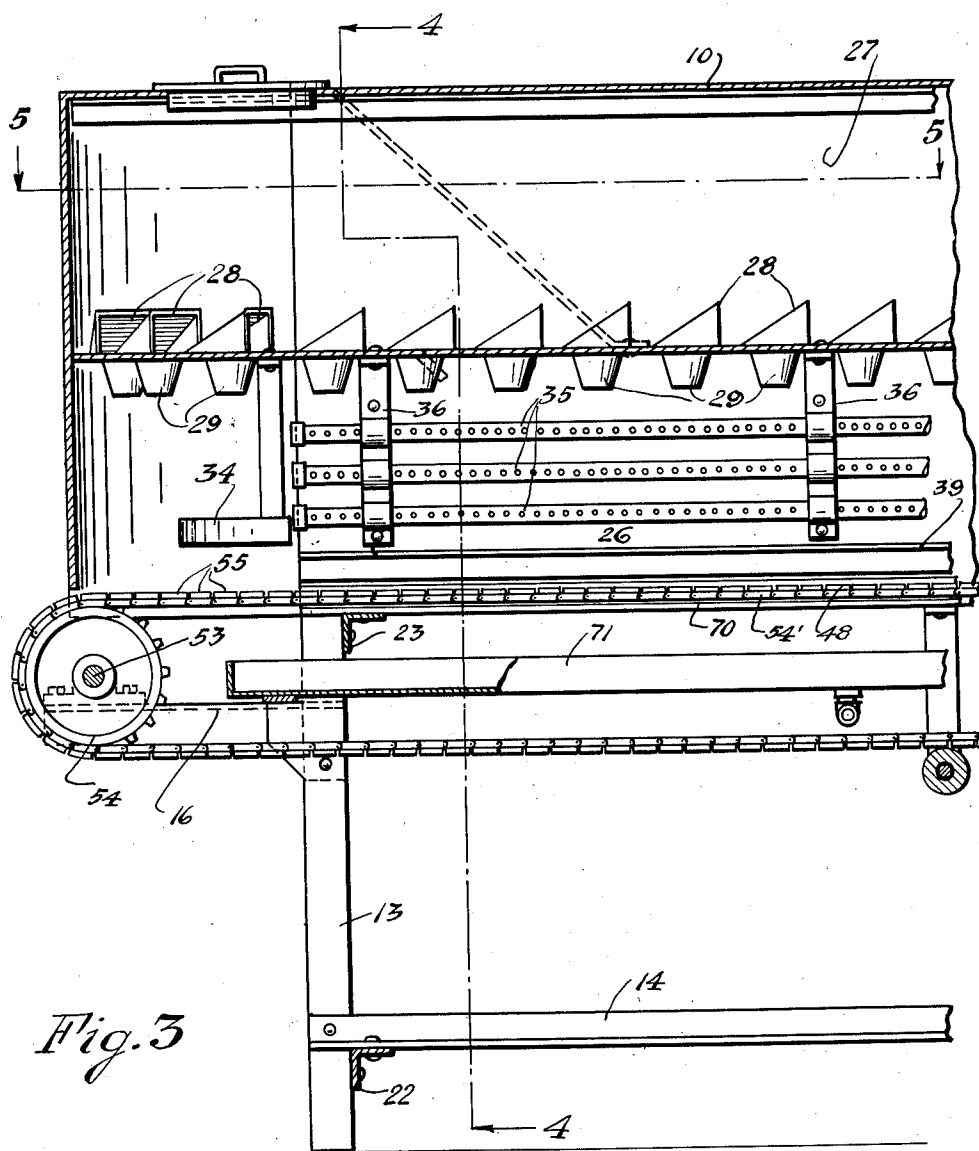


Fig. 3

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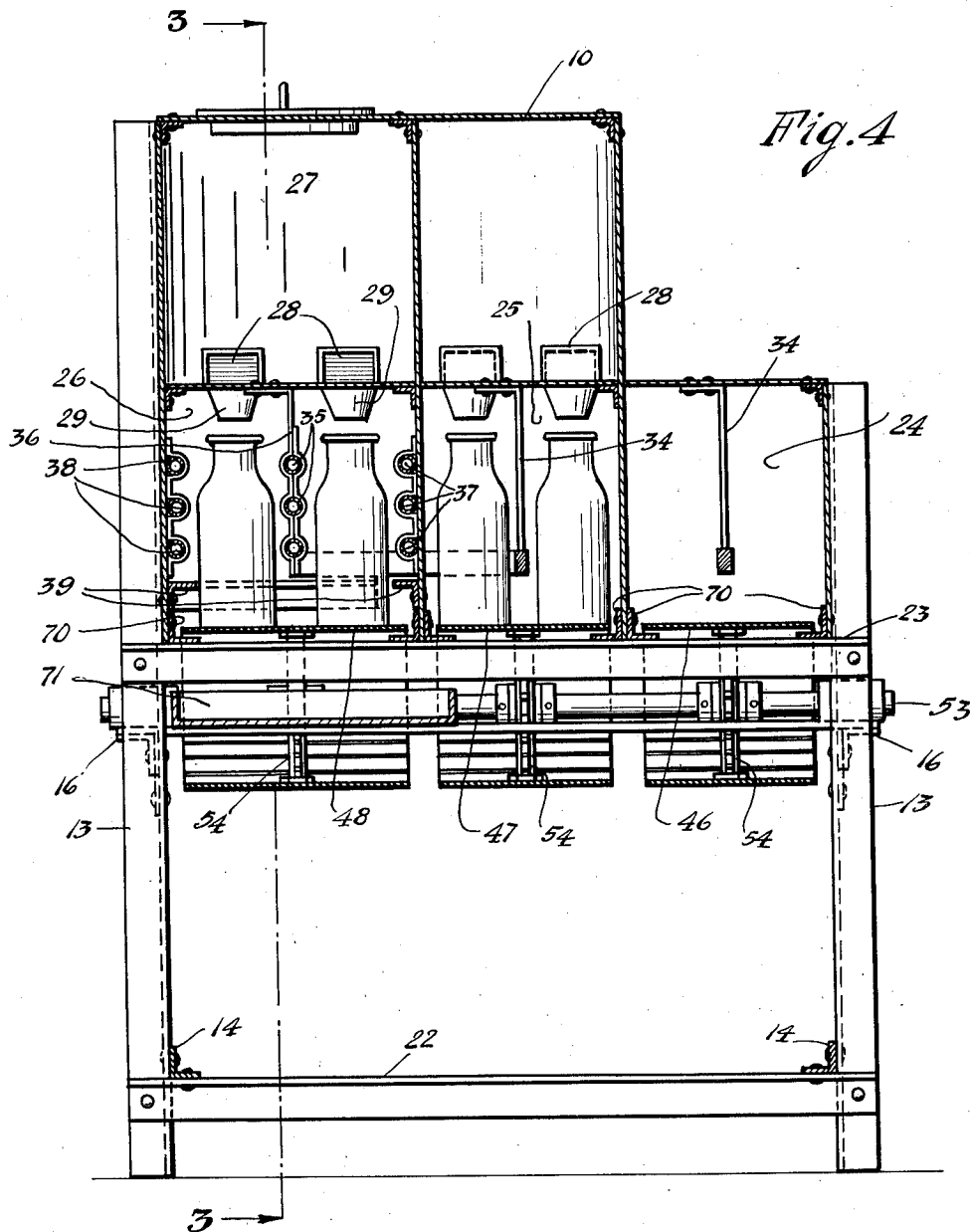
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H. D. LATHROP ET AL

COOLING APPARATUS

Filed Oct. 23, 1922

8 Sheets-Sheet 4



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Jan. 12, 1926.

1,569,191

H. D. LATHROP ET AL

COOLING APPARATUS

Filed Oct. 23, 1922

8 Sheets-Sheet 5

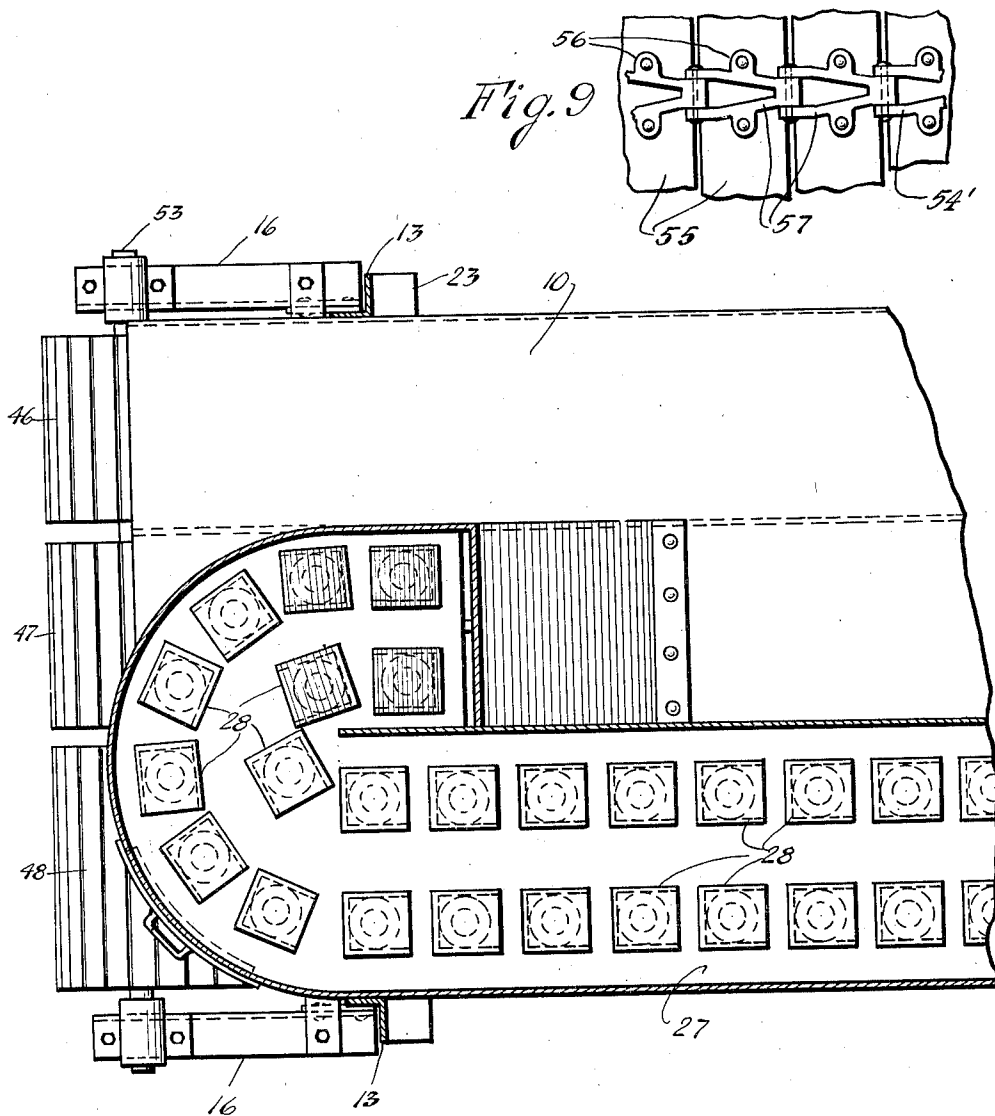


Fig. 5

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H. D. LATHROP ET AL

COOLING APPARATUS

Filed Oct. 23, 1922

8 Sheets-Sheet 6

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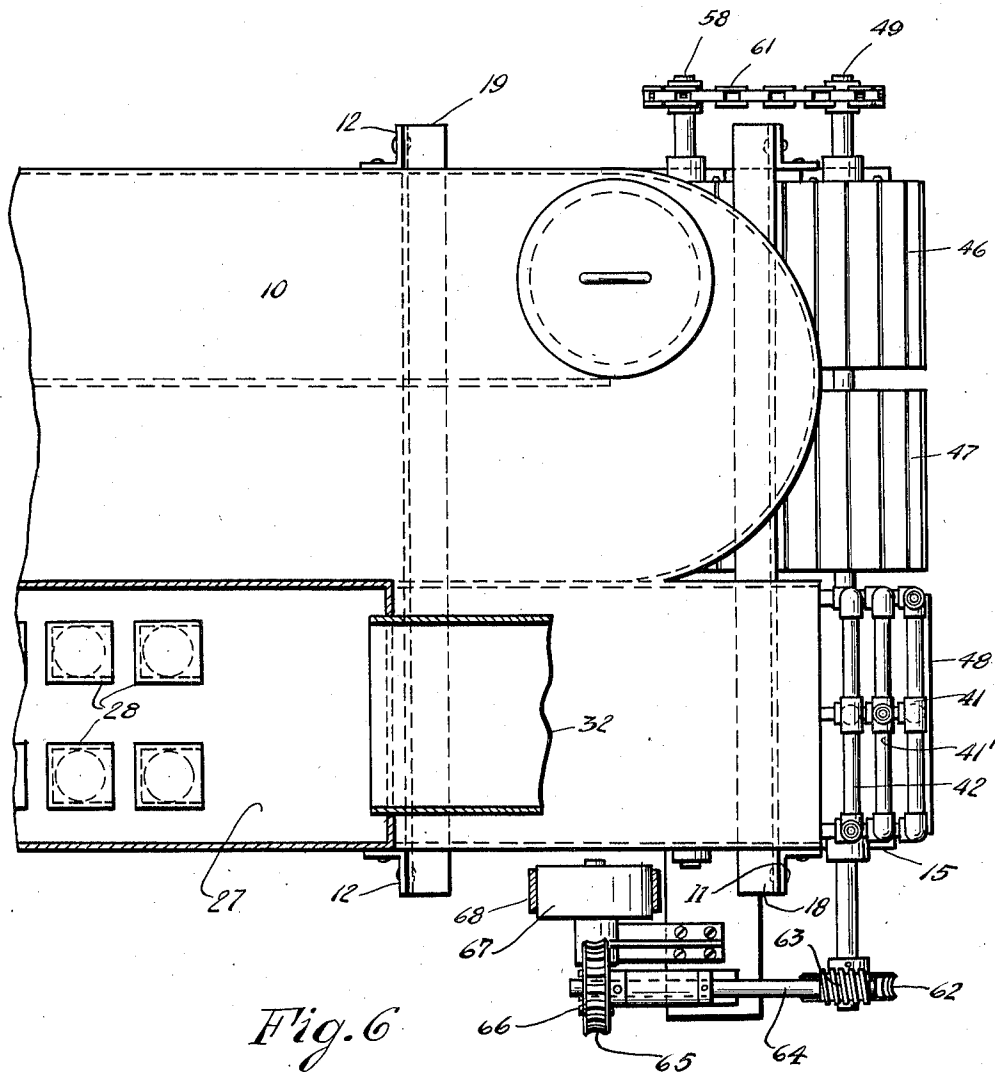


Fig. 6

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H. D. LATHROP ET AL

COOLING APPARATUS

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8 Sheets-Sheet 7

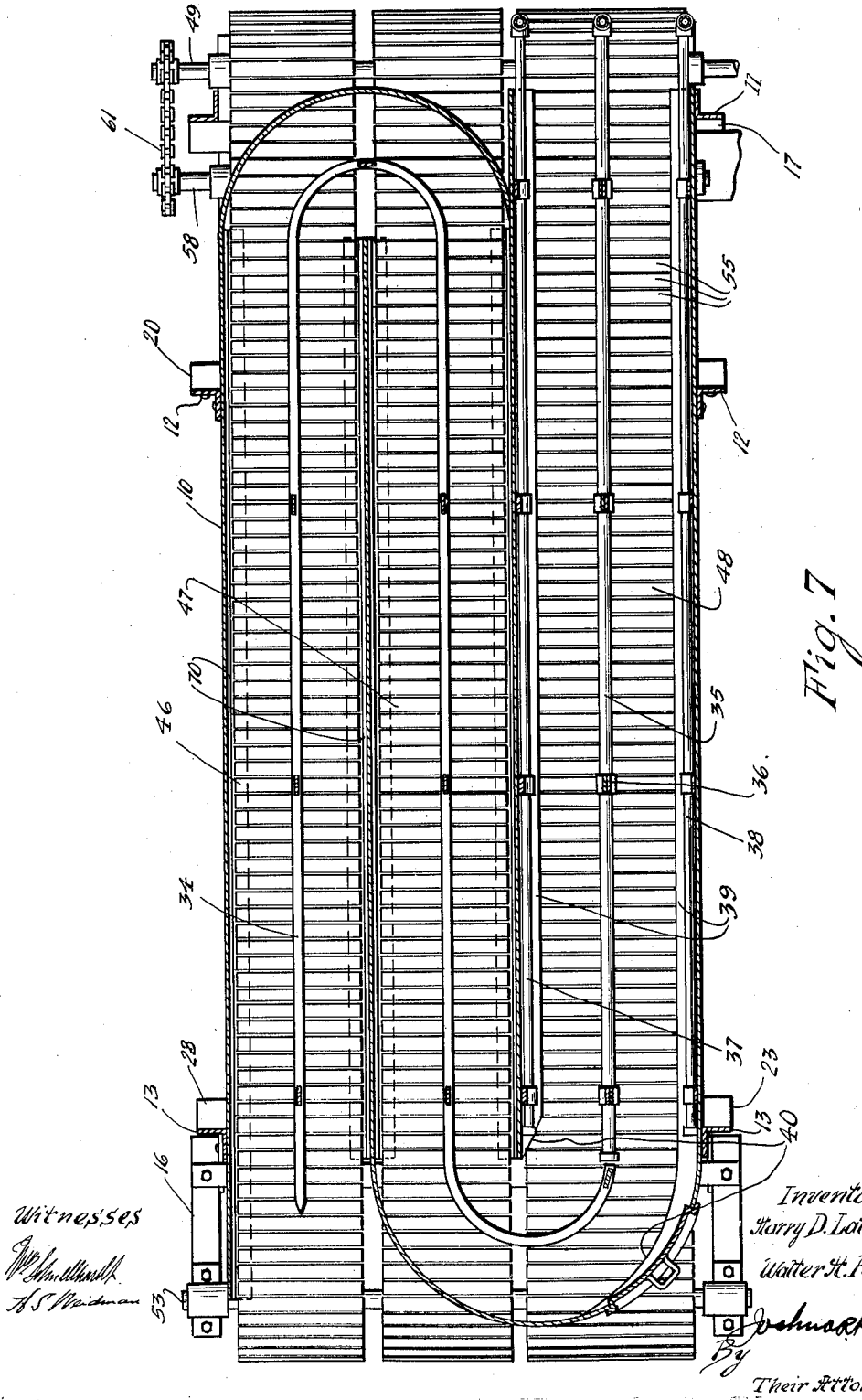


Fig. 7

Witnesses
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Inventors:-
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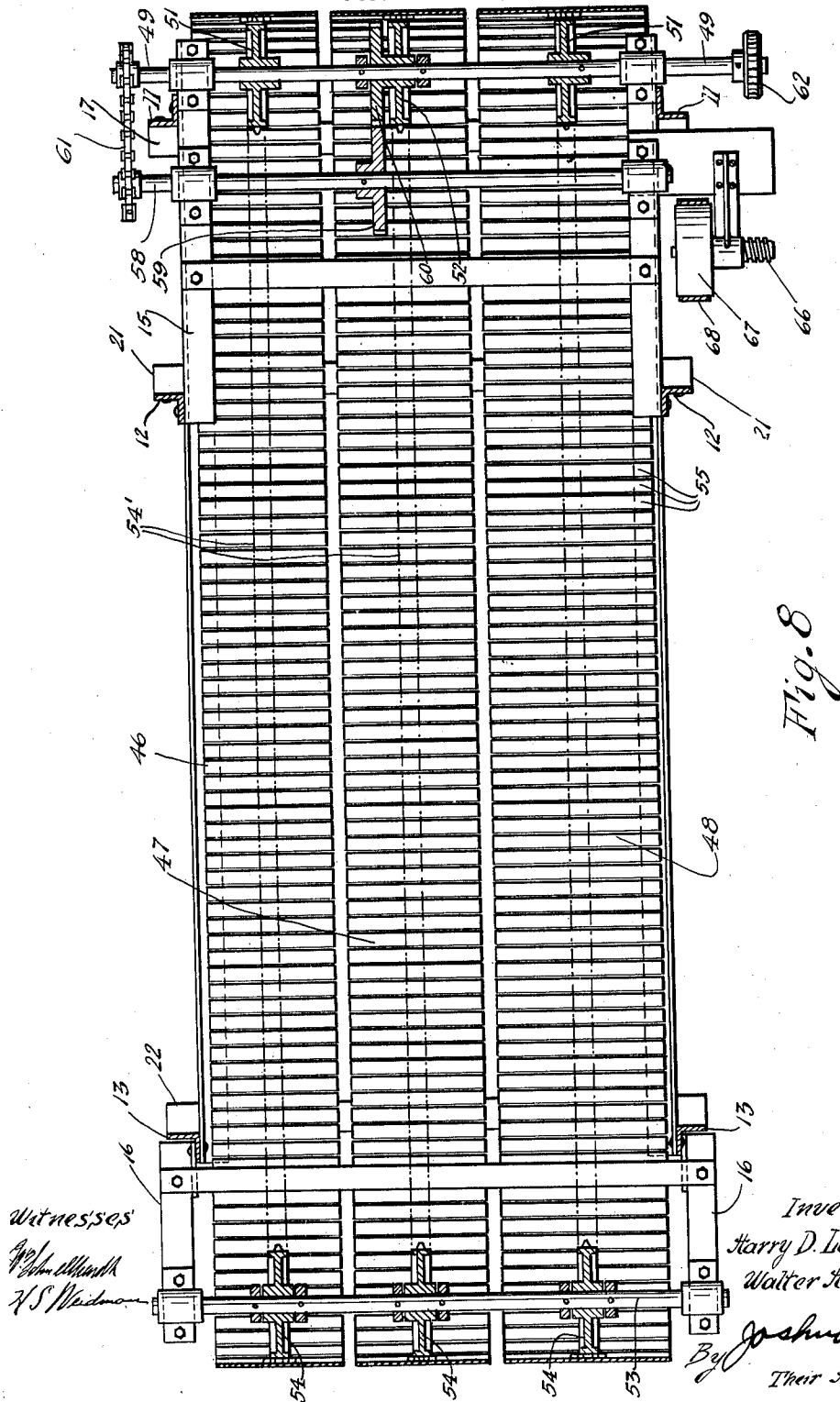
1,569,191

H. D. LATHROP ET AL

COOLING APPARATUS

Filed Oct. 23, 1922

8 Sheets-Sheet 8



UNITED STATES PATENT OFFICE.

HARRY D. LATHROP AND WALTER H. PAULSON, OF CHICAGO, ILLINOIS; SAID PAULSON ASSIGNOR TO SAID LATHROP.

COOLING APPARATUS.

Application filed October 23, 1922. Serial No. 596,285.

To all whom it may concern:

Be it known that we, HARRY D. LATHROP and WALTER H. PAULSON, citizens of the United States, and residents of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Cooling Apparatus, of which the following is a specification.

This invention relates to cooling apparatus, and more particularly to an apparatus for cooling milk bottles, which have been previously heated to high temperatures during sterilization or washing processes, in such a manner that the bottles are gradually and quickly cooled without cracking or breaking the same by sudden reduction in the temperature of the bottles, so that the bottles are almost immediately ready to be filled with milk.

Another object of the invention is to provide means for advancing the bottles through a housing in one direction, and to direct a cooling current of air through said housing in the opposite direction, so that the cooling air is automatically tempered by passage over the bottles, and automatically tempers the bottles with the result that by the time the bottles reach a point adjacent the end of the housing they will be sufficiently cooled so that a cold water spray may be directed onto same without breaking the bottles.

Another object of the invention is to arrange the cooling means in such a manner that the same is initially directed to the outside of the bottles, but as the bottles are somewhat cooled during their travel, the cooling means is also introduced inside of the bottles, further cooling same, and in addition different and more drastic cooling means such as a cold water spray, is directed onto the bottles when same are cooled enough to withstand it without breaking.

Another object of the invention is to provide a housing having a tortuous passage-way therethrough, so that the bottles travel a comparatively long distance within a small space. Another object is to provide means for conveying the bottles through the tortuous passage-way at a uniform and predetermined rate of speed; still another object of the invention is to provide guide

means so that a plurality of rows of bottles may be conveyed through the housing at one time without interference; still another object of the invention is to provide means for disposing the water cooling means so that same may be adjusted to operate upon bottles of different sizes and to form part of said guiding means; and still another object of the invention is to arrange means for directing air inside of the bottles a certain distance apart so that during the passage of the bottles through the housing a plurality of jets of air are directed into the bottles.

Other objects will appear hereinafter.

The invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification, and in which,

Fig. 1 is a front elevation of the invention;

Fig. 2 is a fragmentary longitudinal sectional view of the invention on the line 2—2, Fig. 1, showing the forward portion of the apparatus;

Fig. 3 is a fragmentary longitudinal sectional view of the invention on the line 3—3, Fig. 4, showing the rear portion of the machine;

Fig. 4 is a vertical sectional view of the invention taken on the line 4—4 of Fig. 3;

Fig. 5 is a transverse sectional view on the line 5—5, Fig. 3;

Fig. 6 is a plan view of the forward end of the invention, partly in section, on the line 6—6, Fig. 2;

Fig. 7 is a transverse sectional view of the invention, on the line 7—7, Fig. 1;

Fig. 8 is a transverse sectional view of the invention, on the line 8—8 of Fig. 1; and

Fig. 9 is a fragmentary detail view of conveyor links, showing the manner of fastening slats on the chain to form the conveyor.

Referring to the drawings, 10 represents a housing of suitable sheet metal, mounted upon a suitable frame preferably comprising vertical angle bars 11, 12 and 13, longi-

tudinal bars 14, 15 and 16, and transverse bars 17, 18, 19, 20, 21, 22 and 23, as shown in the drawings.

The housing 10 is preferably provided with parallel passage-ways 24, 25 and 26, such passage-ways preferably communicating at their opposite ends so as to form a continuous tortuous passage-way. Preferably disposed above the passage-way 26 is a compartment 27, which is co-extensive with the passage 26, and extends partly onto the passage 25, as shown in Fig. 5, where it is deflected downwardly into the passage 25. The compartment 27 preferably is provided with a plurality of deflectors 28, preferably arranged in two rows along the bottom thereof as shown in Fig. 5, such rows of deflectors extending around the curve formed by the passage to a point adjacent where said compartment is deflected into the passage-way 25. Each of the deflectors 28 preferably has a funnel-shaped jet 29 communicating therewith, which projects into the passage-way 26, and into the rear end of the passage-way 25. The deflectors 28 are preferably spaced apart a distance corresponding to the distance between the mouths of quart milk bottles for a purpose as will presently appear.

Preferably mounted upon the angle bars 18 and 19 of the frame, is a supporting base 30, which base may have a lateral extension 31 thereon. Mounted upon the base 30 is a turbine 32 of any suitable type, which is adapted to be driven by a motor 33, so as to direct a strong current of air into the compartment 27, through the deflectors 28 and into the passage-way 26, being then deflected at the rear end of the passage 25 thereinto, and continuing through said passage 25 and outwardly through the passage 24.

Disposed in the passage-ways 24 and 25, substantially at a point intermediate their side walls is a pendant guide or rail 34, which follows the conformation of the tortuous passage formed by the passages 24 and 25. The guide member 34 per se terminates at a point adjacent the rear portion of the passage 26. In its place is provided a plurality of water pipes 35, disposed in spaced superposed relation, and supported in such passage-way by a suitable bracket 36, said pipes being provided with a plurality of spraying apertures at their opposite sides for a purpose which will presently become apparent. Mounted upon the side walls of the passage 26 preferably in the same planes as the pipes 35 are similar pipes 37 and 38, the pipes 37 and 38 having a plurality of spray apertures which are directed inwardly toward the pipes 35. It will be seen that the pipes 35 being disposed in the position of the guide member 34 will form a substitute for the guide 34 and act in place of said guide. In addition to the guide 34 and

the pipes 35, 37 and 38, we preferably provide the opposite walls of the passage 26 with angle bars 39 which preferably extend inwardly to the point where the passage 26 curves into communication with the passage 25, the ends of the bars 39 preferably being tapered as shown at 40 so as to afford efficient guide means for bottles traveling therepast.

The water pipes 35, 37 and 38 are disposed in three superposed tiers as shown in Figs. 1, 2, 3 and 4, and each tier of said pipes is connected to a separate header, the lowermost tier being connected to a header 41, the intermediate tier to a header 41', and the uppermost tier to a header 42, each of said headers being controlled by separate valves 43, 44 and 45 respectively, so that the water in the various tiers of pipes may be simultaneously controlled.

Any suitable means are provided for conveying the bottles through the tortuous path formed by the communicating passages 24, 25 and 26; however, we preferably provide endless conveyors 46, 47 and 48, in the passage-ways 24, 25 and 26 respectively, and so arrange the conveyors that the conveyor 46 travels toward the forward end of the machine, the conveyor 47 toward the rear end of the machine, and the conveyor 48 toward the forward end of the machine. By this arrangement it will be seen that bottles placed on the conveyor at the beginning of the passage 24, will be moved toward the forward end of said passage, and by reason of the guide member 34, and the pressure exerted by bottles behind same will be delivered onto the conveyor 47, which will carry such bottles into the rear end of the passage 25 and into the passage 26 as will be readily appreciated. As stated any suitable conveyors may be employed, but we preferably construct such conveyors in the following manner. Mounted on the frame by any suitable means is a shaft 49, which may have sprockets 51 keyed thereon and sprocket 52 loosely mounted thereon. The rear end of the machine is also provided with a shaft 53, which has sprocket wheels 54 loosely mounted thereon. Sprocket chains 54' are adapted to extend over the sprocket wheels so as to form endless conveying chains. Upon each of the said chains we mount a plurality of slats 55, which may be secured to ears 56 provided on the chain links 57. In order to drive the conveyor 47 in a direction opposite to the conveyors 46 and 48, we preferably provide a counter-shaft 58, and provide same with a spur gear 59 adapted to engage a spur gear 60 fastened to the sprocket wheel 52 as shown in Fig. 8, the countershaft 58 being driven by a chain 61 from the main driven shaft 49. The shaft 49 is provided with a worm gear 62, which is adapted to

be driven by means of a worm 63, mounted on a shaft 64 which shaft in turn is driven by a worm gear 65 driven from a worm 66, the worm 66 being connected to a pulley 67, said pulley being driven by a belt 68 from a pulley 69 connected to the motor shaft 33.

By this arrangement the ratio between the speed of the motor and the speed of the conveyors is greatly reduced. The upper operable portion of each of the conveyors preferably has the side edges of the slats 55 disposed above angle bars 70 as shown in Figs. 1 and 4 to prevent tilting of the conveyors.

A drain pan 71 is preferably mounted beneath the passage-way 26, to catch the drainage water from the spraying pipes 35, 37 and 38, such water being conveyed to a discharge point by any suitable means (not shown.)

In operation milk bottles are fed to the conveyor 46 at the rear end of the machine, preferably in two rows of adjacent bottles; said bottles are carried by the conveyor at a comparatively low rate of speed through the passage 24, into the passage 25, and all during this time such bottles are subjected to a strong current of air from the turbine 32 through the compartment 27 and downwardly into the passage 25, the air passing over the bottles becoming automatically tempered, or milder, as it travels past the bottles toward the outlet of the passage 24 thus partially cooling the bottles. At the point adjacent the rear end of the passage-way 25 the current of air is introduced into the bottles by means of the deflectors 28 and the jets 29; the bottles thus being further cooled, then travel into the passage-way 26, and pass the sprays of water delivered by the pipes 35, 37 and 38, at the same time continuously receiving a current of cool air through the deflectors 28 and jets 29, until the bottles are delivered at the end of the passage 26 onto a table such as that shown at 72 in Figure 2 of the drawings, in a thoroughly cooled condition, so that they may be immediately filled with milk.

It is to be noted that a most important practical feature of the invention lies in the fact that there is a combined application of air and water to the bottles in such a manner that the air automatically tempers itself to the bottles, and automatically tempers the bottles, so that by the time the bottles reach the cold water spray they are sufficiently cooled so that they will not break on account of the sudden change of temperature. This is brought about mainly by reason of the fact that the hot bottles and the cold air are traveling in opposite directions, which automatically produces the required tempering effect and makes it possible to quickly cool the bottles from a very high to a very low temperature without breaking the same.

While we have illustrated and described the preferred form of construction for carrying our invention into effect, this is capable of variation and modification without departing from the spirit of the invention. We therefore do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of such variations and modifications as come within the scope of the appended claims.

Having described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A cooling apparatus comprising means for advancing heated hollow objects therethrough; and means for directing different degrees of cooling medium to the inside of said articles at different points in their travel.

2. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in co-operative relation with said articles for cooling same from the inside and the outside; and additional cooling means introduced after said articles have been partially cooled.

3. A cooling apparatus comprising means for advancing heated hollow objects therethrough in a tortuous direction; and means for directing different degrees of cooling medium to the inside of said objects and for automatically tempering the cooling medium to said objects during the operation of the apparatus.

4. A cooling apparatus comprising means for advancing heated objects therethrough; and means for directing different degrees of cooling medium both inside and outside of said articles at different points in their travel.

5. A cooling apparatus comprising means for conveying a plurality of heated articles in a continuous upright position; means arranged in co-operative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; and additional cooling means introduced after said articles have been partially cooled.

6. A cooling apparatus comprising level means for conveying a plurality of heated articles in a continuous upright position therethrough; means arranged in co-operative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; and means for applying another and different cooling medium to said articles after they are partially cooled.

7. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in co-operative relation with said articles for cooling

same and automatically tempering the cooling medium to said articles during the operation of said apparatus; and means for directing cooling medium both inside and outside of said articles.

8. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in cooperative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to both the inside and outside.

9. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in cooperative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus, said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to both the inside and outside; and means for introducing another and more drastic means to the outside of said article.

10. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in cooperative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to the inside thereof; and means for introducing another and more drastic cooling medium to the outside of said article at the same time that said first named cooling medium is directed to the inside of said article.

11. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in cooperative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; means for applying another and different cooling medium to said articles after they are partially cooled; and means for accommodating said laterally mentioned cooling medium to objects of different sizes.

12. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction; and means for applying another and differently affective cooling medium to said articles when the same are partially cooled.

13. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction; and means for directing cooling medium both inside and outside of said articles.

14. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction; and other and differently affective cooling means introduced adjacent the end of the travel of said articles.

15. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction, said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to both the inside and outside; and means for introducing another and more drastic means to the outside of said article.

16. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction, said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to both the inside and outside; and means for introducing another and more drastic cooling medium to the outside of said article at the same time that said first named cooling medium is directed to the inside of said article.

17. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction, said means during a portion of the travel of said articles being directed to the outside thereof, and at another point in said travel being directed to both the inside and outside; means for introducing another and more drastic cooling medium to the outside of said articles at the same time that said first named cooling medium is directed to the inside of said articles; and means for accommodating said latterly mentioned cooling medium to objects of different sizes.

18. A cooling apparatus having a plurality of passages arranged parallel laterally and forming a tortuous passage-way therethrough; and means for conveying articles through said passage-way, said means comprising separate conveyors traveling in different directions.

19. A cooling apparatus comprising a housing having horizontally annexed parallel passage-ways communicating at their op-

posite ends; a conveyor for each of said passage-ways for carrying articles in an upright position, the outer of said conveyors being driven in the same direction while the inner of said conveyors is driven in the opposite direction; and means for directing different cooling mediums along said passage-way.

20. A cooling apparatus having a tortuous, level passage-way therethrough; means for conveying articles in a continuous upright position through said passage-way, said means comprising separate conveyors traveling in different directions; means for transferring articles from one conveyor to another, and means for directing cooling medium along said passage-way.

21. A cooling apparatus comprising a passage-way; means for conveying articles through said passage-way; and means for directing a cooling medium both inside and outside of said articles during their travel.

22. A cooling apparatus having a tortuous passage-way therethrough; means for conveying heated articles through said passage-way, said means comprising conveyors traveling in different directions; and means for directing a cooling medium both inside and outside of said articles during their travel.

23. A cooling apparatus having a tortuous passage-way therethrough; means for conveying heated articles through said passage-way, said means comprising conveyors traveling in different directions; and means for directing a cooling medium along said passage-way in a direction opposite to the travel of said articles; and means for directing a cooling medium both inside and outside of said articles during their travel.

24. A cooling apparatus having a passage-way; means for conveying articles through said passage-way; means for introducing a cooling medium outside of said articles during part of their travel, and means for introducing a cooling medium both inside and outside of said articles during another part of said travel.

25. A cooling apparatus having a passage-way; means for conveying articles through said passage-way; means for introducing a cooling medium outside of said articles during part of their travel, means for introducing a cooling medium both inside and outside of said articles during another part of said travel; and means for introducing additional drastic cooling means to the outside of said articles during the latter part of their travel.

26. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction; and means for applying another and more drastic cool-

ing medium to said articles after they are partially cooled, said drastic means being a cold water spray.

27. A cooling apparatus comprising means for conveying a plurality of heated articles therethrough; means arranged in cooperative relation with said articles for cooling same and automatically tempering the cooling medium to said articles during the operation of said apparatus; means for applying another and different cooling medium to said articles after they are partially cooled; and means for accommodating said latterly mentioned cooling medium to objects of different sizes, said accommodating means comprising water spraying pipes arranged at different heights.

28. A cooling apparatus comprising means for introducing a body of cooling medium traveling in one direction; a plurality of heated articles traveling in said body in the opposite direction; means for applying another and more drastic cooling medium to said articles after they are partially cooled, said drastic means being a cold water spray; and means for drawing the waste water away from the apparatus.

29. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; means for directing air through said passage-way in the opposite direction; and water pipes arranged in superposed tiers in said passage-way adjacent the discharge end thereof.

30. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; means for directing air through said passage-way in the opposite direction; water pipes arranged in superposed tiers in said passage-way adjacent the discharge end thereof; and valve means for controlling each tier of said water pipes.

31. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; means for directing air through said passage-way in the opposite direction; and centrally disposed guide means extending through said housing, said guide means terminating short of the discharge end of said passage-way; and water spray pipes disposed in said passage-way and forming a continuation of said guide means.

32. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-

way for a portion thereof adjacent the discharge end of same, and then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; and deflectors in said compartment communicating with said passage-way for directing air into said articles.

33. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-way for a portion thereof adjacent the discharge end of same, and then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles, said deflectors being spaced apart a distance equal to the distance between said heated articles.

34. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-way for a portion thereof adjacent the discharge end of same, then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; and water spraying pipes disposed in said passage-way adjacent the discharge end thereof for spraying said heated articles as they progress therepast.

35. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-way for a portion thereof adjacent the discharge end of same, then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; and water spraying pipes disposed in said passage-way adjacent the discharge end thereof for spraying said heated articles as they progress therepast, said water pipes

being arranged in superposed tiers in said passage-way.

36. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-way for a portion thereof adjacent the discharge end of same, then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; water spraying pipes disposed in said passage-way adjacent the discharge end thereof for spraying said heated articles as they progress therepast, said water pipes being arranged in superposed tiers in said passage-way; and valve means for controlling each tier of said water pipes.

37. A cooling apparatus comprising a housing having a continuous passage-way therethrough; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being substantially co-extensive with said passage-way for a portion thereof adjacent the discharge end of same, and then merging into said passage-way; means for directing air through said compartment and said passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; guide means extending centrally through said passage-way and terminating at a distance from the discharge end thereof; and water spray pipes some of which are arranged centrally in said passage-way and form a continuation of said guide means.

38. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends and forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; and deflectors in said compartment communicating with said passage-way for directing air into said articles.

39. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends and forming a continuous passage-way;

means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; and water pipes arranged in superposed tiers in said passage-way adjacent the discharge end of said passage-way.

40. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; and water pipes arranged in superposed tiers in said passage-way adjacent the discharge end thereof; and valve means for controlling each tier of said water pipes.

41. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; centrally disposed guide means extending through said housing, said guide means terminating short of the discharge end of said passage-way; and water spraying pipes some of which are disposed in said passage-way to form a continuation of said guide means.

42. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; said conveying means comprising conveyors arranged

to travel in opposite directions; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; and deflectors in said compartment communicating with said passage-way for directing air into said articles.

43. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; said conveying means comprising conveyors arranged to travel in opposite directions; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; and water pipes arranged in superposed tiers in said passage-way adjacent the discharge end of said passage-way.

44. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction; said conveying means comprising conveyors arranged to travel in opposite directions; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; water pipes arranged in superposed tiers in said passage-way adjacent the discharge end of said passage-way; and valve means for controlling each tier of said water pipes.

45. A cooling apparatus comprising a housing having a plurality of parallel passages communicating at their opposite ends, forming a continuous passage-way; means for conveying heated articles through said passage-way in one direction, said conveying means comprising conveyors arranged to travel in opposite directions; a compartment disposed adjacent said passage-way, said compartment being co-extensive with said passage-way for a portion adjacent the

discharge end thereof, and then merging into said passage-way; means for directing air through said compartment and passage-way in a direction opposite to the travel of said heated articles; deflectors in said compartment communicating with said passage-way for directing air into said articles; centrally disposed guide means extending through said housing, said guide means terminating short of the discharge end of said passage-way; and water spraying pipes some of which are disposed in said passage-way to form a continuation of said guide means.

In testimony whereof we have signed our names to this specification.

HARRY D. LATHROP.
WALTER H. PAULSON.