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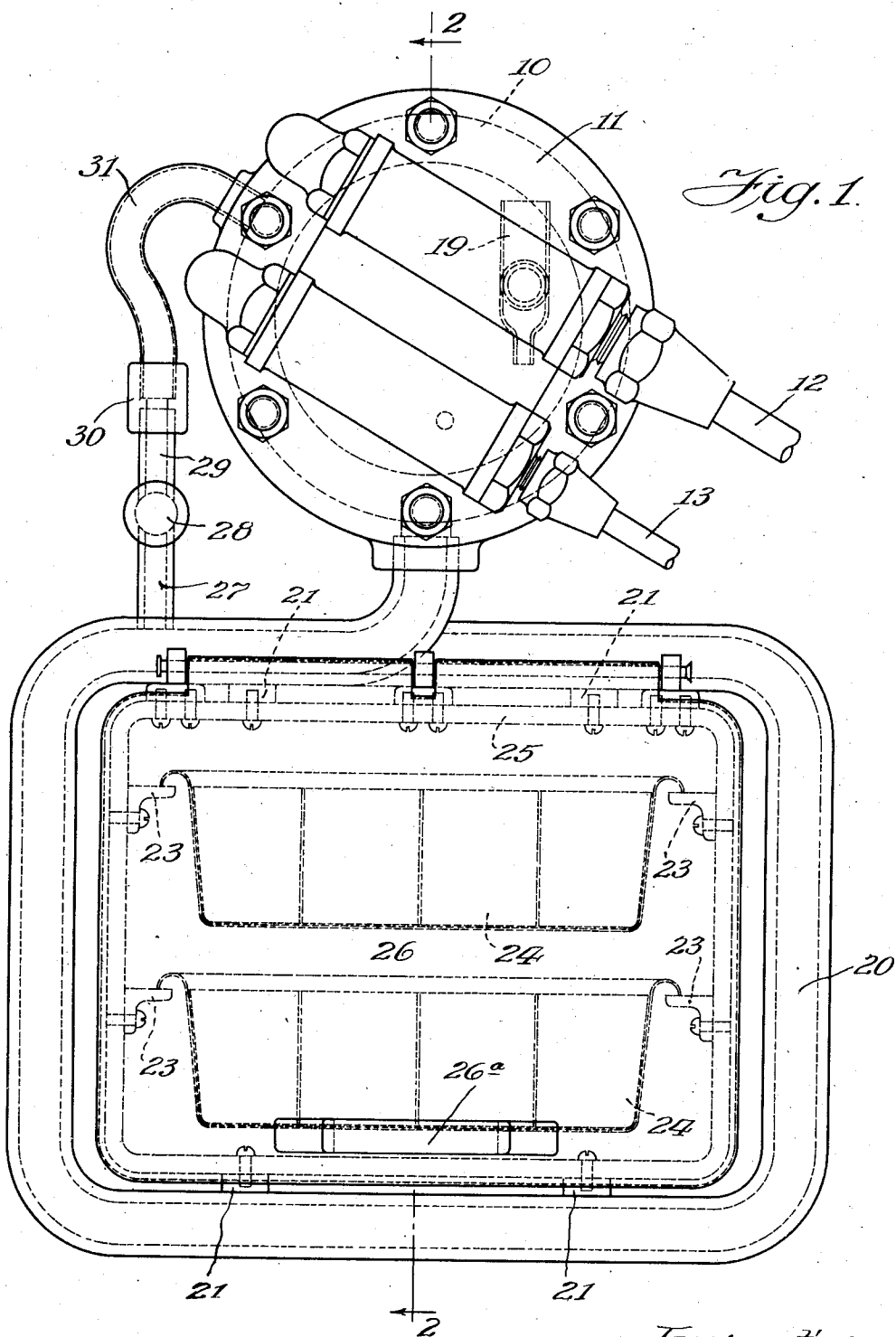
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1,820,746

CHILLING UNIT

Filed June 29, 1929

6 Sheets-Sheet 1



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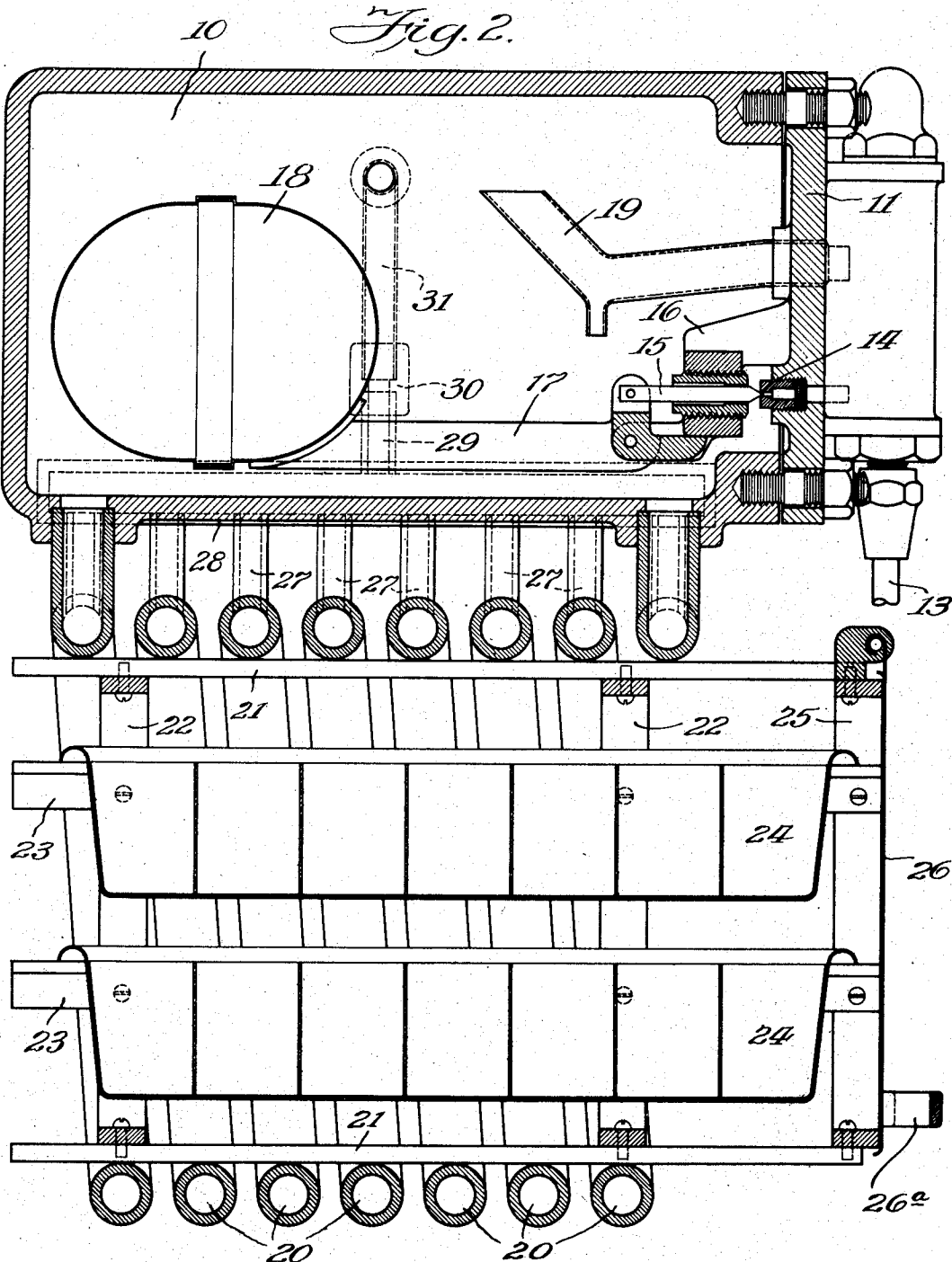
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6 Sheets-Sheet 2



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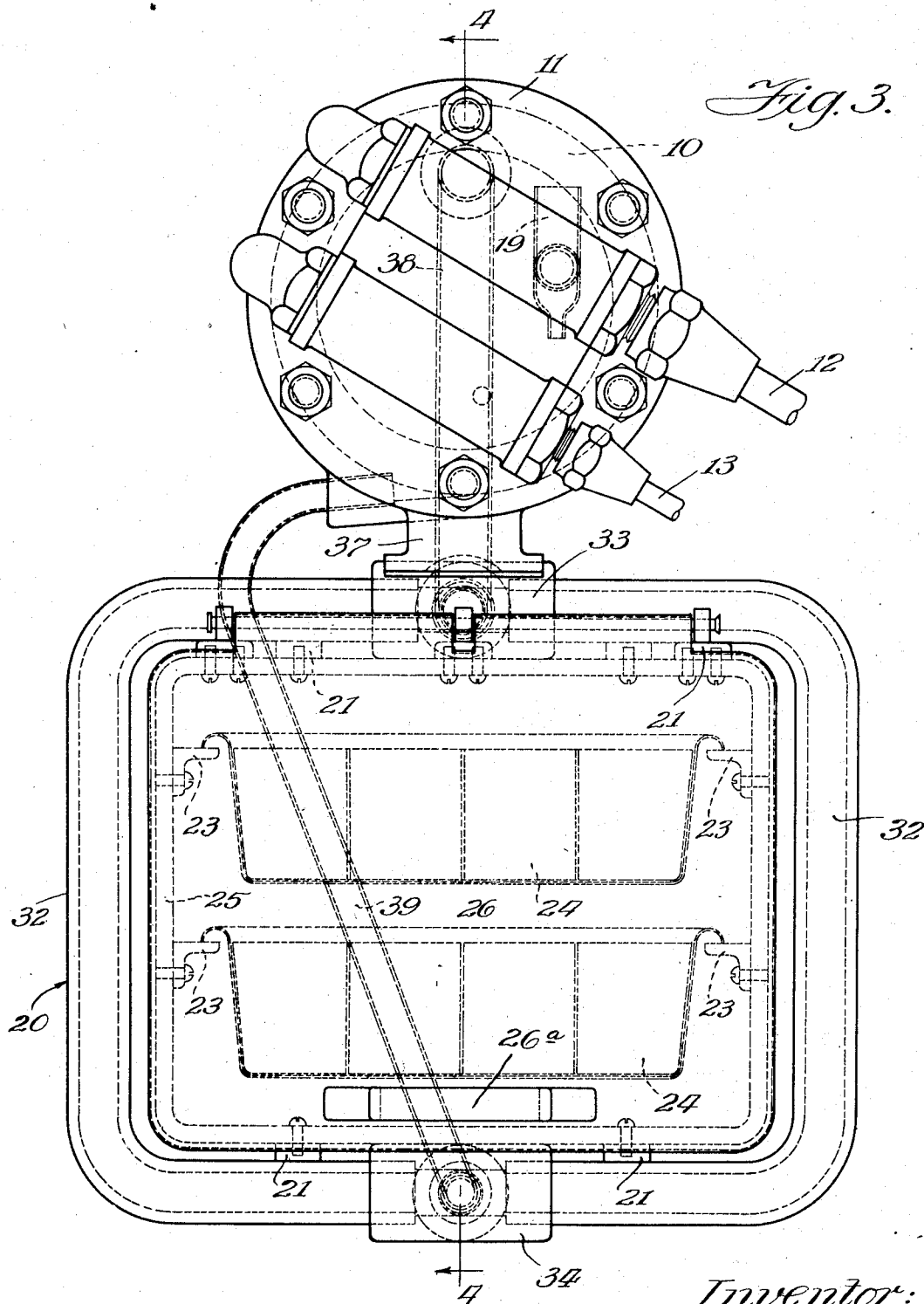
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6 Sheets-Sheet 3



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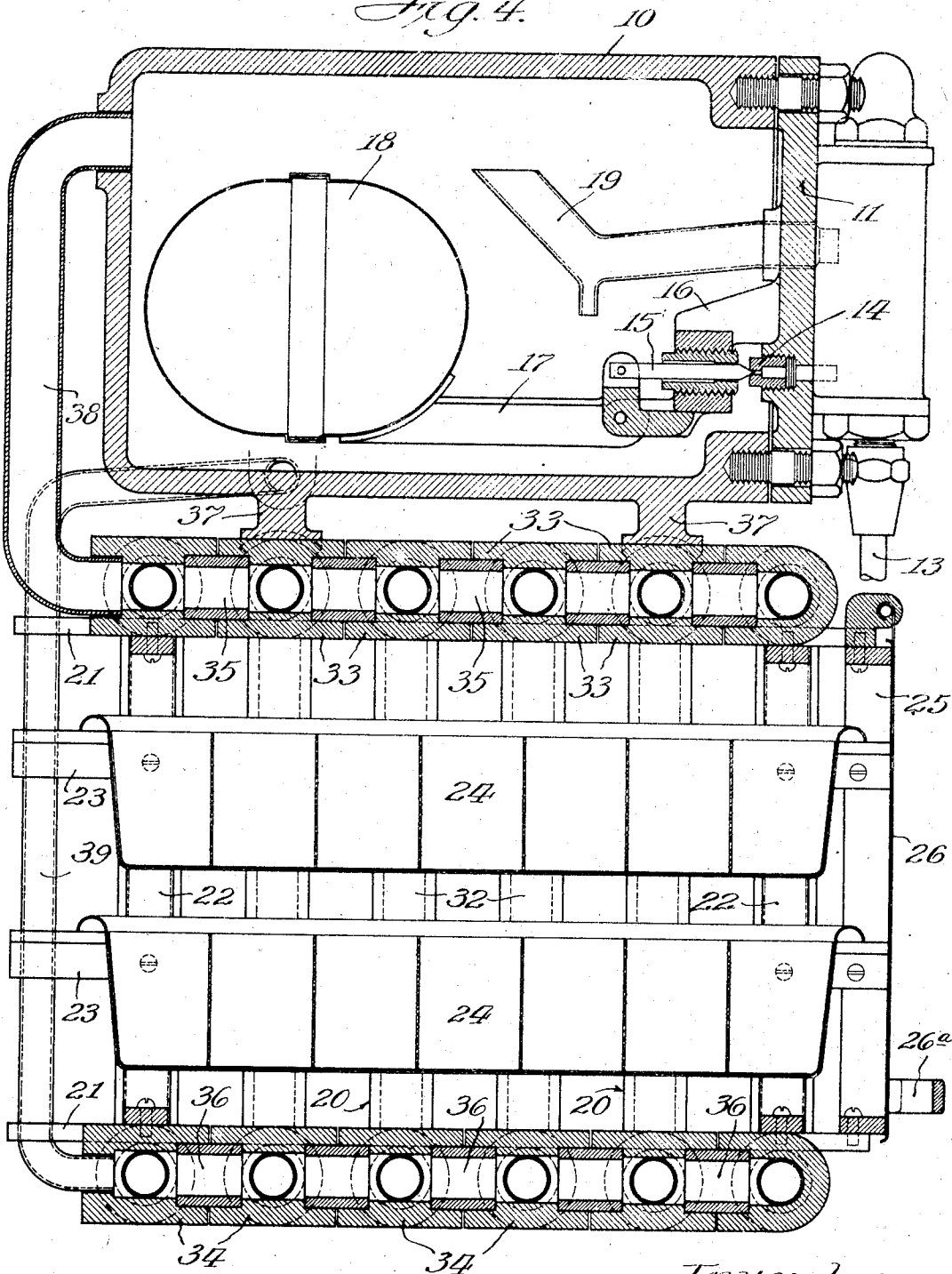
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Fig. 4.



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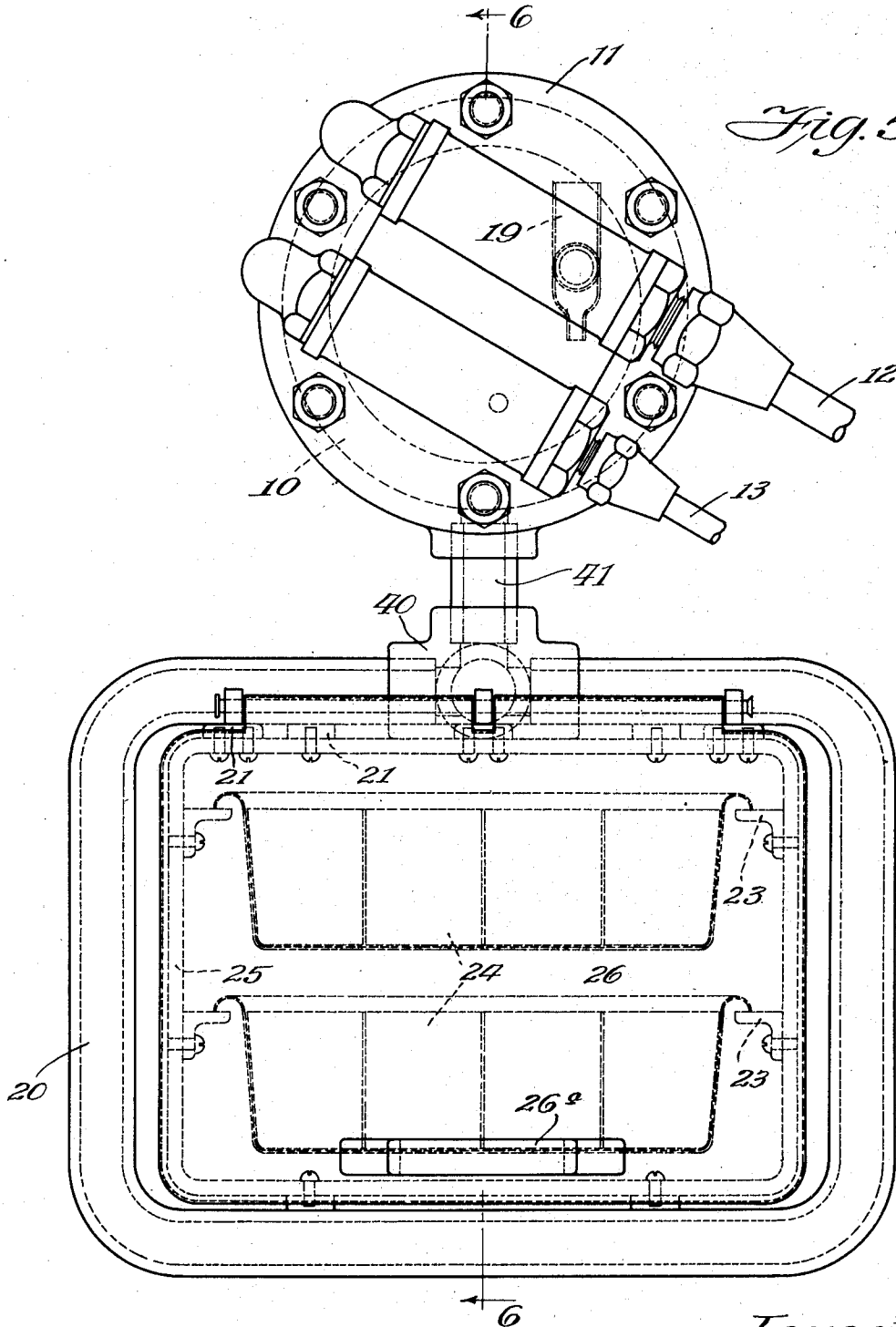
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6 Sheets-Sheet 5



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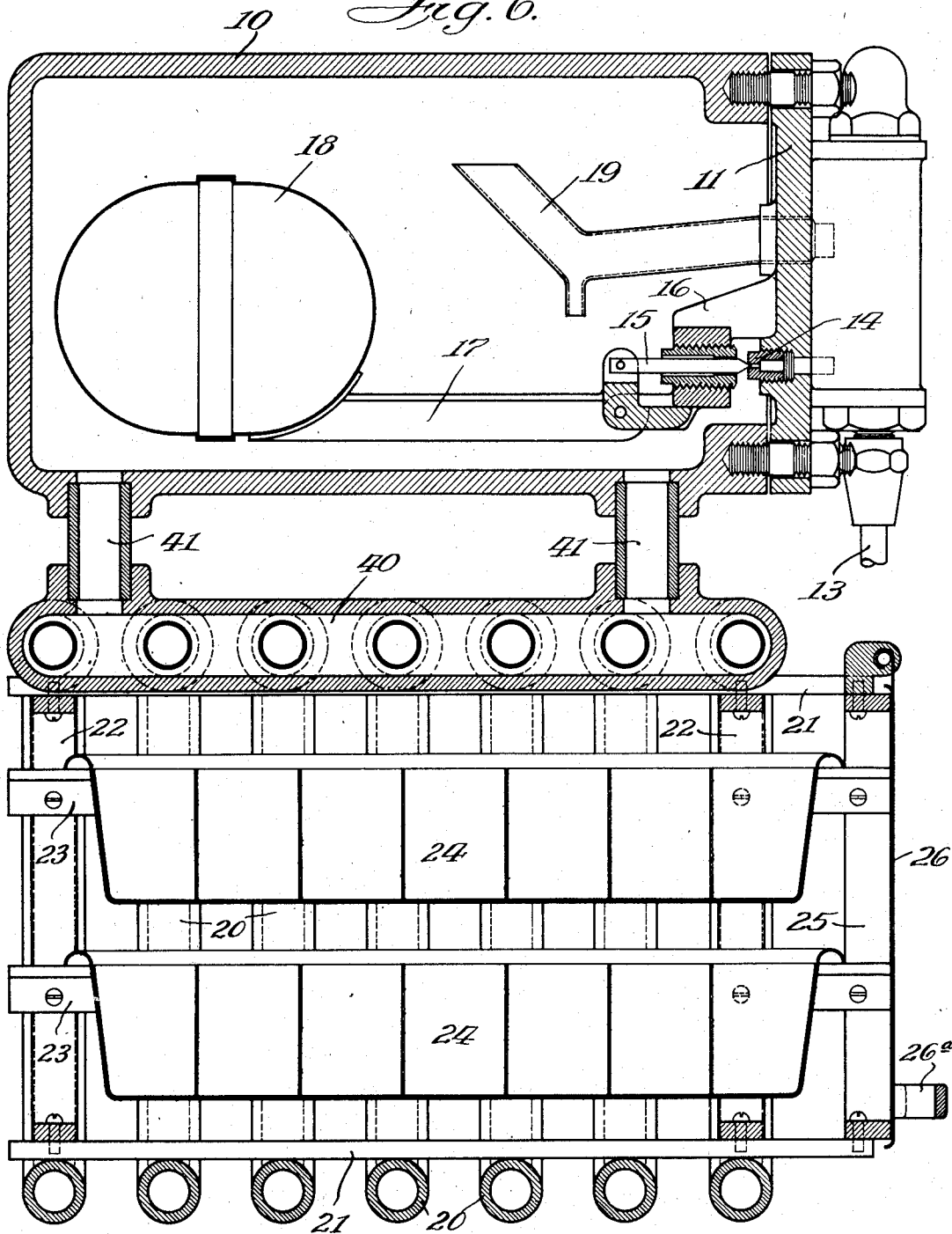
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6 Sheets-Sheet 6

Fig. 6.



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UNITED STATES PATENT OFFICE

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CHILLING UNIT

Application filed June 29, 1929. Serial No. 374,828.

This invention relates to chilling units and more particularly for such units which are intended for use in domestic refrigerators.

One of the objects of the invention is to simplify the construction of such units and at the same time enhance the efficiency thereof.

A further object of the invention is to provide a unit having chilling coils, each of which is provided with connections whereby vapor produced therein is rapidly removed.

A further object of the invention is to provide such a unit composed of relatively few parts and readily assembled so as to produce a device having highly efficient heat exchange capabilities. Other objects, advantages and capabilities will later more fully appear.

My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while I have shown herein certain preferred embodiments, I wish the same to be understood as illustrative only, and not limiting the scope of my invention.

In the drawings,

Figure 1 is a front elevation of one embodiment of my invention,

Fig. 2 is a sectional view on the line 2—2 of Fig. 1,

Fig. 3 is a front elevation of another embodiment of my invention,

Fig. 4 is a sectional view on the line 4—4 of Fig. 3,

Fig. 5 is a front elevation of a further embodiment of my invention, and

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Referring to Figs. 1 and 2 of the drawings, the apparatus comprises a boiler 10 for the refrigerant liquid which is preferably constituted by a horizontally arranged longitudinal chamber provided with a closure 11. Said closure 11 carries connections for the vapor pipe 12 and liquid refrigerant pipe 13 which communicate with suitable compression and cooling means (not shown). The liquid refrigerant enters the boiler 10 through a valve 14 which is controlled by a valve needle 15 guided in a bracket 16 on which is pivoted an arm 17 pivotally connected to

the valve needle 15, and carrying a float chamber 18 which is adapted to control the valve 14 so as to maintain constant level of liquid refrigerant within the boiler 10. A drained vapor outlet 19 is provided in the boiler 10 for the purpose of conveying vapors outwardly to the pipe 12.

Below the boiler 10 the chilling unit is provided with a radiating or heat exchange section which is constituted by spaced coils 20, which, in the embodiment illustrated in Figs. 1 and 2, are formed from a single length of pipe, of which the ends connect into the boiler 10 below the liquid level therein and preferably at the bottom thereof near its ends.

As shown in Fig. 1, the coils 20 are of substantially rectangular form so as to define a chamber suitable for the freezing of water to form ice cubes, or other liquids. Longitudinal bars 21 are spot welded or otherwise attached to the coils 20, and said bars have mounted thereon transversely rectangular frames 22 which support longitudinal slides 23 which slidably support receptacles 24 adapted to contain water or other liquids to be frozen. The bars 21 and slides 23 extend forwardly and carry at their forward ends a frame 25 and a hinged door 26 which is adapted to conceal the receptacles 24 from view, except during withdrawal and replacement. The door 26 may be provided with a handle 26^a.

The upper sides or portions of the coils 20 are connected by nipples or risers 27 to a longitudinal header 28. Said header is provided with an upstanding nipple 29 which is connected by a union 30 to a bent tube 31 which is connected into the upper portion of the boiler 10, that is above the liquid level in said boiler.

In the operation of the unit, the coils 20 are maintained substantially full of liquid refrigerant at a low temperature. As heat passes through the walls of the coils, vaporization occurs and the vapors from each coil pass immediately upwards through the nipples 27, header 28, nipple 29 and tube 31 into the vapor space in boiler 10, so that the coils 20 will be maintained substantially full of

liquid refrigerant so that a highly efficient heat transfer is insured.

The material from which the parts of the system exposed to the refrigerant are made depends upon the nature of said refrigerant. Thus where sulphur dioxide is employed, such parts are preferably made of copper. In such a case the connections between the coils 20 and the boiler 10 and the nipples 27, likewise the connections between the nipple 29 and union 30, and between the pipe 31 and the union 30 and boiler 10 may suitably be brazed or soldered together.

In the case of certain other refrigerant liquids, such as methyl chloride, it is possible to make the coils 20 and the boiler 10 of iron. In this case it is preferred to weld the various parts together. For the purpose of convenience, it is preferable that the pipe 31 should be of copper since tubes of that metal are more readily bent into the configuration desired. The copper tube 31 may suitably be soldered into the boiler 10 and union 30.

In Figs. 3 and 4 similar parts are referred to by the same reference numerals. In this embodiment the coils 20 are of annular form, each coil 20 being formed from a pair of tubes 32 of U shape, the ends of which are soldered, brazed, welded or otherwise suitably attached to cross connections 33 and 34. Adjacent cross connections 33 are similarly held rigidly by nipples 35, and the cross connections 34 are similarly united by nipples 36 so that the coils 20 are arranged in a spaced series as seen in Fig. 4. The boiler 10 is provided with depending lugs 37 which are welded to certain of the cross connections 33 so as to support the coils from the boiler.

The cross connections 33 and nipples 35 constitute a conduit which communicates with the upper part of each of the coils 20. Such conduit is closed at its forward end and its rear end is connected by a tube 38 to the upper part of the boiler 10. The cross connections 34 and the nipples 36 define a conduit into which the lower parts of the coils open. This conduit is also closed at its forward end and is connected at its rear end by a pipe 39 which extends therefrom into the bottom of the boiler 10.

In the operation, liquid refrigerant flows from the boiler 10 through the pipe 39 into the coils 20 thereby maintaining same substantially full of liquid refrigerant. Vapors produced in said coils pass therefrom into the conduit defined by the cross connections 33 and nipples 35, from which they pass by pipe 38 into the vapor space of the boiler 10.

In Figs. 5 and 6 similar reference numerals are applied to similar parts. In this embodiment the coils 20 are constituted by a series of pieces of bent pipe, the ends of which are received in sockets provided in a longitudinal header 40. The header 40 is connected

by a plurality of nipples 41 to the boiler 10 below the liquid level thereof.

In operation liquid refrigerant passes from the boiler downwardly through one or more of the nipples 41 so that the coils 20 are maintained flooded. Vapors which are produced in any of the coils 20 pass immediately into the header 40, from which they pass upwardly into the boiler 10 through one or more of the nipples 41.

I claim:

1. A chilling unit comprising an elongated refrigerant boiler, a series of spaced interconnected coils at a lower level, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant and conduit means communicating with the upper portion of each coil and with said boiler.

2. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils at a lower level arranged to define a chilling chamber, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant and a header connected to the upper portion of each coil and to said boiler.

3. A chilling unit comprising an elongated refrigerant boiler, a series of spaced interconnected coils at a lower level, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant, and conduit means communicating with the upper portion of each coil and with said boiler above the liquid level therein.

4. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils at a lower level arranged to define a chilling chamber, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant and a header connected to the upper portion of each coil and to said boiler above the liquid level therein.

5. A chilling unit comprising a refrigerant boiler, a series of coils formed from a single length of tube, said tube being connected to said boiler so as to be maintained substantially full of liquid refrigerant, and conduit means connected to each of said coils and adapted to return vapors therefrom to the boiler.

6. A chilling unit comprising a refrigerant boiler, a series of coils formed from a single length of tube, conduit means communicating with the upper end of each coil and with said boiler and means adapted to supply liquid refrigerant to said coils.

7. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils formed from a single length of tube at a

lower level, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant and conduit means communicating with the upper portion of each coil and with said boiler.

8. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils formed from a single length of tube at a lower level, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant and a header connected to the upper portion of each coil and to said boiler.

9. A chilling unit comprising a refrigerant boiler, a series of coils formed from a single length of tube, means adapted to supply liquid refrigerant to said coils and a conduit connected to each of said coils and adapted to return vapors therefrom to the boiler above the liquid level therein.

10. A chilling unit comprising a refrigerant boiler, a series of coils formed from a single length of tube, conduit means communicating with each coil and with said boiler above the liquid level therein, the ends of said tube being connected directly to said boiler below the liquid level therein to maintain said coils substantially full of liquid refrigerant.

11. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils formed from a single length of tube at a lower level, means connecting said coils to the boiler below the liquid level therein so that said coils are maintained substantially full of liquid refrigerant, and conduit means communicating with the upper portion of each coil and with said boiler above the liquid level therein.

12. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils formed from a single length of tubing at a lower level, means connecting said coils to said boiler below the liquid level therein so that said coils are maintained substantially full of liquid and a header connected to the upper portion of each coil and to said boiler above the liquid level therein.

13. A chilling unit comprising an elongated refrigerant boiler, a series of spaced interconnected coils at a lower level arranged to define a chilling chamber, means connecting said coils to a point below the liquid level of said boiler so that said coils are maintained substantially full of liquid refrigerant, and conduit means communicating with the upper portion of each coil and with said boiler.

14. A chilling unit comprising an elongated refrigerant boiler, a series of spaced interconnected coils at a lower level arranged to define a chilling chamber, means connecting said coils to a point below the liquid level of said boiler so that said coils are main-

tained substantially full of liquid refrigerant, and conduit means communicating with the upper portion of each coil and with said boiler above the liquid level therein.

15. A chilling unit comprising a refrigerant boiler, a series of coils formed from a single length of tube so as to define a chilling chamber, said tube being connected to said boiler so as to be maintained substantially full of liquid refrigerant, and conduit means connected to each of said coils and adapted to return vapors therefrom to the boiler.

16. A chilling unit comprising an elongated refrigerant boiler, a series of spaced coils formed from a single length of tubing so as to define a chilling chamber at a lower level, means connecting said coils to said boiler below the liquid level therein so that said coils are maintained substantially full of liquid and a header connected to the upper portion of each coil and to said boiler above the liquid level therein.

In testimony whereof, I have hereunto set my hand this 26th day of June, 1929.

JOHN J. KORENCHAN.

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