C. E. KLEINSCHMIDT.

FREEZING OR COOLING MACHINES.

No. 184,012. Patented Nov. 7, 1876.

Fig. 1.

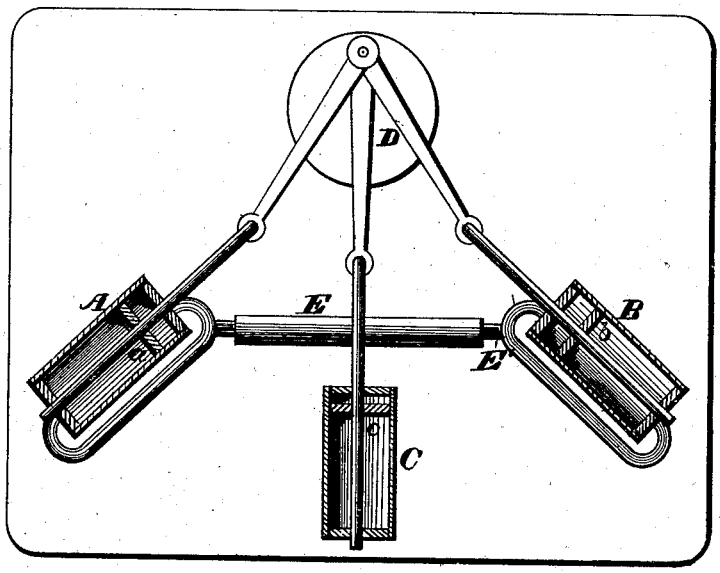
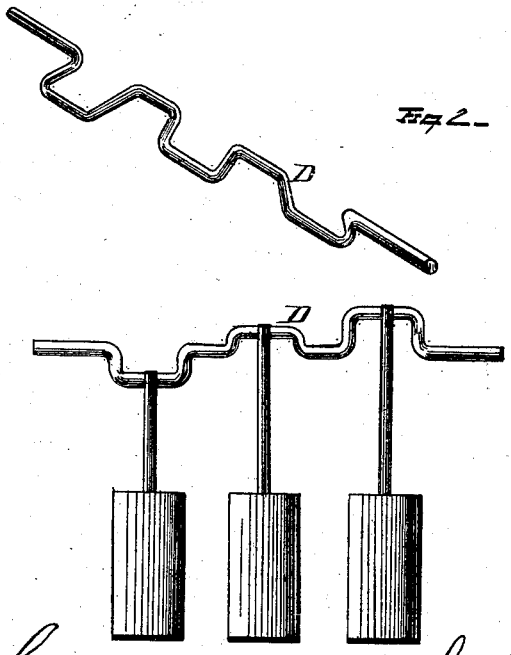


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES E. KLEINSCHMIDT, OF CLEVELAND, OHIO.

IMPROVEMENT IN FREEZING OR COOLING MACHINES.

Specification forming part of Letters Patent No. **184,012**, dated November 7, 1876; application filed June 21, 1876.

To all whom it may concern:

Be it known that I, CHARLES E. KLEINSCHMIDT, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Freezing or Cooling Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to freezing or cooling machines of that class operating by means of compressed air to produce a reduced temperature.

In Figure 1 of the drawing is represented, in plan view, a demonstration of the essential parts and mechanism entering into a device constructed according to my invention, said invention consisting in the following parts and combinations, as hereinafter specified and claimed, wherein A is the cylinder, where air is compressed; C, the steam or power cylinder; and B, the expansion or auxiliary cylinder. Each cylinder A B C is provided with its piston *a b c*. The three pitmen center upon and are attached to a single crank, D. E is a cooler, which may be of any suitable construction. That which I prefer is a vessel or chamber for containing water at the ordinary degree of temperature, or lower, as may be desired. Through this chamber is led a pipe, E′, which may be made to pass direct, or in the form of a worm or any tortuous manner, so as to obtain the desired cooling effect of the water upon the compressed air in the pipe E′.

The cylinder C may be either any suitable steam-engine or water-power, and this cylinder is the prime source of power for the operation of my device, which is as follows: The cylinder A, which I term the "compression-chamber," is essentially a double-acting bellows. Each stroke of the piston, as it travels in one direction, draws air into the cylinder behind it, while it compresses the air in its front. The compressed air is exhausted into the pipe E′, and passes in its compressed condition through the cooling medium E, whereby its temperature is greatly reduced. This compressed air is discharged into the expansion or auxiliary cylinder B, where it is forced against the piston in said cylinder, and is utilized to assist the action of the steam-cylinder C, thereby requiring less power on the part of steam-cylinder C for the proper operation of the machine. As the piston of the cylinder returns in its stroke, the operation just described is repeated upon opposite ends of the cylinders A and B. As the compressed air in the cylinder B operates to force the piston *b* sufficiently near to the end of its cylinder, a valve is operated in said cylinder whereby the compressed air behind said piston *b* is released and discharged into a cooling-chamber or upon the material to be cooled. At the same time and by the same means the valve in front of the piston *b* is closed just before the compressed air from the cylinder A escapes, and is discharged into the cylinder B for producing a return stroke of piston *b*.

It will be seen that my machine operates to produce a low temperature upon the well-known principle of first compressing atmospheric air; then cooling this compressed air, and afterward allowing it to expand. I have placed the motive power of my device in such position and relation to the compressing-cylinder A that their collective and separate force shall act to the best advantage when the resistance of the compressing-cylinder A is at its maximum. To accomplish this I can either place the compressing and expanding cylinders A and B in such a relation to each other that their center lines, when extended, shall cross each other at an angle of not more than one hundred and twenty degrees or less than seventy-five degrees; or I can place the cylinders parallel to each other, as shown at Fig. 2 of the drawings, in which case their piston-rods or pitmen shall operate upon three cranks of a single shaft set at angles to each other corresponding to the angles above named. This I consider but a modification of the arrangement shown in Fig. 1, and either may be employed at pleasure. It is not necessary that the cylinder or driving power C should be situated between the cylinders A and B, as shown, as it may be placed opposite that location, if desired.

One of the principal objects of my invention is to accomplish the greatest amount by the

expenditure of the least amount of force, and I do this by utilizing the expansive force of the compressed air, making it assist the motive power, through its action upon the piston *b*, at a time when most needed, and when it can be applied to the best advantage.

I do not limit myself to any precise construction of valves, as any suitable valves may be employed for accomplishing the results and functions hereinbefore specified.

What I claim is—

1. The combination, with the motive-cylinder C, of the compression-cylinder A and auxiliary or expansion cylinder B, substantially as and for the purpose shown.

2. The cylinders A and B, placed in such relation to each other that their line of direction and operation shall bear the relation of not more than one hundred and twenty degrees or less than seventy-five degrees, in combination with exhaust and cooling pipe E and its valves, substantially as and for the purpose shown.

3. The combination, with the compressing-cylinder A and steam-cylinder C, of the expansion or auxiliary cylinder B, substantially as and for the purpose shown.

4. The combination of the cylinders A and B, pipe E′, and cooler E, substantially as and for the purpose shown.

5. The cylinders A B C, situated relative to each other, as described, uniting or operating upon a single crank or shaft, substantially as and for the purpose shown.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES E. KLEINSCHMIDT.

Witnesses:

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JAMES P. WALSH.