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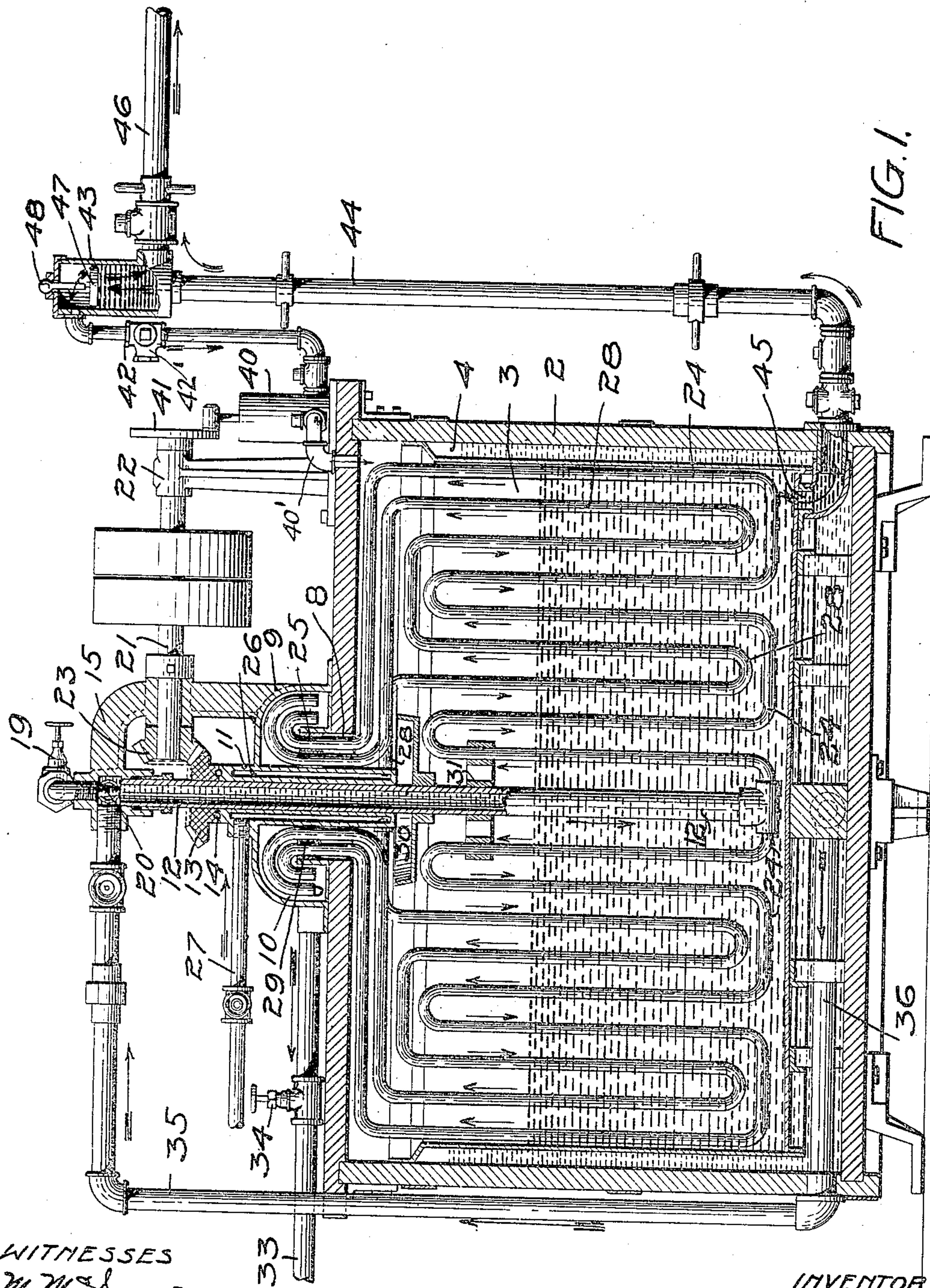
PATENTED MAR. 27, 1906.

D. W. PAYNE.

COMBINED COOLER, CREAM RIPENER, AND PASTEURIZER.

APPLICATION FILED JULY 17, 1905.

3 SHEETS—SHEET 1.



WITNESSES  
M. M. Davis  
C. Yamamura

INVENTOR  
DARIUS W. PAYNE  
BY *Paul Paul*  
HIS ATTORNEYS



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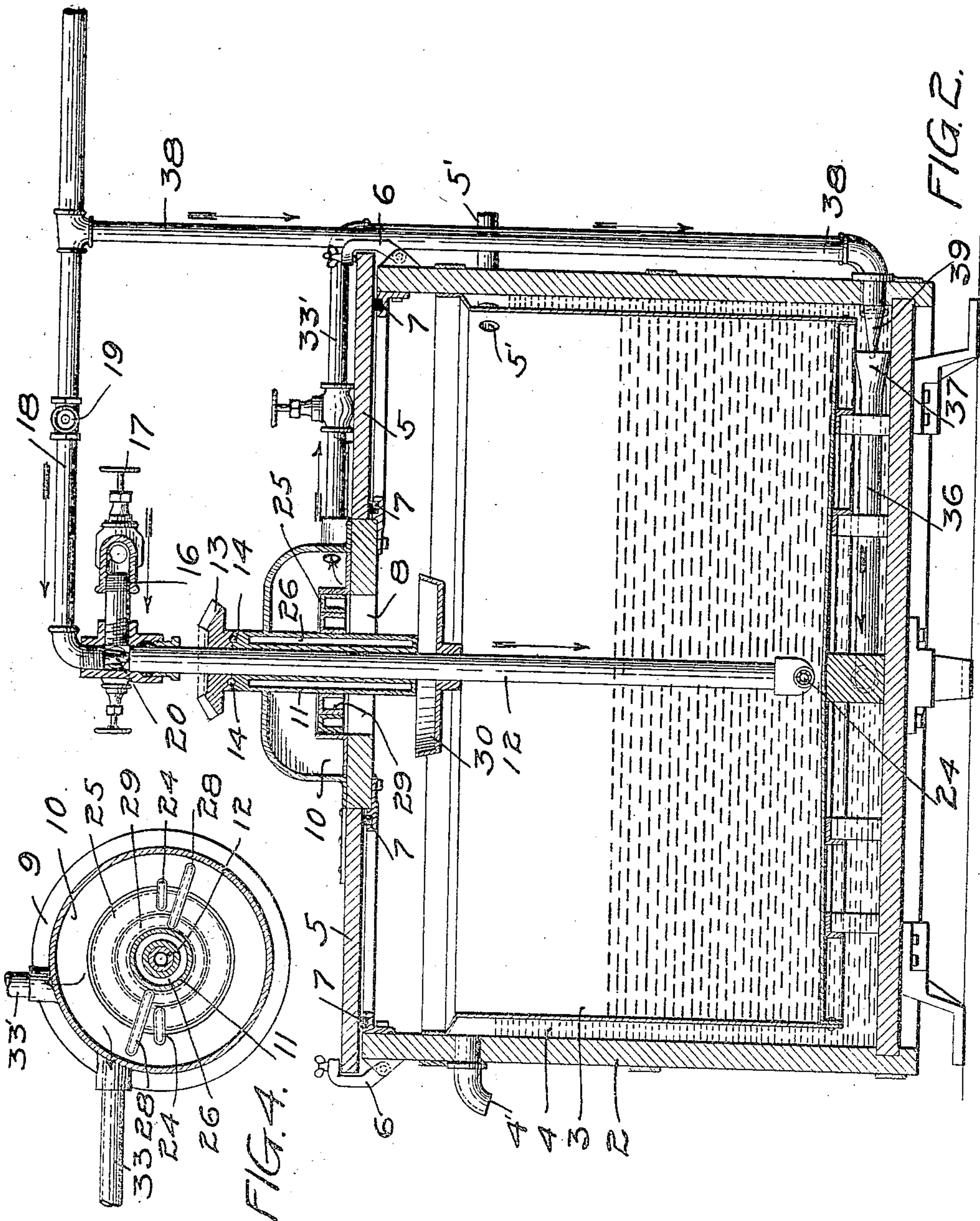
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WITNESSES  
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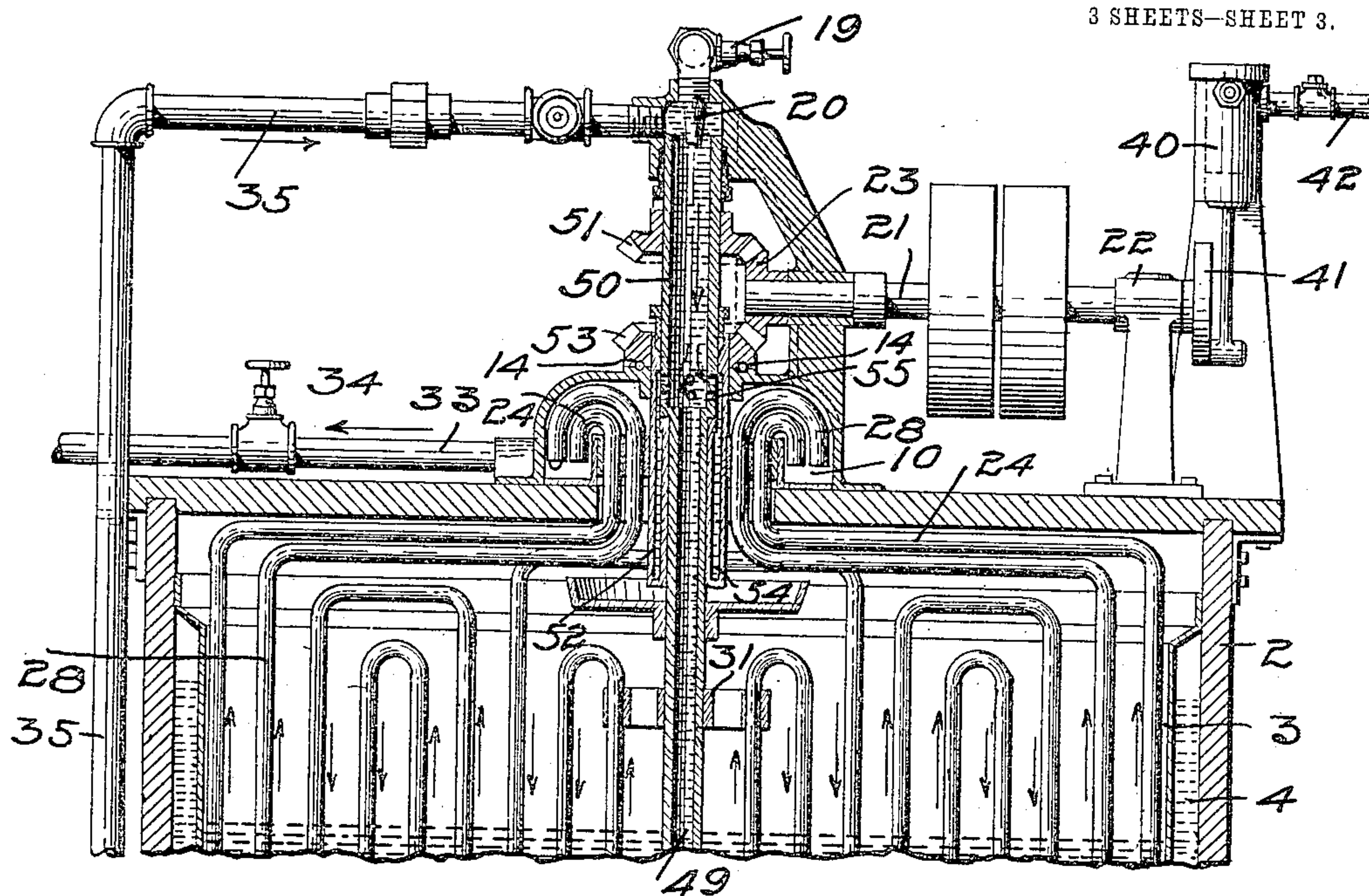
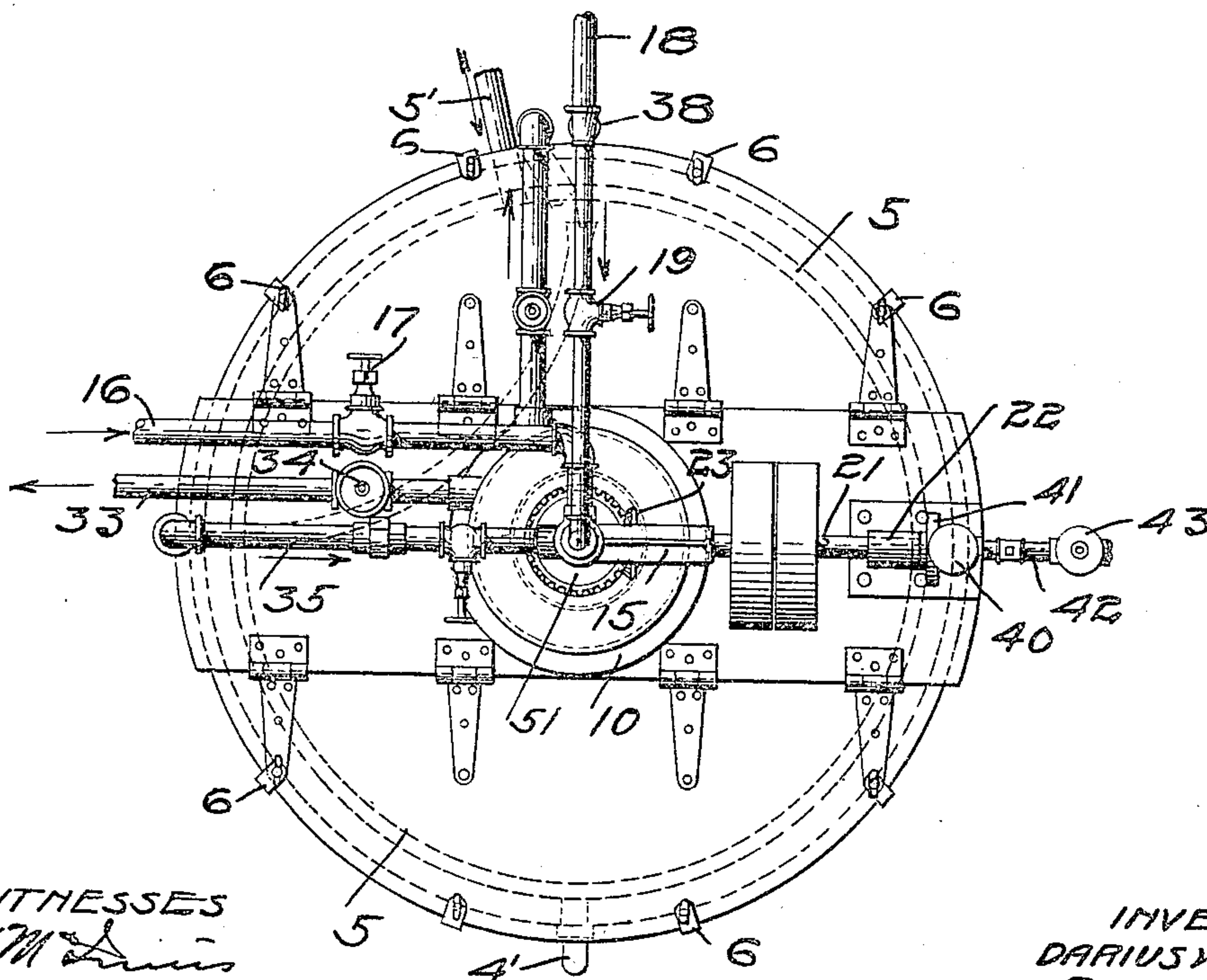


FIG. 5



WITNESSES  
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C. F. Hamman

FIG. 3.

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# UNITED STATES PATENT OFFICE.

DARIUS W. PAYNE, OF MINNEAPOLIS, MINNESOTA.

## COMBINED COOLER, CREAM-RIPENER, AND PASTEURIZER.

No. 816,181.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed July 17, 1905. Serial No. 270,056.

*To all whom it may concern:*

Be it known that I, DARIUS W. PAYNE, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in a Combined Cooler, Cream Ripener, and Pasteurizer, of which the following is a specification.

The object of my invention is to improve the apparatus for a similar purpose shown and described in my pending application for United States Patent, No. 246,668, filed February 21, 1905.

The invention consists generally in providing an improved cream-receptacle and improved means for agitating the cream.

Further, the invention consists in suspending the rotating parts above the cream-receptacle to avoid having the bearings immersed in the cream and to prevent leakage of water into the cream.

Further, the invention consists in improved means for establishing a circulation through the apparatus and in adapting it for cooling or pasteurizing purposes.

Further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical sectional view of an apparatus wherein cream may be cooled, ripened, or pasteurized, Fig. 2 is a sectional view taken on a line substantially at right angles to the section of Fig. 1. Fig. 3 is a plan view of the apparatus. Fig. 4 is a transverse sectional view through the casting below the driving mechanism. Fig. 5 is a vertical sectional view of the upper part of the apparatus embodying a modified construction.

In the drawings, 2 represents a tank or casing, preferably of wood, containing a cream-receptacle 3, which is spaced around the sides and bottom from the walls of the tank to form a water-chamber 4, having an overflow-pipe 4'. The tank has suitable hinged covers 5, through which access may be had to the cream-receptacle for filling purposes, or the receptacle may be filled through the pipe 5'. The covers are provided with clamping devices 6 and gaskets 7 to insure a tight joint between them and the walls of the tank. The top of the tank has a central hole or opening 8, over which a casing 9 is placed. This casing is provided with an annular chamber 10, surrounding a centrally-disposed

sleeve 11, in which a pipe or hollow vertical shaft 12 is arranged, and provided with a beveled gear 13, between which and the upper end of the sleeve 11 is a ball-bearing 14. The upper end of the shaft 12 is journaled in a casting 15 and communicates with a water-intake pipe 16, having a valve 17. A steam-pipe 18, having a valve 19, leads into the casting 15 and has a nozzle 20, located near and in line with the open upper end of said shaft 12. A horizontal driving-shaft 21 has bearings in the casting 15 and a bracket 22 and is provided with a pinion 23, which meshes with the gear 13 to revolve the shaft 12. Upon the lower end of the shaft 12 a series of radiating tubes or pipes 24 are mounted and bent into a series of vertical U-shaped loops extending from the center of the cream-receptacle toward its side walls and having their open outer ends bent in horizontally from said wall toward the center of the receptacle and inserted into a loosely-mounted ring 25, located between the sleeve 11 and the walls of the chamber 10.

The extreme ends of the tubes 24 are outwardly and downwardly turned over the inner wall of the chamber 10 to discharge their contents therein. When the shaft 12 is revolved, the tubes will be revolved around the center of the cream-receptacle, and the ring 25, through which the tubes pass, will be revolved also. The sleeve 11 is provided with a water-chamber 26, having an inlet-pipe 27 and communicating at the lower end of the sleeve with tubes 28, which are bent to form loops running parallel with the loops 24 and having their ends turned in horizontally toward the sleeve 11 at the top of the cream-receptacle similar to the tubes 24 and passed through a fixed ring 29 on said sleeve, the ends of the tubes being curved outwardly and downwardly to discharge their contents into the chamber 10. The tubes 28 will be stationary and will allow the free revolution of the tubes 24 within the cream-receptacle. A suitable drip-pan 30 is provided on the shaft 12 below the sleeve 11, and a brace 31 also secured on said shaft, supports the contiguous loops of the tubes 24. Other braces may be provided, if desired. An outlet-pipe 33, having a valve 34, communicates with the chamber 10 through its walls, and a pipe 33' leads from said chamber to the space between the cream receptacle and tank, and a pipe 35 leads from the water-inlet pipe 16 down beside the walls of the tank and into



the said space beneath the cream-receptacle, terminating in a pipe-section 36, having a flaring open end 37. A branch 38 of the steam-pipe 18 extends down beside the tank and is provided with an injector-nozzle 39, arranged opposite the flaring end 37. The water is admitted to the hollow shaft 12 through the pipe 16 and flowing down through the loops of the tubes 24 is finally discharged into the chamber 10, from whence it flows out of the apparatus. The same is true of the water admitted through the pipe 27 into the chambered sleeve. A rapid circulation can be established through the pipes—as, for instance, when it is desired to pasteurize the cream—by opening the steam-nozzle valve and allowing jets of steam to be directed into the hollow shaft 12 and the pipe-section 36. The water in the pipes by means of these jets can be heated to any desired degree for the purpose of pasteurizing the cream and can be forced round through the pipes to quicken the circulation.

I prefer to draw off the cream from the receptacle by means of a pump apparatus 40, connected with a crank-disk 41 on the shaft 21 and having a pipe connection 42 with the upper part of the chamber 43, the lower end of which is connected by a pipe 44 with a discharge-port 45 in the bottom of the cream-receptacle. A discharge-pipe 46 leads from the bottom of the chamber 43, and a float 47 is provided in said chamber and has a vertical movement therein and is adapted to engage and open a gravity-regulating valve 48. The operation of the pump will create a vacuum in the pipes 42 44 and the chamber 43, and the cream will flow up from the receptacle into the said chamber and pass out through the pipe 46. If the cream rises too high in the chamber 43, the float will strike the regulating-valve and open the same, and the air rushing in will balance the pressure on the float and pressure on the float and prevent it from rising sufficiently to allow the cream to overflow from said chamber.

In Fig. 5 I have shown a modified construction which consists in providing a hollow shaft 49, having an enlarged extension 50 at its upper end communicating with the water-inlet pipe and the steam-injector nozzle, as previously described, and carrying a gear 51, meshing with the driving-pinion for revolving the said shaft. A sleeve 52 incloses the said shaft and extension and is provided with a gear 53, which also meshes with the driving-pinion. The sleeve is provided with a water-chamber 54, similar to the one described, and ports 55 lead into said chamber from the extension 50. The tubes or pipes are mounted and coiled in the same manner as heretofore described with reference to Fig. 1, except that both sets revolve, one in one direction and the other in the other, and their movement serves to thoroughly agitate the cream,

and when water, either cold or hot, is allowed to flow through the tubes the cream coming in contact therewith will be thoroughly cooled or pasteurized, depending on the temperature of the water. In this view the air-pump is shown inverted from the position shown in Fig. 1 for convenience of operation. Its functions, however, are precisely the same as those of the pump in the figure above described.

In some cases, especially where it is desirable to elevate the cream to a greater height than the suction-pump would lift it, I provide means for converting the pump into a pressure-pump. For this purpose I turn the air-outlet from the pump into the cream-tank by means of an elbow 40', and I also provide a valve 42'', Fig. 1, on the pipe 42, by means of which the air-suction is diverted from the vacuum-chamber to the open air. The covers of the cream-tank are then clamped down air-tight upon the tank and the cream may then be forced out of the tank to any desired height.

I claim as my invention—

1. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls of said tank, a water-pipe communicating with the space between said tank and cream-receptacle, a chamber centrally arranged in said tank and having a discharge-pipe, and a series of fixed and movable agitating-tubes suspended within said cream-receptacle and having their open discharge ends terminating in said chamber, means for delivering a liquid to said tubes, and means for revolving said movable tubes in said receptacle.

2. The combination with a tank provided with a closed top, of a cream-receptacle arranged therein and spaced from the walls of said tank, a water-supply pipe leading into the space between said tank and receptacle, a hollow shaft depending within said receptacle, a chamber inclosing the same, a series of tubes provided with vertical loops carried by the lower end of said shaft and having their open discharge ends terminating in said chamber, means for supplying a tempering liquid to said tubes, and means for revolving said shaft and tubes.

3. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls thereof, a hollow shaft depending within said receptacle, a chamber inclosing said shaft, a ring loosely mounted between said chamber and shaft, a series of tubes carried by said shaft and bent to form vertical loops and having ends passing through said ring and terminating in said chamber, means for revolving said shaft and tubes, and inlet and discharge pipes communicating with said shaft with the space between said tank and receptacle and with said chamber, substantially as described.



4. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls of said tank, a series of agitating-tubes suspended within said receptacle, means for revolving said tubes, means for supplying a cooling liquid to said tubes, and an air-pump connected with said cream-receptacle, substantially as described.

5. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls thereof, a hollow shaft depending within said receptacle, a series of tubes carried by said shaft and bent into a series of vertical loops, a sleeve having a water-chamber inclosing said shaft, a series of fixed tubes supported at one end in said sleeve and bent to form loops parallel with the loops of said first-named tubes, means for revolving said shaft and first-named tubes, and tempering-fluid pipes communicating with the space between said tank and said receptacle, substantially as described.

6. The combination, with a tank, of a cream-receptacle located therein and spaced from the walls thereof, a hollow shaft depending within said receptacle, a fixed sleeve inclosing said shaft, a water-chamber mounted on said tank and inclosing said sleeve and shaft, agitating-tubes mounted on said shaft, the discharge ends of said tubes being bent inwardly and curved outwardly and downwardly within said chamber, means for revolving said shaft and the tubes carried thereby, and tempering-fluid pipes communicating with said tubes and with said chamber, substantially as described.

7. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls thereof, a series of fixed and movable agitating-tubes suspended within said receptacle, means for delivering a cooling liquid to said tubes, and means for revolving said movable tubes.

8. The combination, with a tank, of a cream-receptacle arranged therein and spaced from the walls thereof, a series of fixed and movable agitating-tubes suspended within said receptacle, means for circulating hot or cold water through said tubes, and means for revolving said tubes in said receptacle.

9. The combination, with a tank, of a cream-receptacle located therein and spaced from the walls thereof, a hollow shaft depending within said receptacle, a series of fixed and movable agitating-tubes carried by said shaft, a water-pipe communicating with said hollow shaft and with a space between said tank and receptacle, a steam-nozzle arranged to project a jet of steam into said shaft, and means for revolving said shaft and tubes.

10. The combination, with a tank provided with a cream-receptacle, of a hollow shaft depending therein, a series of fixed and movable agitating-tubes carried by said shaft within said receptacle, means for revolving

said shaft and movable tubes, and tempering-fluid pipes communicating with said shaft.

11. The combination, with a tank, of a cream-receptacle therein, a series of agitating-tubes suspended within said receptacle, said tubes being bent to form vertical loops, means for revolving said tubes in said receptacle, and means for circulating a cooling liquid through said tubes.

12. The combination, with a tank, of a cream-receptacle therein, a series of fixed and movable agitating-tubes suspended within said receptacle, means for passing the cooling liquid through said tubes, means for revolving said movable tubes in said receptacle, and an exhaustor connected with said receptacle.

13. The combination, with a tank, of a cream-receptacle therein and spaced from the walls thereof, a hollow shaft depending within said receptacle, a series of agitating-tubes carried by said shaft, a water-inlet pipe communicating with said shaft, a branch pipe communicating with said hollow shaft and with the space between said cream-receptacle and said tank, a steam-nozzle provided between said receptacle and tank near said branch pipe, and means for revolving said shaft and tubes.

14. The combination, with a tank, of a cream-receptacle arranged therein, a hollow shaft depending within said receptacle, a series of tubes carried by said shaft and having their discharge ends extended to a point outside said receptacle, a sleeve having a water-chamber inclosing said shaft, a series of tubes carried by said sleeve and communicating with said chamber and having their discharge ends extended to a point outside said receptacle, means for revolving said shaft and said first-named tubes in said receptacle, and water supply and discharge pipes communicating with said shaft and sleeve and with the discharge ends of said tubes, substantially as described.

15. The combination with a casing, of a cream-tank therein and spaced from the walls thereof, a pipe depending within said cream-tank, means for revolving said pipe, hollow agitating-arms carried by said pipe and radiating therefrom within said cream-tank, a sleeve inclosing said pipe and provided with a water-chamber, a series of hollow agitating-arms carried by said sleeve and connected with said chamber, and means for supplying tempering fluids to said pipe and to said chamber, substantially as described.

16. The combination with a tank, of a cream-receptacle arranged therein, a hollow shaft depending centrally within said receptacle, a sleeve provided with a circulating-chamber and embracing said shaft, circulating-pipes connected to the said hollow shaft and the said sleeve, a centrally-arranged discharge-chamber for the said pipes, a ring or



flange attached to the said sleeve through which the pipes pass that are connected to the said sleeve, a supplementary ring through which the pipes pass that are connected to  
5 said hollow shaft, and means for rotating said pipes and said ring.

17. The combination with a cream-receptacle, of a series of fixed and movable agitating-tubes suspended within said receptacle,  
10 means for revolving said movable tubes in said receptacle, and means for passing a cooling fluid through said fixed and movable tubes.

18. The combination with a cream-receptacle, of a series of fixed and movable agitating-tubes suspended therein, means for passing a cooling fluid through said fixed and

movable tubes, means for revolving said movable tubes in said receptacle, and an ex-  
hauster connected with said receptacle. 20

19. The combination with a cream-receptacle, of a series of fixed and movable agitators suspended within said receptacle, and means for revolving said movable agitators, and means for passing a tempering agent  
25 through said movable agitators, substantially as described.

In witness whereof I have hereunto set my hand this 8th day of July, 1905.

DARIUS W. PAYNE.

Witnesses:

RICHARD PAUL,  
C. MACNAMARA.