

Feb. 26, 1924.

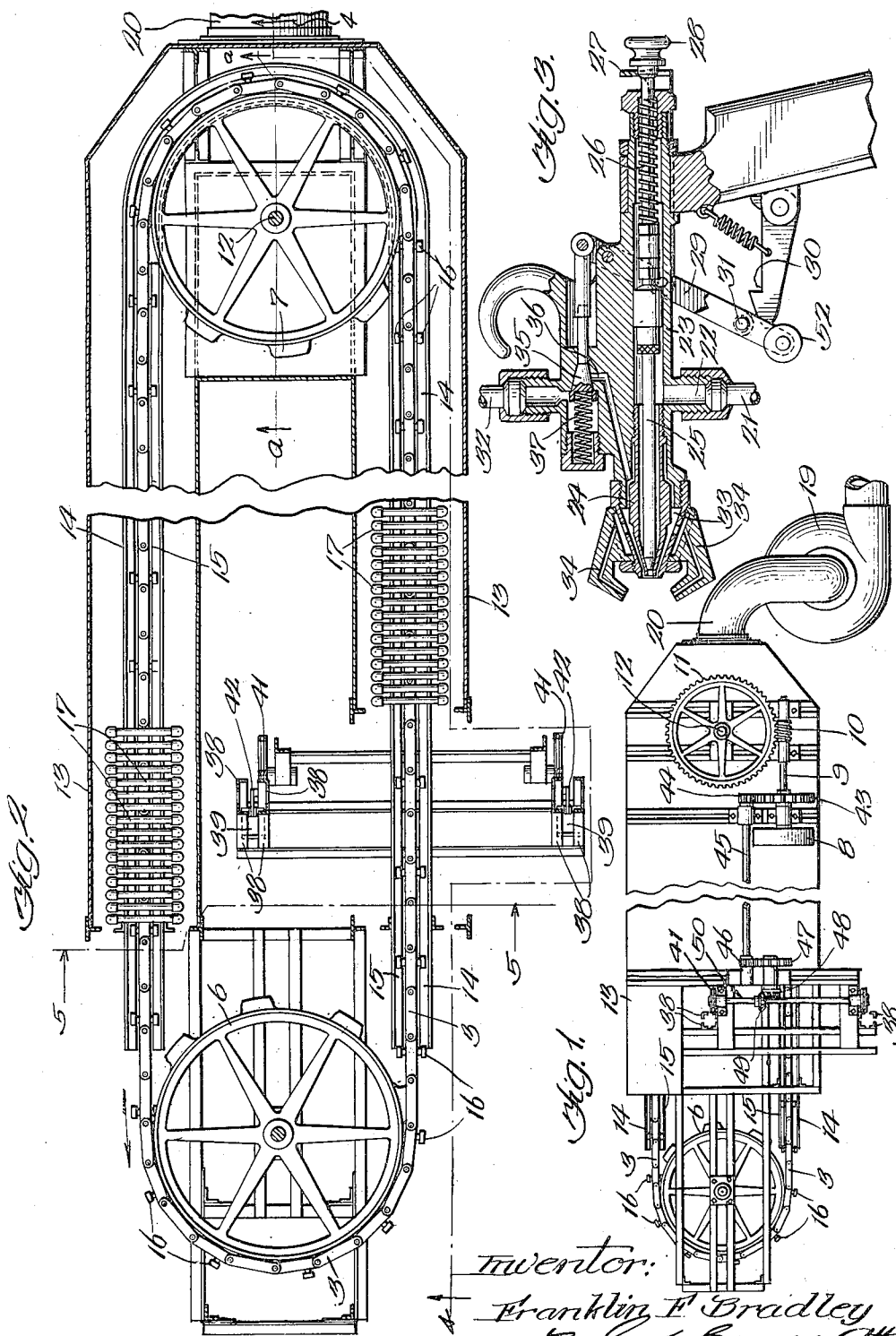
F. F. BRADLEY

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APPARATUS FOR COATING OBJECTS

Filed Oct. 3, 1921

5 Sheets-Sheet 1



Feb. 26, 1924.

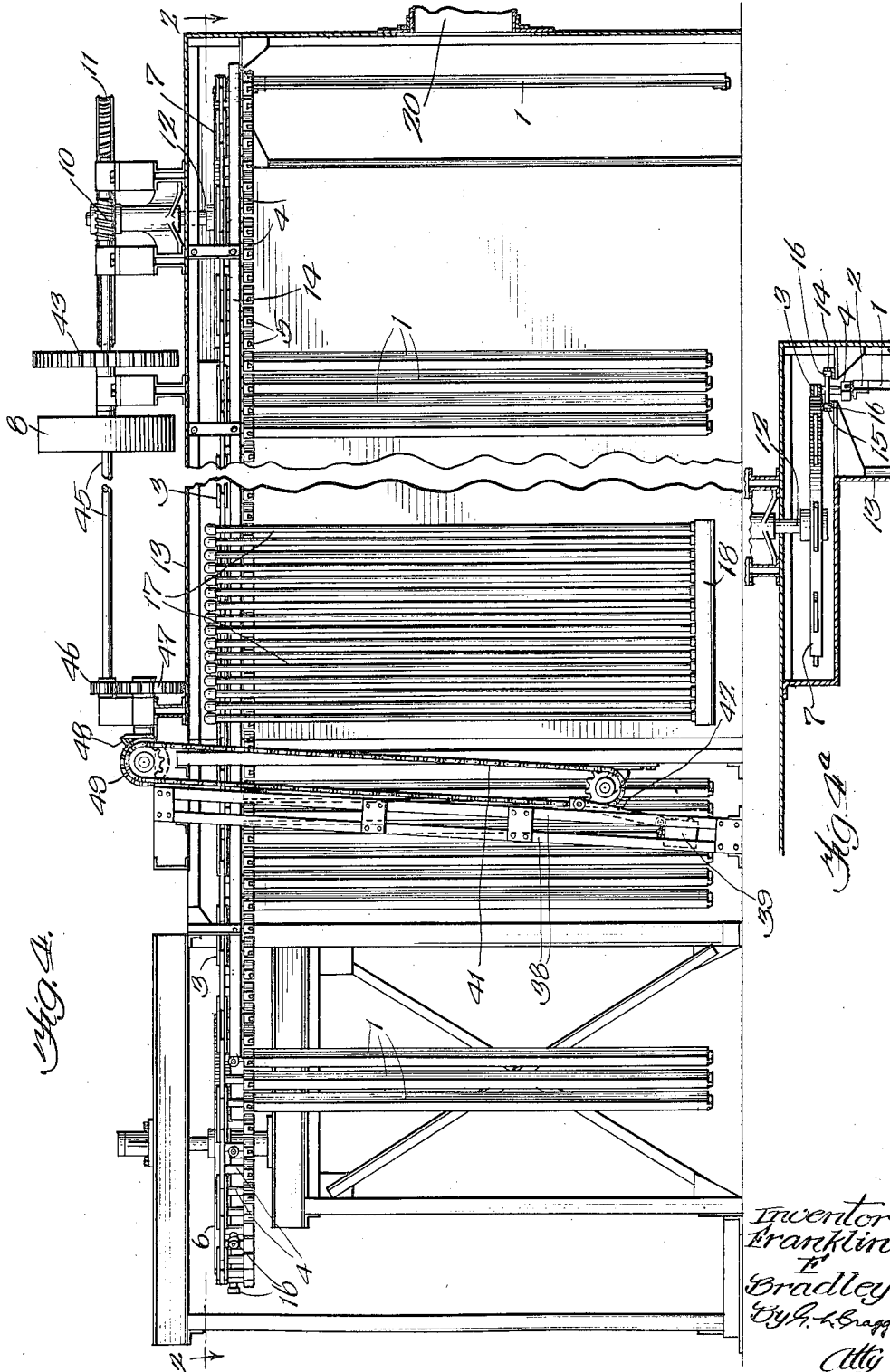
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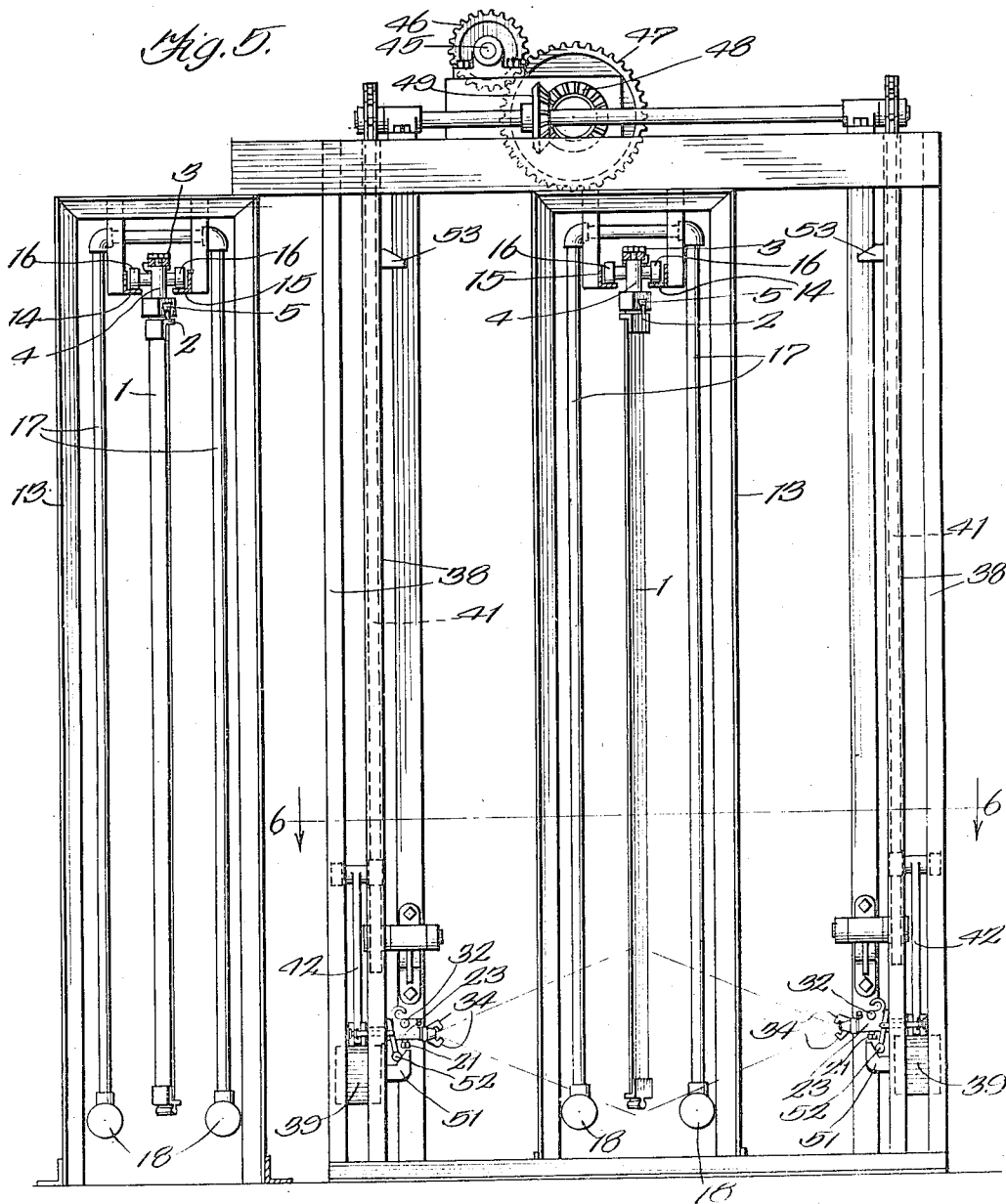
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APPARATUS FOR COATING OBJECTS

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Inventor:
Franklin F. Bradley

By G. L. Bragg *Att.*

Feb. 26, 1924.

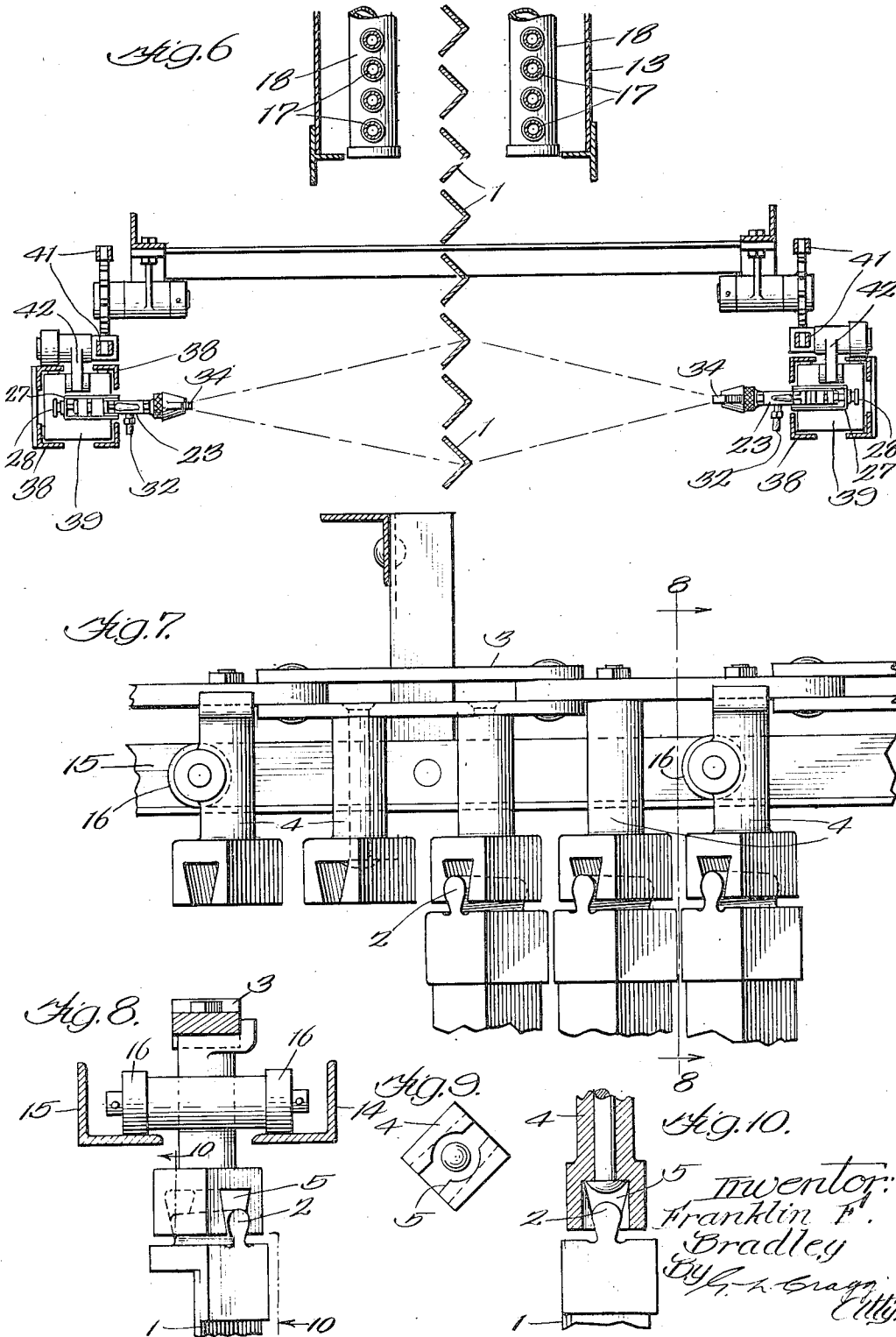
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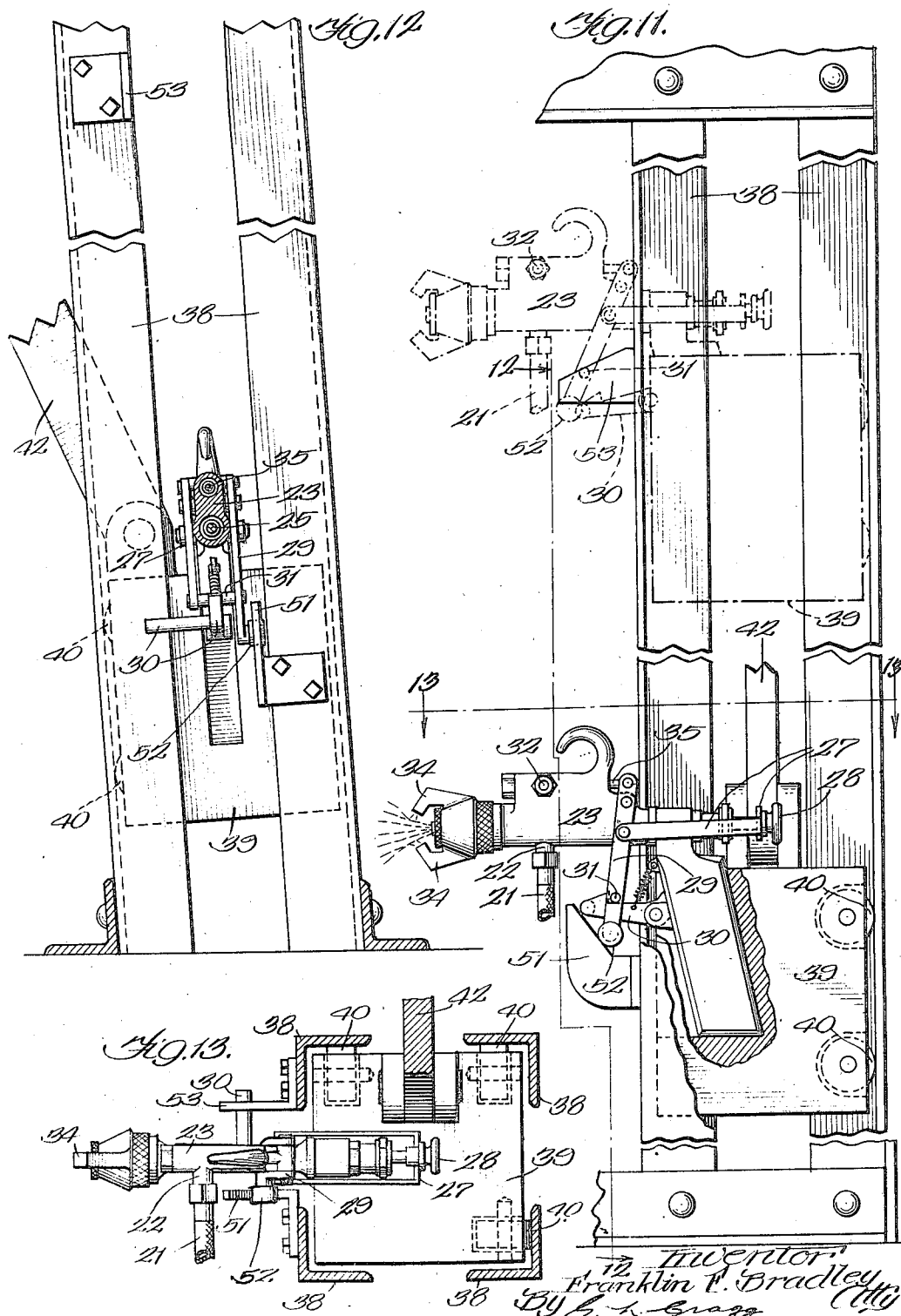
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F. F. BRADLEY

APPARATUS FOR COATING OBJECTS

Filed Oct. 3. 1921

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UNITED STATES PATENT OFFICE.

FRANKLIN F. BRADLEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO BRADLEY & VROOMAN COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APPARATUS FOR COATING OBJECTS.

Application filed October 3, 1921. Serial No. 504,808.

To all whom it may concern:

Be it known that I, FRANKLIN F. BRADLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Coating Objects, of which the following is a full, clear, concise, and exact description.

My invention relates to apparatus employing discharge nozzles for directing fluid upon objects and is of particular utility when embodied in liquid spraying apparatus such, for example, as is employed for applying paint.

In carrying out my invention I employ means for effecting travel of the nozzle along an object and for restoring the nozzle to starting position. In the preferred embodiment of the invention mechanism is also employed for cutting off flow of fluid through the nozzle while being restored to its normal position and for thereafter re-establishing flow of fluid through the nozzle.

The objects to be painted, or to which fluid is to be otherwise applied, are mounted upon an object carrier that is provided with mechanism for effecting its travel, the discharge nozzle being disposed so as to direct fluid upon the object or objects borne by the carrier. The mechanism that is employed to control the relation of the discharge nozzle to the object toward which the nozzle is directed serves to effect travel of the nozzle crosswise of the direction of travel of the object carrier, there being means for maintaining the nozzle in position to discharge upon the object as the object and nozzle are traveling. The nozzle is desirably provided upon a carrier, this carrier and the object carrier traveling in angular directions, there preferably being a guide for the nozzle carrier that is so inclined toward the direction of travel of the object carrier as to maintain the nozzle in position to discharge upon the object while both nozzle and object are traveling.

When the apparatus of my invention is embodied in a painting equipment, for example, there is also employed a conduit through which the object carrier and its load travel in one direction angular to the direction of travel of the nozzle whose inclined guide is preferably disposed outside of the conduit and at the entrance thereto.

Means are employed for heating the air

in the conduit and means are also preferably employed for forcing the circulation of the heated air through the conduit.

It is believed that the conduit which is employed in my apparatus for the traveling objects and the means that is used to heat the air are novel without regard to the nozzle, and the invention, therefore, in all of its aspects, is not to be limited to the employment of the nozzle.

The invention has other characteristics and will be fully explained by reference to the accompanying drawings showing the preferred embodiment thereof as employed in painting equipment, Fig. 1 being a plan view of the apparatus thus embodied, parts being broken away for lack of space; Fig. 2 is a sectional plan view on a larger scale on line 2—2 of Fig. 4; Fig. 3 is a view, mainly in section, illustrative of the nozzle; Fig. 4 is a sectional elevation on line 4—4 of Fig. 2; Fig. 4^a is a sectional detail view on line *a—*a** of Fig. 2; Fig. 5 is a sectional end view on line 5—5 of Fig. 2; Fig. 6 is a sectional plan view on line 6—6 of Fig. 5; Fig. 7 is a detail view showing a portion of the object carrier; Fig. 8 is a view on line 8—8 of Fig. 7; Fig. 9 is a view from beneath of one of the holding elements upon the object carrier; Fig. 10 is a sectional view on line 10—10 of Fig. 8; Fig. 11 is a view in elevation, parts being broken away, illustrating the nozzle and the inclined guide therefor; Fig. 12 is a view on line 12—12 of Fig. 11; and Fig. 13 is a view on line 13—13 of Fig. 11.

Like parts are indicated by similar characters of reference throughout the different figures.

The equipment illustrated is one which is designed for the painting of the side rails of bedsteads but it is to be understood that the invention is not to be limited to any particular use thereof nor to the application of liquid to objects as it will become apparent that fluid in other form may be applied to or directed upon traveling objects by means of the apparatus of my invention.

The bedstead side rails 1 that are illustrated in the drawings are of the usual form having the ear formations 2 on the ends thereof for reception within corresponding sockets provided upon the bedstead posts. The object carrier is preferably in the form of a traveling chain 3 from which object holders 4

depend, these object holders having dove-tailed grooveways 5 in the bottom ends thereof into which the ear formations 2 may be slipped in a manner similar to the insertion thereof within the sockets provided upon the bedstead posts. The side rails thus depend vertically from the object carrier and are caused to travel in the orbit of the chain 3 that is passed about the horizontal sprocket wheels 6 and 7 that are horizontally disposed. The mechanism for effecting the travel of the chain includes a main traveling pulley 8 upon a shaft 9 that carries a worm 10 in mesh with a worm gear 11 that is fixed upon the shaft 12 of the sprocket wheel 7. As illustrated in Fig. 2, the object carrying chain 3 is caused to travel in a counter-clockwise direction. The conduit 13 is of U-shape, one side of the U-shaped conduit taking one stretch of the chain and the side rails depending therefrom and the other side of the conduit taking the other stretch of the chain and the side rails depending therefrom. Two tracks 14 and 15 thread the conduit passage and project through the ends of the conduit. The chain carries rollers 16 upon the side of the chain, these rollers turning upon said tracks as the chain is driven by the sprocket wheel 7. The tracks are spaced sufficiently apart to permit the holders 4 depending from the chain to pass between the tracks.

Paint is applied to the objects preferably by means of the nozzle mechanism herein-after to be described, but to the employment of which nozzle mechanism the invention is not to be limited in all of its aspects.

In order to heat the air for the purpose of drying the paint applied to the objects 1, heating means are disposed within the U-shaped conduit, this heating means being preferably in the form of steam coils 17 supplied with steam from any suitable source through the steam supply piping 18. These coils may be located throughout the conduit or in spaced apart portions thereof. As illustrated, the coils straddle the chain and the side rails depend upon the chain. Air is kept in circulation within the conduit by means of a suction fan 19 having connection with the bight of the conduit and serving to draw the air from the open ends of the conduit rearwardly through the pipe 20 connecting the bight of the conduit with the chain.

The nozzle for directing paint or other fluid upon the side rails or other objects may be of any suitable form, the nozzle illustrated in Fig. 3 being preferred. There are preferably two such nozzles between which the side rails pass. One nozzle will be specifically described, similar characters of reference being employed in connection with the other. The paint is supplied through the pipe 21 and the nipple 22 to the nozzle casing 23 and the nozzle tube 24 communicating

with the interior of the casing. A plunger valve 25 is reciprocable in the bore of the tube 24 whereby the ejection end of the tube may be opened to varying degrees or completely closed as desired. This plunger valve is forwardly pressed by means of a spring 26 against the force of which it may be withdrawn by means of a bar 27 that is pressed rearwardly against the head 28 of the valve for this purpose. The bar 27 is automatically operated to open the plunger valve when the nozzle is on its painting stroke and to permit closure of the valve when the nozzle is on its return stroke. To this end the bar 27 is connected with an oscillating lever 29 pivoted upon the nozzle casing 23. This lever is swung in a counter-clockwise direction when the plunger valve 25 is to be opened during the bodily travel of the nozzle as will later appear. Said lever is held in the position to which it is turned in a counter-clockwise direction by means of a detent 30 that engages a pin 31 upon the lever, the engagement of the pin 31 and detent 30 being maintained while the nozzle is in its spraying movement. When the nozzle has reached the end of its spraying movement the pin and detent are separated, as will appear, to permit the spring 26 to close the valve 25. Air is admitted to the nozzle through the pipe 32 into the air chamber 33 that surrounds the forward end of the nozzle tube 24, the air chamber 33 terminating in front of the forward end of the nozzle tube 24 whereby the paint is drawn forwardly and atomized. The atomization of the paint may be increased by means of supplemental air jets 34 that terminate at their discharge ends in front of the air chamber 33. The valve 35 opens and closes the passage 36 that establishes communication between the air pipe 32 and the air chamber 33. The valve 35 is also connected with the lever 29 and is opened whenever said lever is moved to open the valve 24 and is closed whenever said lever is freed to permit the valve 24 to be closed by the spring 26. The spring 26 may be supplemented, in its function, by the spring 37 cooperating therewith to effect the closing movements of the valves 24 and 35.

The nozzle is guided in its travel upon the guide 38 that is inclined in the direction in which the side rails are directed into the U-shaped conduit 13. To this end the nozzle is mounted upon a carriage 39 that moves in the channel that is formed in the guide structure 38, this guide structure being preferably made of a number of angle iron rails, illustrated in Fig. 13. Rollers 40 keep the carriage 39 from warping into binding engagement with the angle irons that form the guide structure 38. Each nozzle carriage 39 is connected with a sprocket chain 41 by a link 42. The sprocket chain 41 is inclined forwardly in the direction of forward travel

of the side rails correspondingly to the guide 38. The sprocket chains have a rate of travel whereby, as they cause the carriage to rise, the nozzles serve to direct paint along the side rails as these rails travel; that is the nozzles are prevented from being shifted laterally with respect to the side rails as both the side rails and the nozzles are in movement during the time the nozzles are directing paint upon the side rails.

The means for causing the chains 41 to travel desirably reside in the spur gear 43 upon the shaft 9 in mesh with a spur pinion 44 upon a shaft 45, this latter shaft carrying a pinion 46 in mesh with a spur gear 47 that drives the bevel pinion 48. This bevel pinion is in mesh with a bevel pinion 49 upon a shaft 50 carrying sprocket wheels at its ends that are in driving engagement with the sprocket chains 41.

Each of the guide structures for the nozzle is formed with a nose 51 that is engageable with the roller 52 upon the lever 29 of the corresponding nozzle when the nozzle is at the lower limit of its travel. The action of the noses 51 is such that they place the pins 31 in position to be engaged by the detents 30 upon the nozzles, said detents then serving to hold the valves 25 and 35 in open position. This adjustment is maintained during the upward movement of the nozzles. When the nozzles have reached the upper limits of their travel the noses 51 upon the guides engage the outer ends of the detents 30 to separate the detents from engagement with the pins 31 whereupon the springs 26 and 37 may function to close the nozzle valves pertaining thereto. This closed position of the valves is maintained during the descent of the nozzles and until the noses 51 again serve to bring the pins 31 into engagement with the detents 30 to hold the valves in open position during the upward travel of the nozzles.

The objects to be painted are mounted upon the object carrier which is caused to move in one direction of travel. The painting nozzle is disposed so as to direct the paint upon the objects borne by the carrier. The discharge nozzle and the object carrier are so controlled in their relative movements that the nozzle is maintained in position to discharge paint upon the objects, a result which is possible because the nozzle carrier is directed in its movements by a guide inclined toward the direction of travel of the object carrier. The object carrier is caused to travel through the U shaped conduit provided therefor, the painted objects being dried in this conduit by means of heated air whose circulation through the conduit is forced.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to

the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. The combination with an object carrier mounted to travel in one direction; of mechanism for effecting the travel of said carrier; a discharge nozzle disposed to discharge upon an object borne by the carrier; and mechanism effecting travel of the discharge nozzle crosswise of the direction of travel of the object carrier, there being means for maintaining the nozzle in position to discharge upon an object, upon the object carrier, as it and the nozzle are traveling.

2. The combination with an object carrier; of a discharge nozzle; a carrier for the discharge nozzle that positions such nozzle to discharge upon an object borne by the carrier; and mechanism for causing said carriers to travel in angular directions and for maintaining the nozzle in position to discharge upon an object, upon the object carrier, while the two carriers are in travel.

3. The combination with an object carrier; of a discharge nozzle; mechanism for causing travel of said carriers in angular directions; and a guide for the nozzle carrier so inclined toward the direction of travel of the object carrier as to maintain the traveling nozzle in position to discharge upon a traveling object upon the object carrier.

4. The combination with an object carrier; of a discharge nozzle; a carrier for the discharge nozzle; mechanism for causing travel of said carriers in angular directions; and a guide for the nozzle carrier inclined toward the direction of travel of the object carrier.

5. The combination with an object carrier; of a discharge nozzle; mechanism for causing the travel of the object carrier; and mechanism for causing the travel of the nozzle in a direction inclined toward the direction of travel of the object carrier.

6. The combination with an object carrier; of a discharge nozzle; mechanism for causing the travel of the object carrier, and mechanism for causing the travel of the nozzle in a direction inclined toward the direction of travel of the object carrier and at a rate to maintain the traveling nozzle in position to discharge upon a traveling object upon the object carrier.

7. The combination with the carrier of a plurality of objects; of mechanism for effecting the travel of said carrier; a discharge nozzle disposed to discharge upon an object borne by the carrier; mechanism effecting travel of discharge nozzle crosswise of the direction of travel of the object carrier, there being means for maintaining the nozzle in position to discharge upon an ob-

ject, upon the object carrier, as it and the nozzle are traveling; mechanism for reversing the direction of travel of the nozzle to restore the nozzle to position to discharge
 5 upon a succeeding object; and mechanism for cutting off flow through the nozzle while being thus restored and for thereafter re-establishing flow through the nozzle.

8. The combination with the carrier of a
 10 plurality of objects; of a discharge nozzle; a carrier for the discharge nozzle that positions such nozzle to discharge upon an object borne by the carrier; mechanism for causing said carriers to travel in angular
 15 directions and for maintaining the nozzle in position to discharge upon an object, upon the object carrier, while the two carriers are in travel; mechanism for reversing the direction of travel of the nozzle carrier to
 20 restore the nozzle to position to discharge upon a succeeding object; and mechanism for cutting off flow through the nozzle while being thus restored and for thereafter re-establishing flow through the nozzle.

25 9. The combination with the carrier of a plurality of objects; of a discharge nozzle; a carrier for the discharge nozzle; mechanism for causing travel of said carriers in angular directions; a guide for the nozzle
 30 carrier so inclined toward the direction of travel of the object carrier as to maintain the traveling nozzle in position to discharge upon a traveling object upon the object carrier; mechanism for reversing the direction
 35 of travel of the nozzle carrier to restore the nozzle to position to discharge upon a succeeding object; and mechanism for cutting off flow through the nozzle while being thus restored and for thereafter re-establishing
 40 flow through the nozzle.

10. The combination with the carrier of a plurality of objects; of a discharge nozzle; a carrier for the nozzle; mechanism for causing travel of said carriers in angular
 45 directions; a guide for the nozzle carrier inclined toward the direction of travel of the object carrier; mechanism for reversing the direction of travel of the nozzle carrier to restore the nozzle to position to
 50 discharge upon a succeeding object; and mechanism for cutting off flow through the nozzle while being thus restored and for thereafter re-establishing flow through the nozzle.

11. The combination with the carrier of a 55 plurality of objects; of a discharge nozzle; mechanism for causing the travel of the object carrier; mechanism for causing the travel of the nozzle in a direction inclined toward the direction of travel of the object 60 carrier; mechanism for reversing the direction of travel of the nozzle to restore the nozzle to position to discharge upon a succeeding object; and mechanism for cutting off flow through the nozzle while being thus 65 restored and for thereafter re-establishing flow through the nozzle.

12. The combination with the carrier of a plurality of objects; of a discharge nozzle; mechanism for causing the travel of the ob- 70 ject carrier; mechanism for causing the travel of the nozzle in a direction inclined toward the direction of travel of the object carrier and at a rate to maintain the traveling nozzle in position to discharge upon a 75 traveling object upon the object carrier; mechanism for reversing the direction of travel of the nozzle to restore the nozzle to position to discharge upon a succeeding ob- 80 ject; and mechanism for cutting off flow through the nozzle while being thus restored and for thereafter re-establishing flow through the nozzle.

13. Apparatus of the class described including a conduit of U-form opening at its 85 ends; conveying mechanism passing through said conduit; and means for heating the air that is within the conduit.

14. Apparatus of the class described including a conduit of U-form opening at its 90 ends; conveying mechanism passing through said conduit; means for effecting circulation of air within the conduit connected with the bight of the conduit; and means for heating the air that is within the con- 95 duit.

15. Apparatus of the class described including a conduit of U-form opening at its ends; conveying mechanism passing through 100 said conduit; means for withdrawing air from the conduit connected with the bight of the conduit; and means for heating the air that is within the conduit.

In witness whereof, I hereunto subscribe my name this 14th day of September A. D., 1921. 105

FRANKLIN F. BRADLEY.