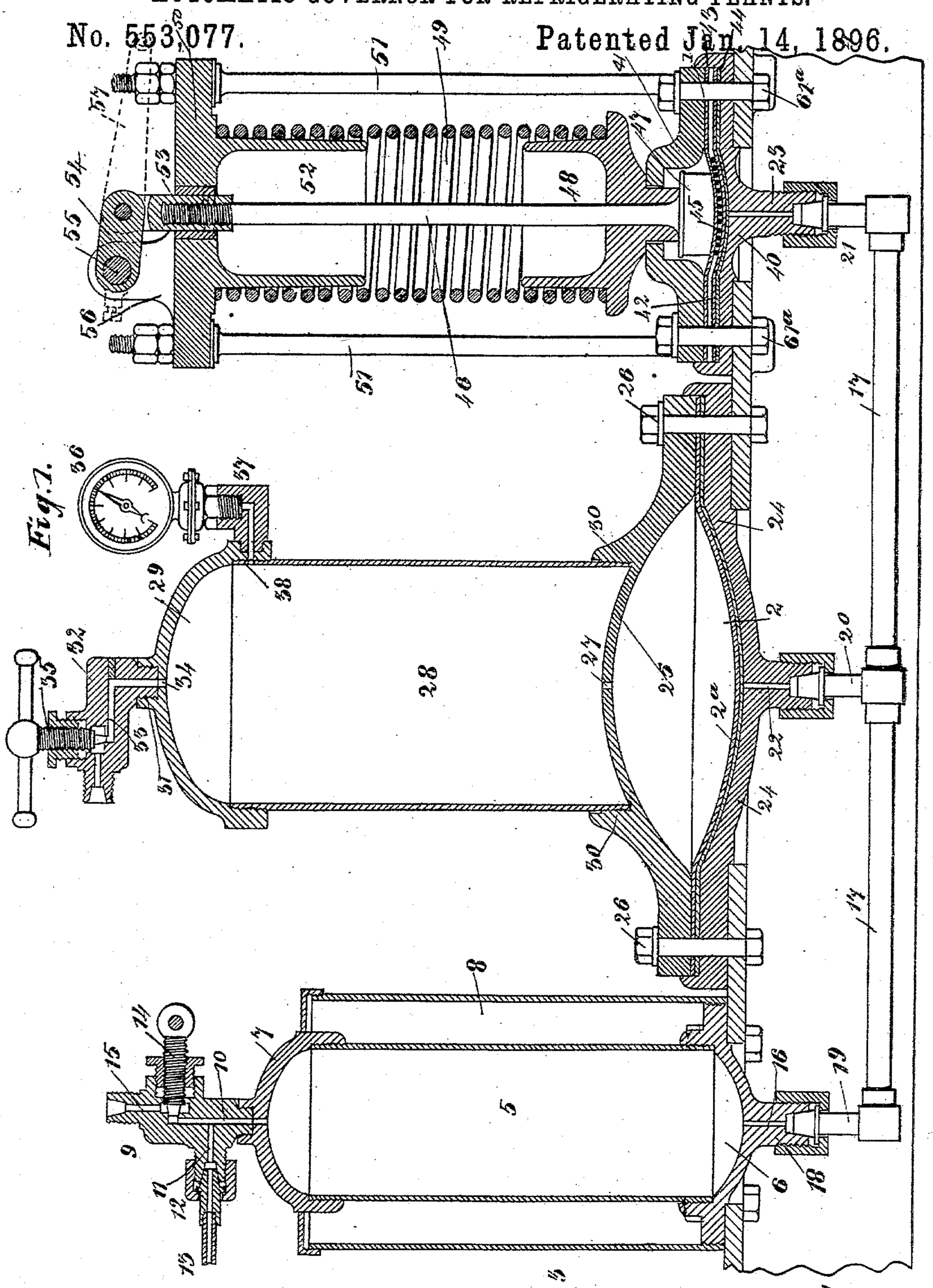
(No Model.) 3 Sheets—Sheet 1.

A. SHIELS.

AUTOMATIC GOVERNOR FOR REFRIGERATING PLANTS.

No. 553,077. Patented Jan. 14, 1896.



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(No Model.) 3 Sheets—Sheet 2.

A. SHIELS.

AUTOMATIC GOVERNOR FOR REFRIGERATING PLANTS.

No. 553,077. Patented Jan. 14, 1896.

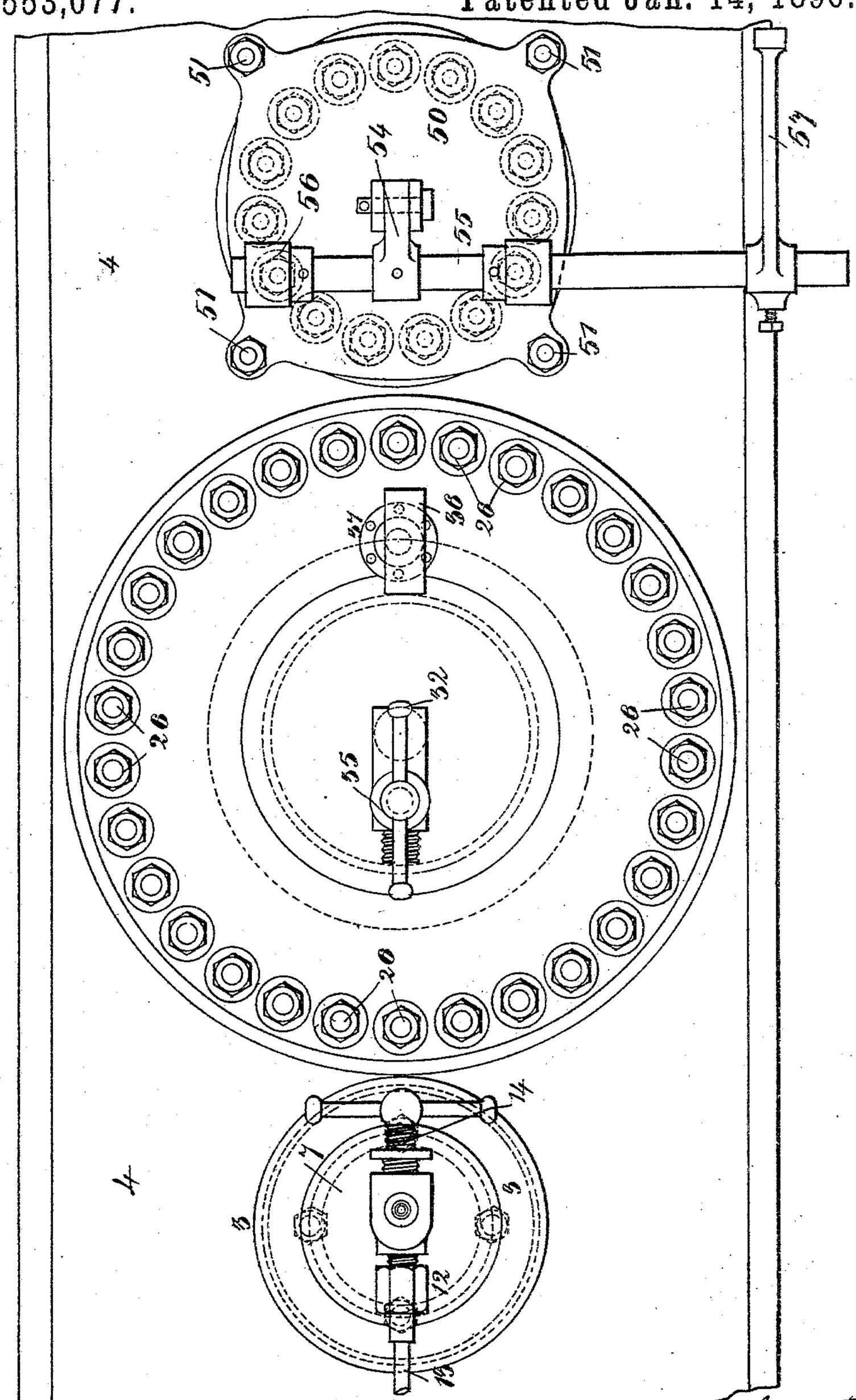

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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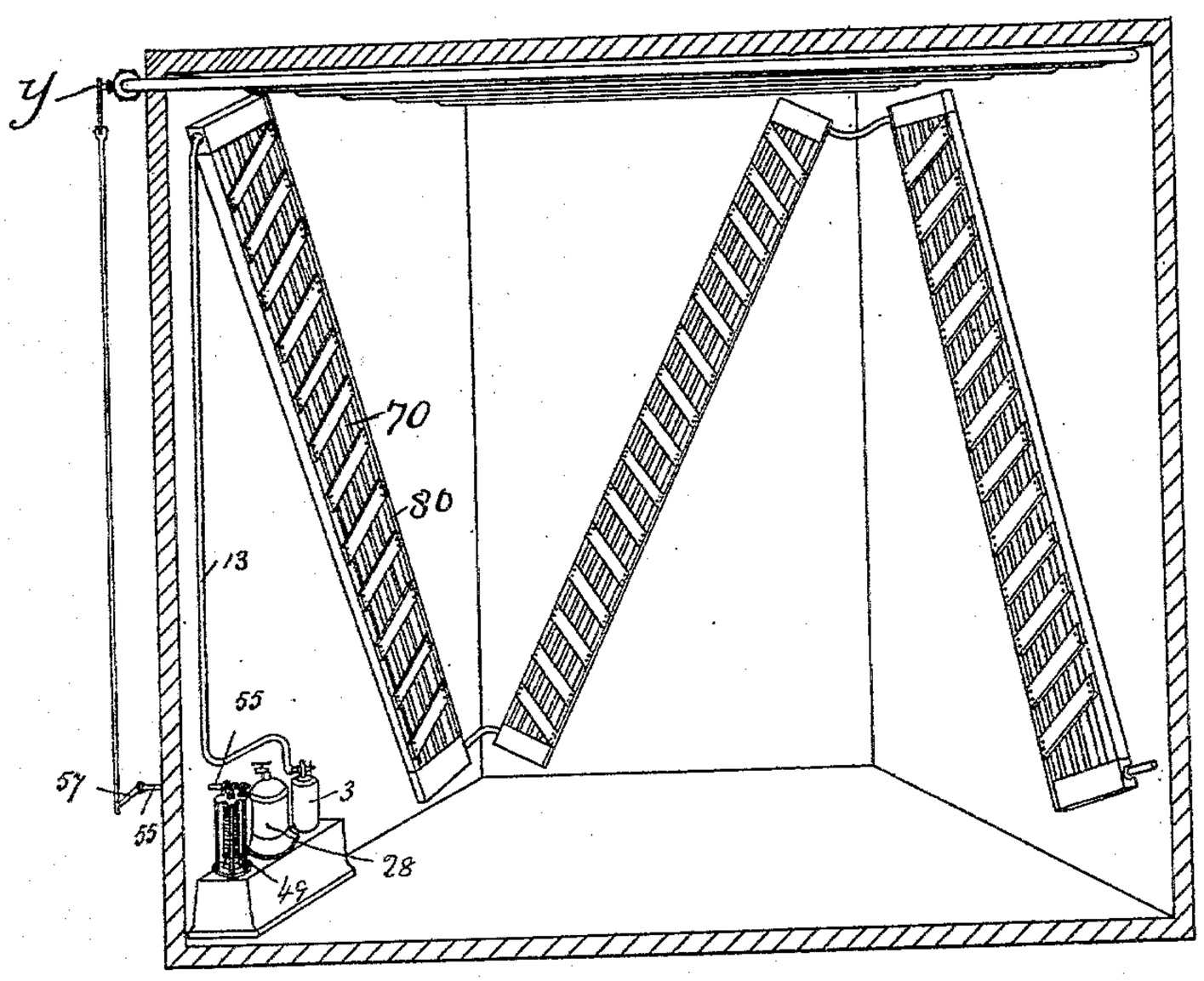
Fig. 3.



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UNITED STATES PATENT OFFICE.

ALEXANDER SHIELS, OF GLASGOW, SCOTLAND.

AUTOMATIC GOVERNOR FOR REFRIGERATING PLANTS.

SPECIFICATION forming part of Letters Patent No. 553,077, dated January 14, 1896.

Application filed June 11, 1894. Serial No. 514,219. (No model.) Patented in England February 11, 1893, No. 3,057.

To all whom it may concern:

Be it known that I, ALEXANDER SHIELS, a subject of the Queen of Great Britain, and a resident of the city of Glasgow, Scotland, have invented certain new and useful Improvements in Automatic Governors for Refrigerating Plants, (for which I have received British Letters Patent No. 3,057, dated February 11, 1893,) of which the following is a specification.

This invention relates to automatic governors for refrigerating plants, and it has for its object to improve their construction.

The invention refers to that class of thermostats wherein the expansion and contraction of mercury, spirit, salt and water, or other fluid sensitive to changes in temperature, is made to operate the apparatus.

The invention is specially designed for use with refrigerating-chambers, although it may be used for other purposes.

My invention includes a special arrangement of safety-diaphragm with its chamber and a special form of regulating-diaphragm.

In order that my said invention may be properly understood I have hereunto appended explanatory sheets of drawings, whereon—

Figure 1 is a longitudinal section of the thermostat. Fig. 2 is a plan. Fig. 3 is a sectional perspective view of a compartment with my invention in place.

The manner of connecting up the system of circulating-pipes is shown in United States Patent No. 478,373, granted to me July 5, 1892, and it will not be necessary to illustrate the arrangement herein.

Referring to the drawings, whereon the same reference-numerals wherever repeated indicate the same or similar parts, 1 is the regulating-diaphragm, 2 the safety-diaphragm, and 3 the storage-vessel.

As will be seen at Figs. 1 and 2, the whole apparatus may be fitted on a bed-plate or foundation 4, the regulating-diaphragm being at one end, the storage-vessel at the other, and the safety-diaphragm in the center.

The storage-vessel consists of a cylindrical chamber 5, which, at its lower end, is screwed into the dished bottom plate 6 and at its upper end into the convex cover-plate 7. The vessel is surrounded by a cylindrical protecting and insulating casing 8. Fitted into the cover of the vessel is a branched casting 9, which is bored with a vertical channel 10 and a horizontal channel 11. Coupled to the casting by the cap and plug-coupling 12 is a pipe 13 leading from the sensitive-fluid-tube system fitted in the interior of the refrigerating-chamber, as shown at 70, Fig. 3. This pipe communicates, as shown, with the horizontal channel 11.

14 is a screwed spindle-valve, which, when screwed down, as shown, closes the upper end of the vertical channel 10.

15 is a vertical channel bored in the upper end of the casting and leading from the channel 10 to the atmosphere.

The bottom plate 6 is made, as shown, with a downwardly-projecting branch 18, which is coupled to the branch 19 of the pipe 17. The branch 18 is bored with a central channel 16. The pipe 17 has also branches 20 and 21 which are coupled, respectively, to the downwardly-projecting branches 22 and 23 of the safety and regulating diaphragm chambers.

The safety-diaphragm chamber consists of a concave bottom-plate 24 and a convex cover-plate 25, which are secured to one another and to the foundation 4 by means of the bolts 26. The safety-diaphragm 2, which may be made of either rubber or metal, is covered by a leather or other protecting diaphragm 2^a. Both diaphragms are tightly secured between the flanges of the bottom and cover plates of the chamber.

27 is a small hole in the cover-plate 25. Mounted on the top of the cover-plate is a cylinder 28, which has screwed on its upper end a domed cover 29. The lower end of the cylinder is screwed into a circular recess 30, cut out of or formed in the cover-plate. The cover 29 has an internally-screwed socket 31 cast on its upper end, and into this socket a knee-shaped casting 32 is screwed. The channel 33 which is bored through this casting communicates with the hole 34 in the cover 29.

35 is a screwed spindle-valve fitted in the casting and by means of which the channel 33 can be closed. 36 is a pressure-gage which is fitted on the hollow branch 37 communicating with the opening 38 in the cylinder 25.

The regulating-diaphragm chamber consists of a slightly-concaved bottom-plate 40 and a recessed cover-plate 41. The main dia-

phragm 42 is protected by leather or other protecting diaphragms 43 44, and by a helically-coiled spring 45, which is interposed between the diaphragms 42 43 and adds elasticity to the same. The spindle 46 has a piston or plunger 47 at its lower end which bears against the back of the diaphragms. This piston or plunger works in the recessed part of the cover-plate 41. A tapered collar 48 is fitted on the spindle and around this collar a powerful spiral spring 49 is fitted. This spring at its upper end bears against the plate 50, which is supported on the pillars 51.

52 is a downwardly-projecting guide, around which the spring 49 is fitted, cast on the plate 50.

The upper end of the spindle 46 passes through a bushed opening 53 in the plate 50 and is connected, as shown, to the short arm 54 on the horizontal shaft 55. This shaft, which is carried in bearings 56, has at its end a long arm 57, which is so connected by levers or other well-known and suitable mechanism to the spindle of the valve Y, Fig. 3, for controlling the supply of refrigerating-fluid to the chamber as to automatically operate it.

The branch 15 of the casing 9 is for filling salt and water or other fluid into the vessel 5, and compressed air or gas is forced into the chamber 28 through the channel 33 in the casing 32.

The sensitive-fluid pipes 70 are, by preference, as shown at Fig. 3, nested or grouped together in boxes 80, which are, preferably, arranged zigzag-wise around the interior of the refrigerating-chamber.

The apparatus is so arranged that any slight increase of temperature in the refrigerating-chamber above a certain fixed limit is sufficient to force up the regulating-diaphragm against the action of the spring and open or partially open the refrigerating-fluid or motive-fluid valve, as the case may be, so as to increase the supply of cold to the refrigerating-chamber and again reduce its temperature to the normal. Likewise, if the temperature in the chamber falls slightly below the proper limit, the action of the spring is sufficient to force down the spindle 46 and close or partially close the supply-valve, so as to stop or reduce the supply of cold and allow the temperature to again rise to the normal.

It is to be understood that I do not confine myself to the exact details of construction shown on the drawings, as parts may be modified or altered without departing from the invention.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination in a regulating apparatus, a regulating device, a conduit and a safety device, comprising a diaphragm chamber, a diaphragm therein, a chamber for compressed air surmounting the diaphragm chamber, the upper part of the diaphragm chamber being dome shaped to form a support for the diaphragm and perforated to form a passage way between the two chambers.

2. In combination in a regulating apparatus, the pipe system and a diaphragm composed of two flexible sheets of material with a spring 45 between them, substantially as described.

3. A safety device comprising in combination, a diaphragm chamber, a diaphragm therein, a chamber for compressed air surmounting the diaphragm chamber, the upper part of the diaphragm chamber being dome shaped to form a support for the diaphragm and perforated to form a passage way between the two chambers, substantially as described.

4. In combination in a regulating apparatus, a storage tank and a regulating device connected together by a conduit with a safety device comprising a diaphragm chamber, a diaphragm therein, a chamber for compressed air surmounting the diaphragm chamber, the upper part of the diaphragm chamber being dome shaped to form a support for the diaphragm and perforated to form a passage way between the two chambers, substantially as described.

Signed at Glasgow, Scotland, this 9th day of January, A. D. 1894.

ALEXANDER SHIELS.

Witnesses:
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WILLIAM GALL.