

(No Model.)

2 Sheets—Sheet 1.

J. R. COOK.
AIR COOLING APPARATUS.

No. 534,549.

Patented Feb. 19, 1895.

Fig. 1.

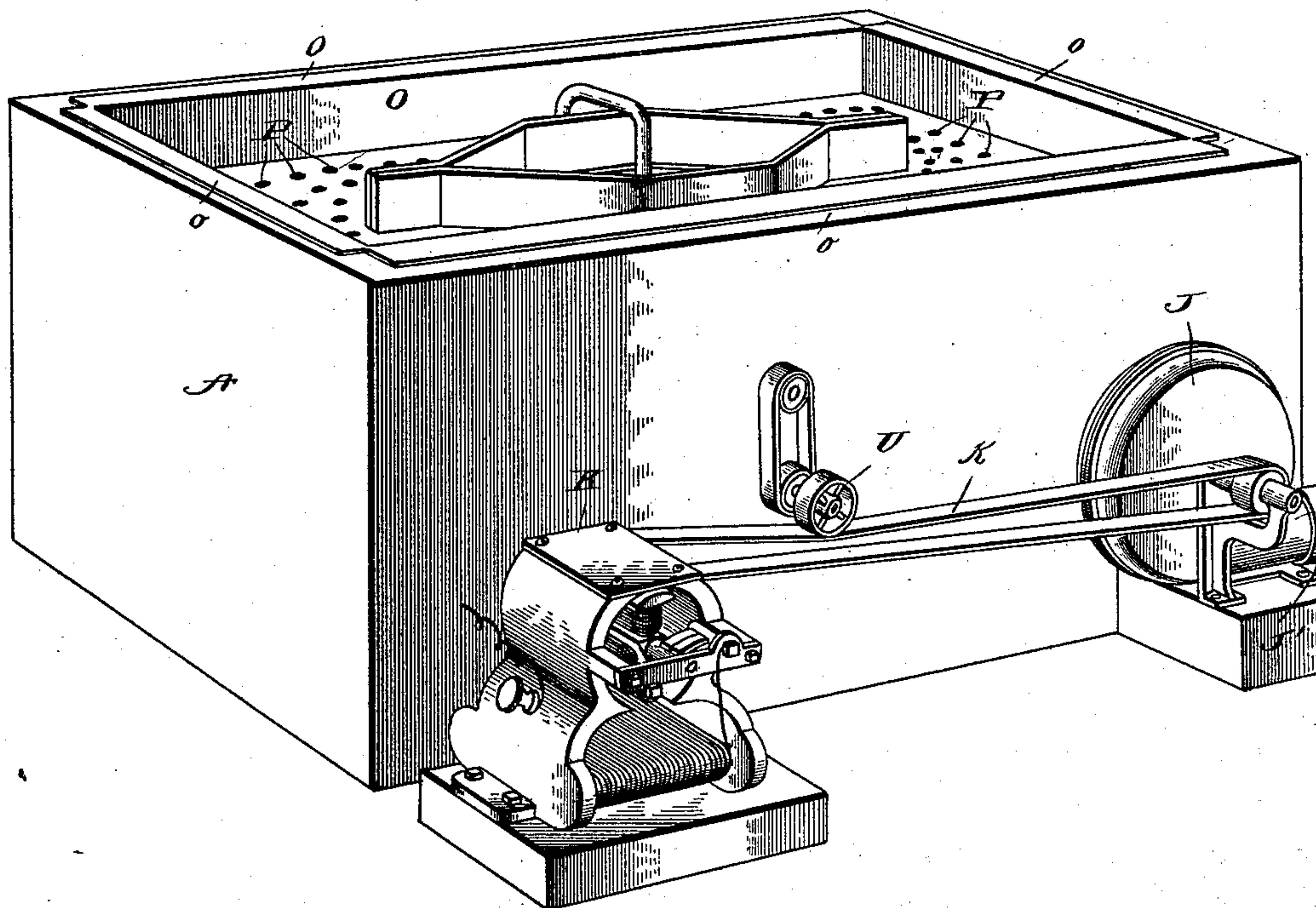
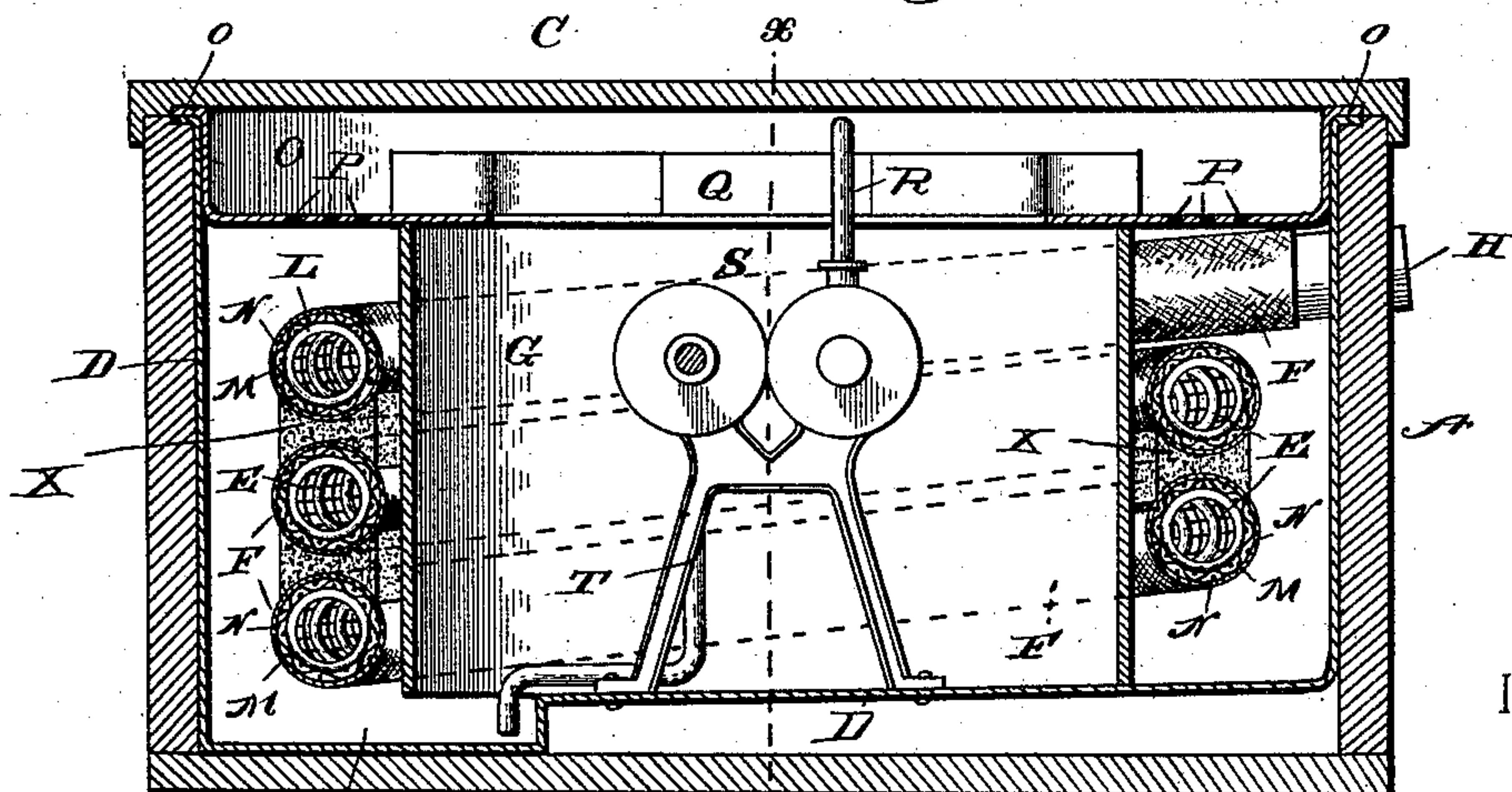


Fig. 2.



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Fig. 3.

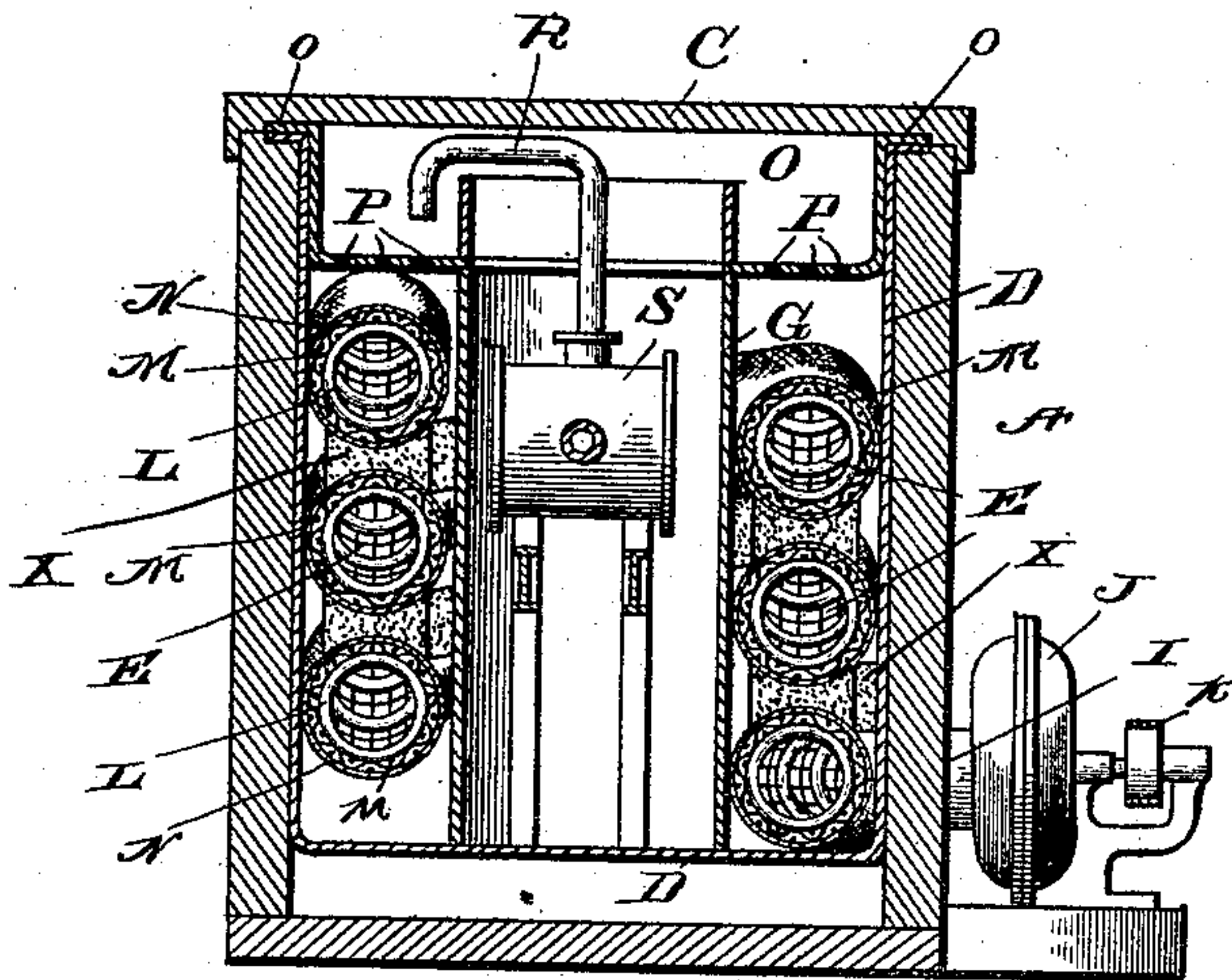


Fig. 4.

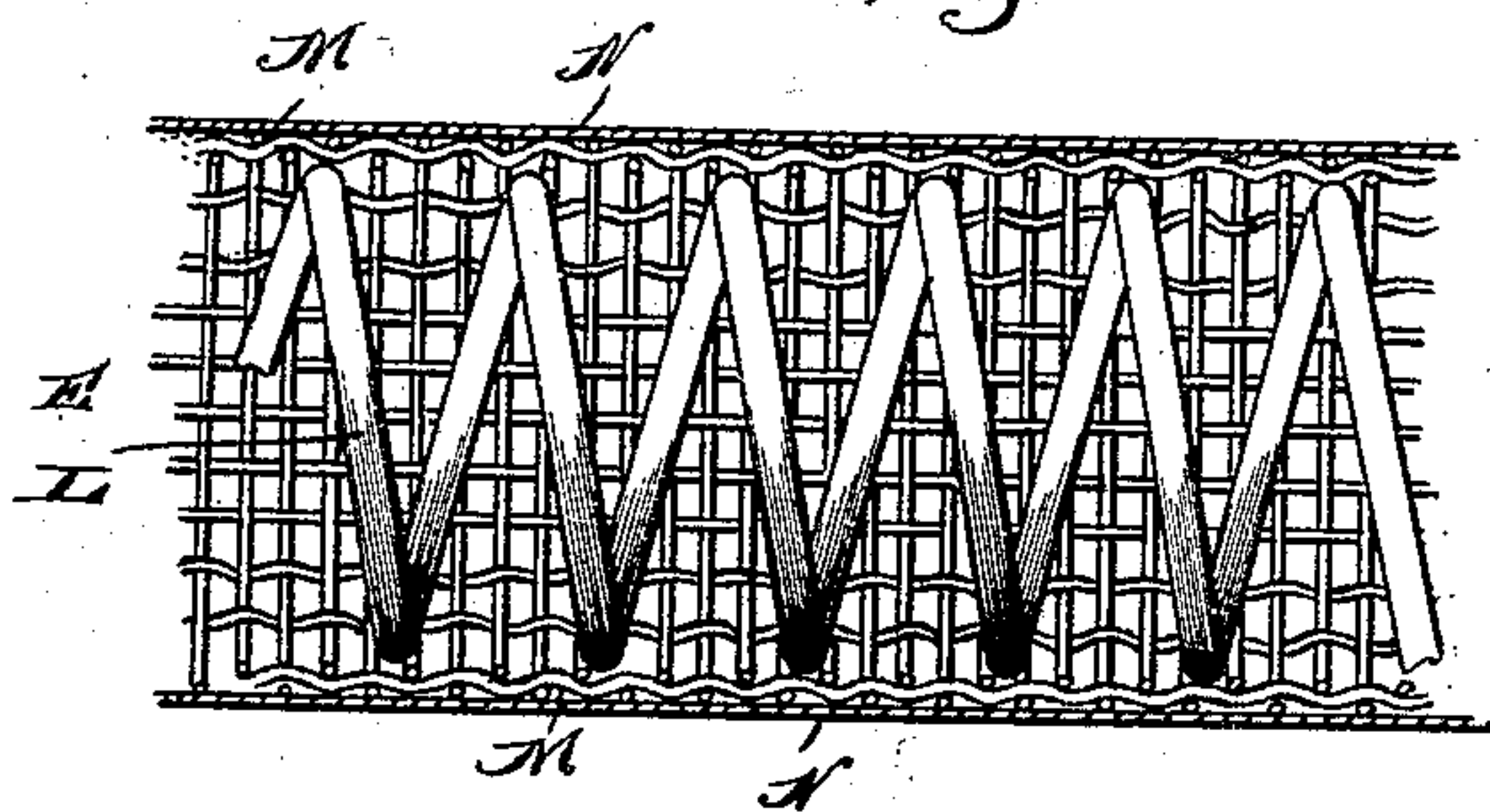
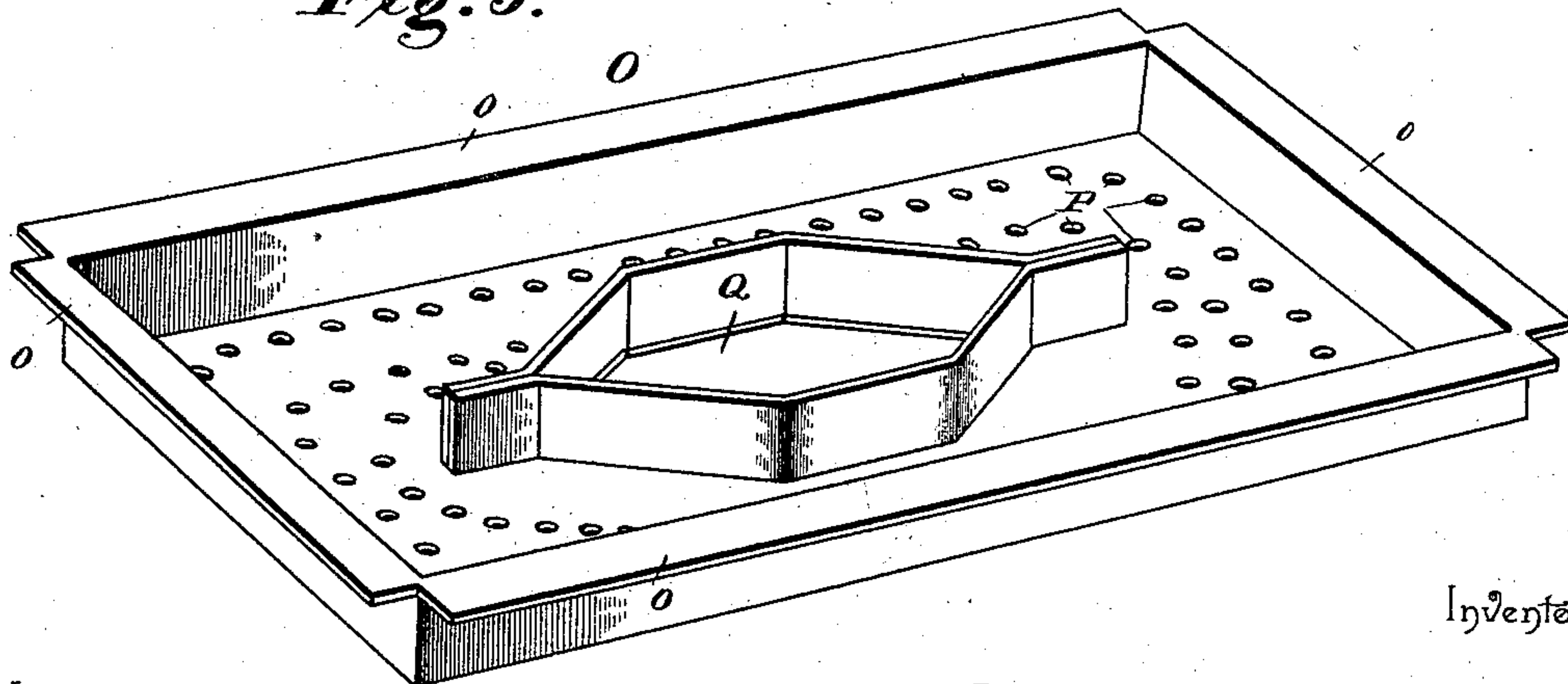


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN R. COOK, OF PIOCHE, NEVADA.

AIR-COOLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 534,549, dated February 19, 1895.

Application filed February 23, 1894. Serial No. 501,194. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. COOK, a citizen of the United States, residing at Pioche, in the county of Lincoln and State of Nevada, have invented a new and useful Air-Cooler and Ventilator, of which the following is a specification.

This invention relates to air cooling apparatus; and it has for its object to effect certain improvements in that class of apparatus which reduce the temperature of the air from the outer atmosphere, and supply the same to buildings for the purpose of cooling and ventilating the same, or to refrigerating rooms or other places for cold storage purposes.

To this end the main and primary object of the present invention is to effect certain improvements in air cooling apparatus whereby a much lower temperature may be secured than ordinarily, and such temperature maintained while the apparatus is in operation.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of an air cooling apparatus constructed in accordance with this invention, the top lid or cover of the cooling box or tank being removed. Fig. 2 is a central vertical longitudinal sectional view thereof. Fig. 3 is a vertical sectional view on the line $x-x$ of Fig. 2. Fig. 4 is an enlarged detail sectional view of a portion of the pervious air cooling pipe. Fig. 5 is a detail in perspective of the perforated drip pan fitted in the top of the cooling box or tank.

Referring to the accompanying drawings, A represents a water tight cooling box or tank adapted to be located in any convenient position where the apparatus may be best adapted for work, and said box is provided at one end thereof with the bottom cold water sink or trap B, and with a removable top lid or cover C, to provide convenient access to the interior of the cooling box when desired.

The inner walls and bottom of the cooling box or tank A, are provided with a metal lining D, to insure the exclusion of the outer air,

and to prevent the leaking of water, and said metal-lined box is adapted to contain therein a continuous pervious air cooling pipe E, through which is adapted to be drawn the supply of air to be cooled and conducted to the point of use, whether for ventilating or refrigerating purposes. The pervious air cooling pipe E, is provided with a number of horizontal convolutions F, which range from the top to the bottom of the box or tank, in order to provide a long circuit or passage for the air to be cooled, and thereby subject the same to the refrigerating or cooling action of the apparatus for a considerable period of time, and insure the reduction of the temperature of the air to a degree sufficiently low for any desired purpose.

The horizontal convolutions F, of the pervious air cooling pipe E, encircle a tubular housing G, of an approximate oval shape, and arising to a point near the top of the cooling box to inclose in the central space, formed by the convolutions of the pipe, the pumping devices to be presently described, while at the same time serving as a former or shaper to hold the convolutions of the pipe one above the other in the direct path of the dripping water which is adapted to seep therethrough. One end of the pipe E, is fitted to the inlet pipe H, projecting through one end or side of the cooling box to supply the cooling coil with the air to be cooled, while the other end of the supply pipe, or the coil formed thereby, connects with a suction pipe I, extending through one end or side of the cooling box and connected to the inlet of an exhaust or vacuum-forming fan J, arranged in a convenient position outside of the cooling box and driven from the electric or other motor K, by the belt k , belted to such motor and also to the shaft of the exhaust fan. The discharge pipe J', of the exhaust fan is adapted to discharge the cooled air into a suitable line of piping which conducts such air to the point of use which may be buildings to be cooled and ventilated, or cold storage rooms.

The pervious air cooling pipe E, is constructed with special reference to the rapid evaporation of water which is allowed to permeate or seep through the same, and such pipe consists of a spiral wire core L, incased in the stiff perforate or screen tube M, which

is preferably made of very coarse screen to provide for a free circulation of the exhausting air with the pervious covering N, for properly keeping the latter to its shape, said covering being wrapped around the perforate tube M, and is of a suitable cloth material which allows the water to seep through the pipe and undergo the evaporation which cools the air exhausted through the several convolutions of the pipe by the exhaust fan J.

The requisite quantity of water is continually fed onto the convolutions of the air cooling pipe, or cooling coil formed thereby, from the upper removable water pan O. The water pan O, is provided with flanged ends o, held onto the top edges of the cooling box by the lid or cover C, and is adapted to fit in the upper end of the cooling box above the top convolution of the cooling coil. The said water pan O, is provided with a series of bottom drip openings P, arranged directly over the cooling pipe and following the convolutions thereof whereby the water from such pan falls directly onto the cooling pipe through which it seeps as just described, and said water pan O, is further provided with a central flanged opening Q, disposed in a line above the upper end of the tubular housing G, arranged inside of the cooling box and within the convolutions of the pervious air cooling pipe, to accommodate the upper discharge pipe R, of a rotary or other suitable type of pump S, the inlet pipe T, of which, extends into the cold water sink or trap B, at one bottom end of the cooling box, the other bottom portion of which may be inclined, if desired, to direct the water which reaches the bottom of the box into the sink or trap at one end thereof.

The lift pump S, is conveniently arranged inside of the housing G, and is geared with the operating friction wheel U, mounted at one end of a suitable shaft projecting through one side or end of the cooling box and adapted to be engaged by the upper portion of the belt $\frac{1}{2}$, from the electric motor to the exhaust fan, so that the pump will be operated simultaneously with the other part of the apparatus.

From the above description it will be obvious that as the air is drawn through the cooling pipe E, by the exhaust or suction fan J, the water drips from the upper water pan onto the pipe and seeps through the same so as to undergo a certain degree of evaporation and thereby cool the air, and it will be also clear that after a time the water which reaches the cold water sink or trap B, of the cooling box will be itself reduced in temperature whereby it will be more efficient in cooling the air as it is used over and over again by means of the pump S, which lifts the water from the sink or trap B, and discharges the same into the upper water pan. From time to time additional water may be introduced into the water tank, to supply that lost by evaporation, in any convenient manner.

The apparatus herein described is thought to be especially efficient in operation by rea-

son of the fact that the supply air is exhausted through the line of cooling pipe E, instead of being forced therethrough as is usual in other apparatus of an analogous nature, for it is well understood that evaporation is much greater in an attenuated atmosphere, than under pressure, and is consequently much more effective.

Changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention, and at this point it may be further observed that, if desirable, a suitable cotton or other waste filling X, may be placed between the convolutions of the cooling pipe to retain the moisture therein.

The herein described apparatus may be used in a variety of different ways, and for cold storage purposes where a low temperature is required, the same is to be placed on the inside of the room to be cooled, or so arranged as to draw the air from the cold storage room and exhaust the air back again through the exhauster into the same room. In this way I only cool a given amount of air, and by continuously circulating it in the manner described, will cool the same to a much lower degree than ordinarily attained. However, in adapting the apparatus for this use, the air in the cooled room would necessarily soon become thoroughly saturated with moisture so as to interfere with or entirely prevent evaporation, but to obviate this I may employ sulphuric acid, calcium chloride, or other chemicals having a strong affinity for water, and by placing such chemicals at the mouth of the exhauster and at the inlet of the apparatus or other desirable point, the air will be kept comparatively dry so as to insure a continuous evaporation of the water inside of the cooler.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. The combination of a water tight cooling box provided with a cold water sink or trap at the bottom thereof, a convoluted pervious cooling pipe coiled within said box, an exhaust fan connected with one end of said pipe to attenuate the circulating air therein, a central tubular metallic housing arranged inside of the cooling box and within the convolutions of the cooling pipe, a perforated water pan fitted within the top of the box above said tubular housing, a lift pump arranged inside of said tubular housing to elevate the water from the bottom sink or trap to the water pan and operating means for said pump and fan, substantially as set forth.

2. In an apparatus of the class described, the combination with a water tight cooling box; of the convolute cooling pipe arranged within the box and consisting of a flexible wire coil core, a stiff perforate or screen tube M incasing said core, and a pervious cloth covering exteriorly wrapped around said stiff

5 tube, a waste filling between each convolution of pipe, an exhaust pan connected with said pipe to attenuate the air therein, and means for supplying water onto said pipe, substantially as set forth.

10 3. In an apparatus of the class described, the combination of a metal-lined cooling box provided in the bottom and at one end with a cold water sink or trap, a convoluted pervious cooling pipe coiled within the box and having one end opening into the outer air, a suction or exhaust fan connected with the other end of said pipe, a waste filling between each convolution of pipe, a central tubular housing arranged inside of the cooling box and
15 the convolutions of the cooling pipe, a water

pan fitted into the upper end of the cooling box and provided with a central flanged opening and bottom drip openings, a lift pump arranged inside of said tubular housing and feeding water from the sink or trap of the box into the upper water pan, and means for simultaneously operating said fan and pump, substantially as set forth.

20 In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN R. COOK.

Witnesses:

WM. CLARK,
J. D. CAMPBELL.