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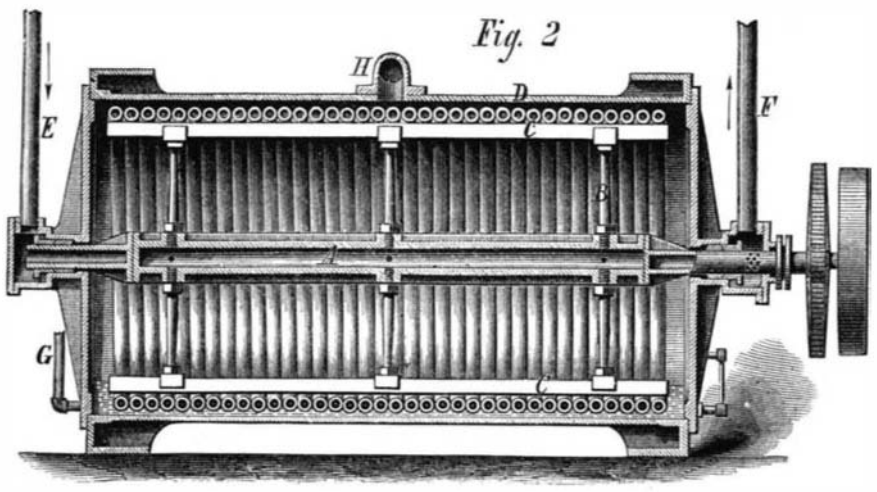
IMPROVED ICE MACHINE.

This ice machine is constructed upon the general principle of the employment of a non-congealable liquid as a vehicle for conveying the cold product to a receptacle where the temperature of the cooled liquid is transmitted to atmospheric air, which is then later directed into a congealing receptacle, where the freezing effect is produced.

A perspective view of the apparatus is shown in Fig. 1. In Fig. 2 is shown the refrigerating cylinder in section, a perspective view of the same being seen at the right of the view, Fig. 1. This refrigerator cylinder may be made of any suitable material and covered with felt or some non-conducting material. It is journaled on a longitudinal shaft, A, which is provided with radial arms, B, which carry upon their outer ends longitudinally arranged ribs, C. Around these ribs, and near the inner periphery of the cylinder, is wound a continuous coiled pipe, D, in which circulates strongly saturated brine or other non-congealable liquid, which is received from a convenient cistern or tank. A coil of pipe extends the entire length of the cylinder, and at each end communicates with the hollow ends of the shaft, A, and through this hollow with the supply pipe, E, and the exit pipe, F, so that a continuous circulation of the non-congealable liquid may be kept up in the coil. Inside of this cylinder a volatile liquid is placed, which may be ether, gasoline, ammonia, bisulphide of carbon, or other easily evaporated liquid, which is introduced through a pipe, G, and is maintained at such level as to immerse the bottom portion of the coil of pipes, which level may be regulated by means of a glass gauge upon the outside. As the coil of pipes is revolved by any suitable mechanism, the coil passes to the upper portion of the cylinder with its surface moistened by the volatile liquid, which it carries up from adhesive attraction; and as the cylinder is exhausted of its gaseous contents through the pipe, H, by means of the pumps seen at the left of the cut, Fig. 1, the evaporation of the liquid upon the surface of the coil rapidly takes place to supply the partial vacuum, and a corresponding reduction of the temperature of the pipes and its contained vehicle of non-congealable liquid takes place.

Fig. 2



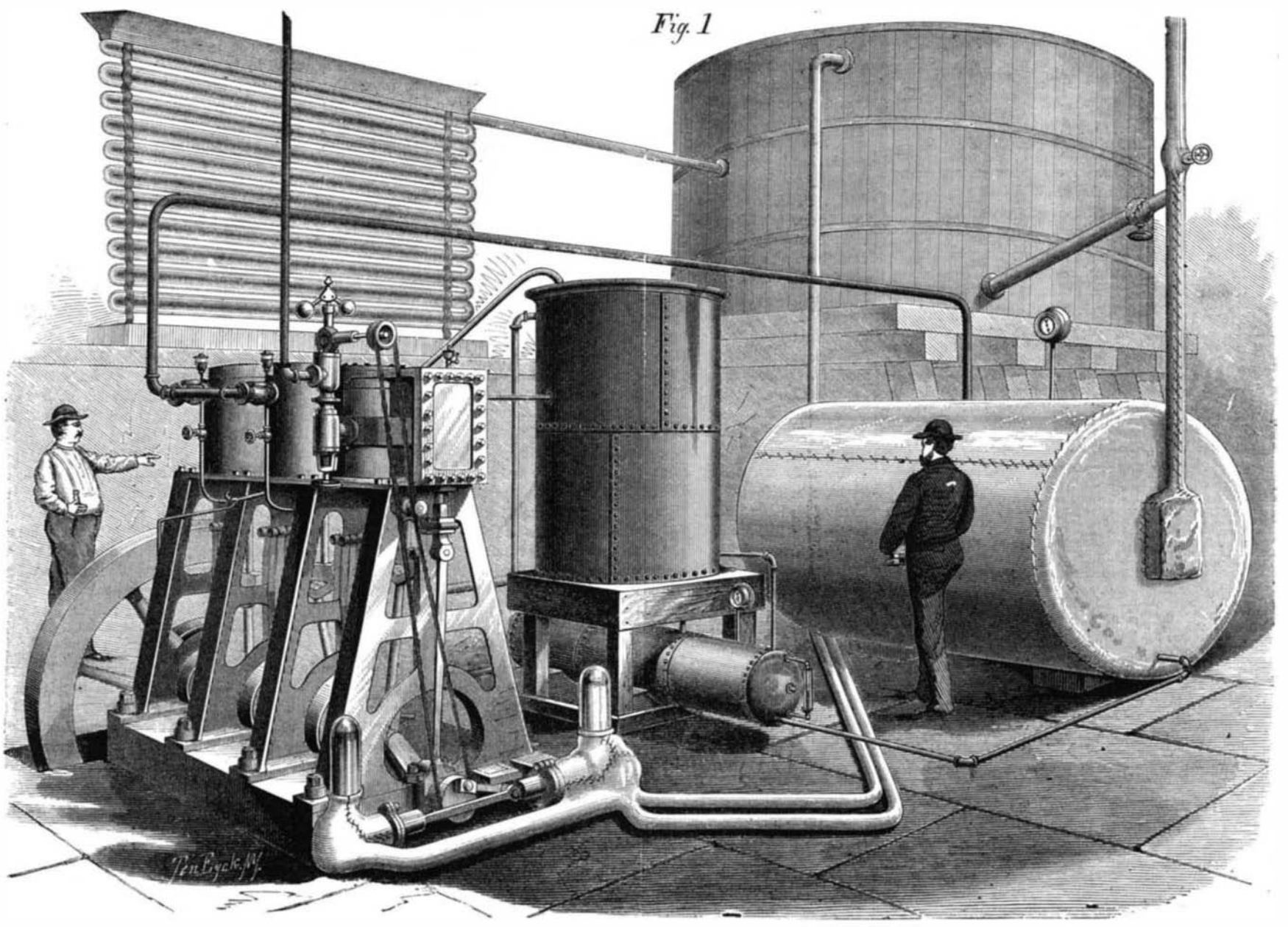
To guard against leakage, which would prevent the best action of the pump in effecting evaporation, the ends of the shaft, A, are provided with stuffing boxes, while the outer parts of the bearings are enlarged to form water boxes, which are filled with the non-congealable liquid, and these, together with the stuffing boxes, effectually seal the bearings against all leakage of air in the interior.

As the gas is exhausted from the cylinder, it passes to the pumps previously referred to, from thence to a condenser, seen in the center of Fig. 1, and thence through a pipe as liquid to a receiver which is shown underneath the condenser. The cooled non-congealable liquid passes into the case, M, Fig. 4, through the pipe, F, and from thence back to the coil in the cylinder through the pipe, E. The circulating of liquid is effected through a circulating pump, shown at the foot and just at the right of the pump previously spoken of, which is operated by the engine at the right of the pumps, which also works the large pumps, refrigerator coil, and a rotary blower for circulating air in the congealing case.

The large pumps, of which there are two (for detail see Fig. 3), form an important part of the apparatus. They communicate with pipe, H, from the cylinder through inwardly opening check valves, I, located in the branches of the pipe. These pumps are also provided with a gravity cup-shaped valve, J, which is of greater diameter than the piston cylinder, and plays between the cylinder head and the flange of the body of the cylinder, upon which it is seated, being guided in its movement by ribs in the enlarged cavity of the cylinder-head. In operation, upon the descent of the piston the gas is drawn through the pipe, H, the check valves, I, are opened, and the pump cylinder filled. But when piston rises the check valves are closed, and the compressed gases above the pis-

[*Continued on page* 98.]

Fig. 1



HOLDEN'S IMPROVED ICE MACHINE.

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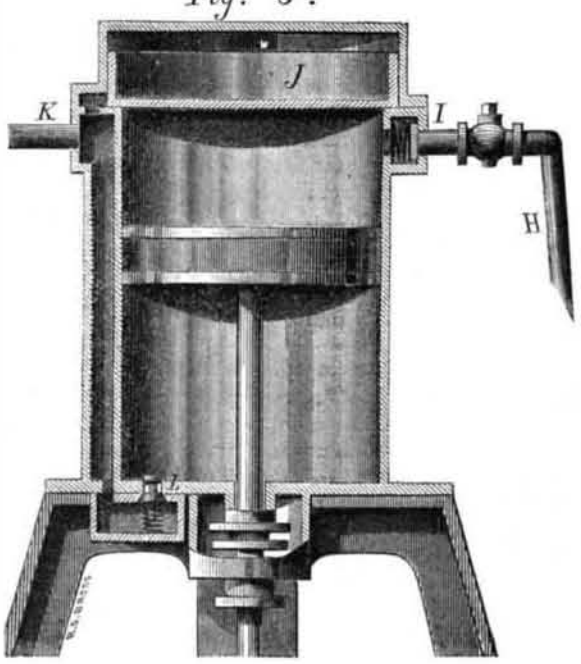

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As the gas is delivered to the condenser it is made to traverse coils and is cooled by the circulation of water of the normal temperature which passes through the condenser. As the gas is liquefied it passes into the receiver, where it accumulates and is fed from time to time back into the refrigerator cylinder.

As the non-congealable liquid in the coil of the refrigertor circulates, it passes out through the pipe, F, to the distribulating pan, M, Fig. 4, where its temperature is to be transferred to the air circulating in the subjacent case, N. The upper case is provided with a distributing pan, into which the cooled liquid is admitted. The bottom of the pan has perforations which are arranged in rows immediately above a series of vertical partitions of wire gauze, between which are arranged the vertical baffle plates.

As the cooled liquid drops through the perforations in the pan, it falls upon the wire partitions, and being retarded in its descent, trickles slowly down, while the current of air driven through the case by the blower is made to pass through and penetrate all parts by reason of the baffle plates, and in so doing takes on the temperature of the non-congealable liquid, which is below the freezing point of water,

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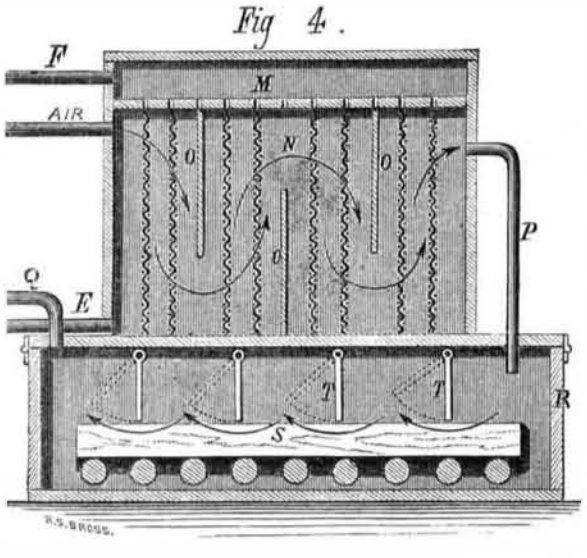

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The congealing case has doors, R R, at each end, and is provided with supporting rollers upon which the pans, S, are fed in at one end and removed at the other.

The apparatus may be made applicable to cooling liquids, as beer, etc. When applied to such purpose, the liquid is allowed to trickle down over the coiled pipes seen at the left of Fig. 1. In a large brewery, where a contract required 560 barrels of water to be cooled from 60° to 38° Fah. in 24 hours, which is equal to the production of 8½ tons of ice from water at 80°, the actual yield of this machine consisted in the cooling of 1,010 barrels of water, which is equal to the production of 16 tons of ice per diem. For this yield the machine required an average of 24 horse power. The apparatus, as shown in Fig. 1, was taken from one in actual use in a large brewery in Philadelphia. It requires but the attention of a single attendant.

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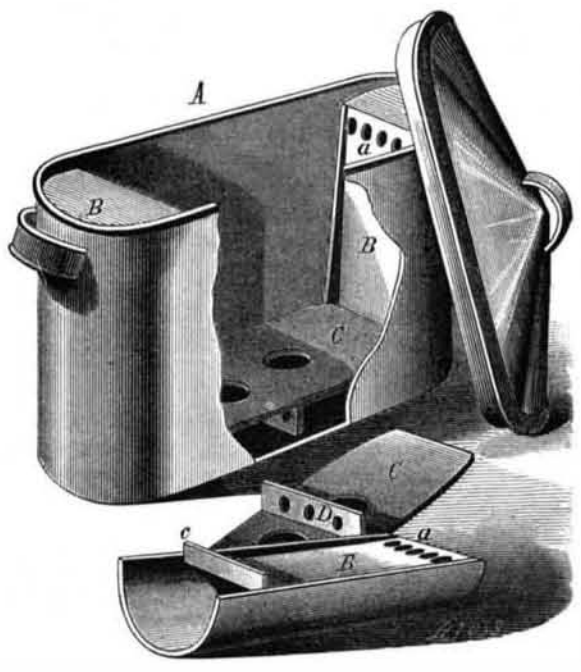

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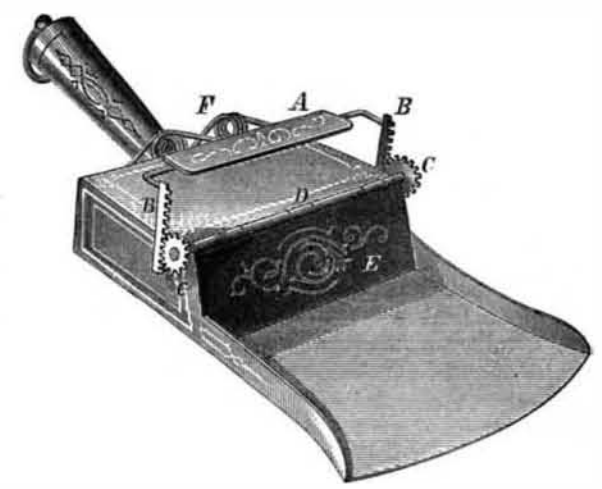

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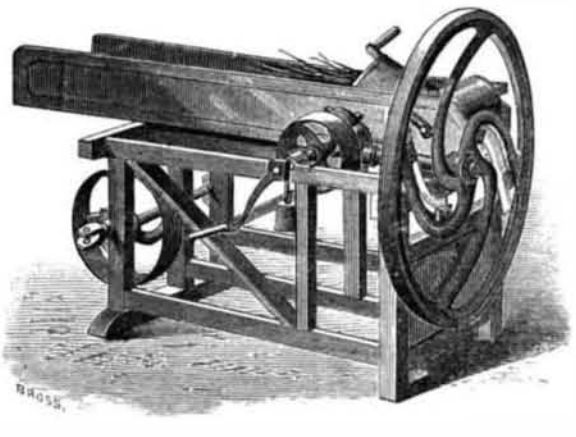

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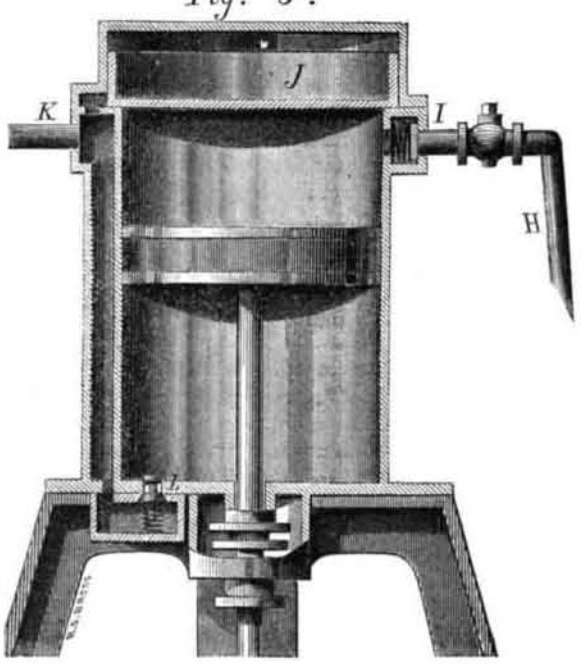

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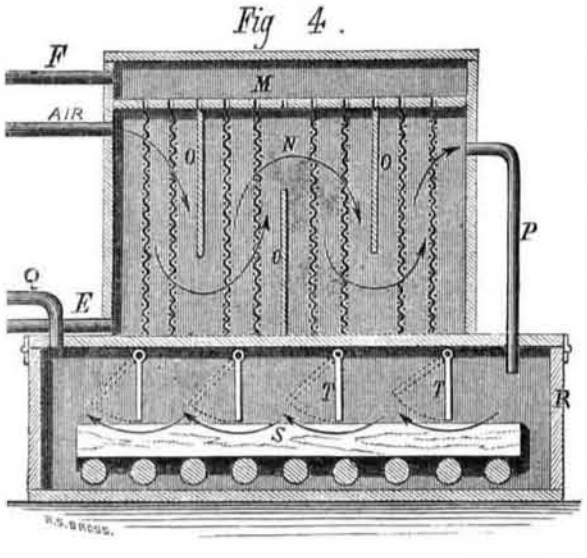

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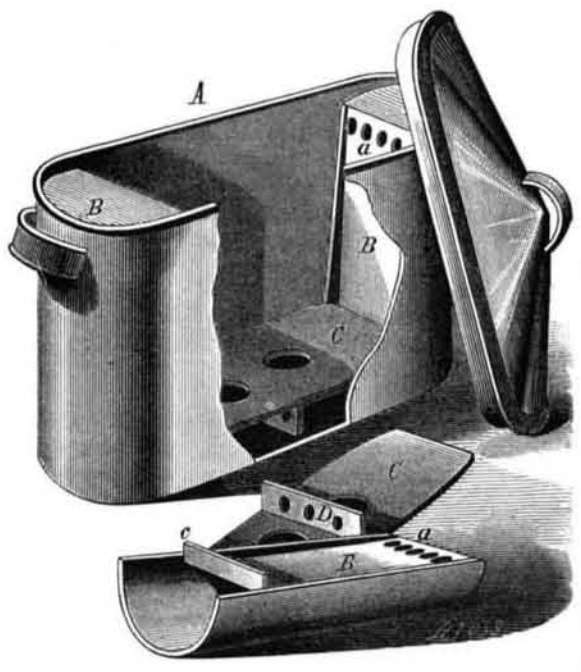

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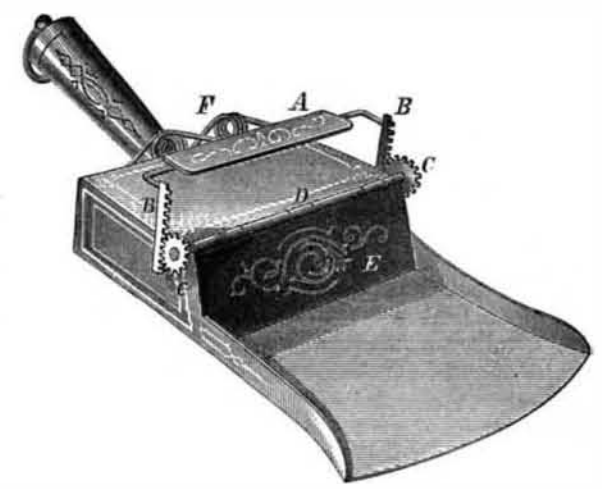

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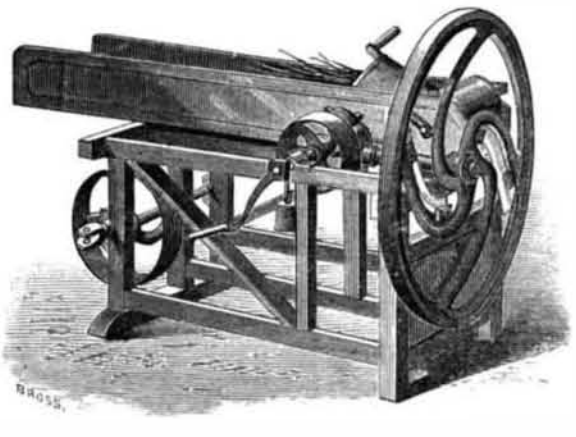

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