

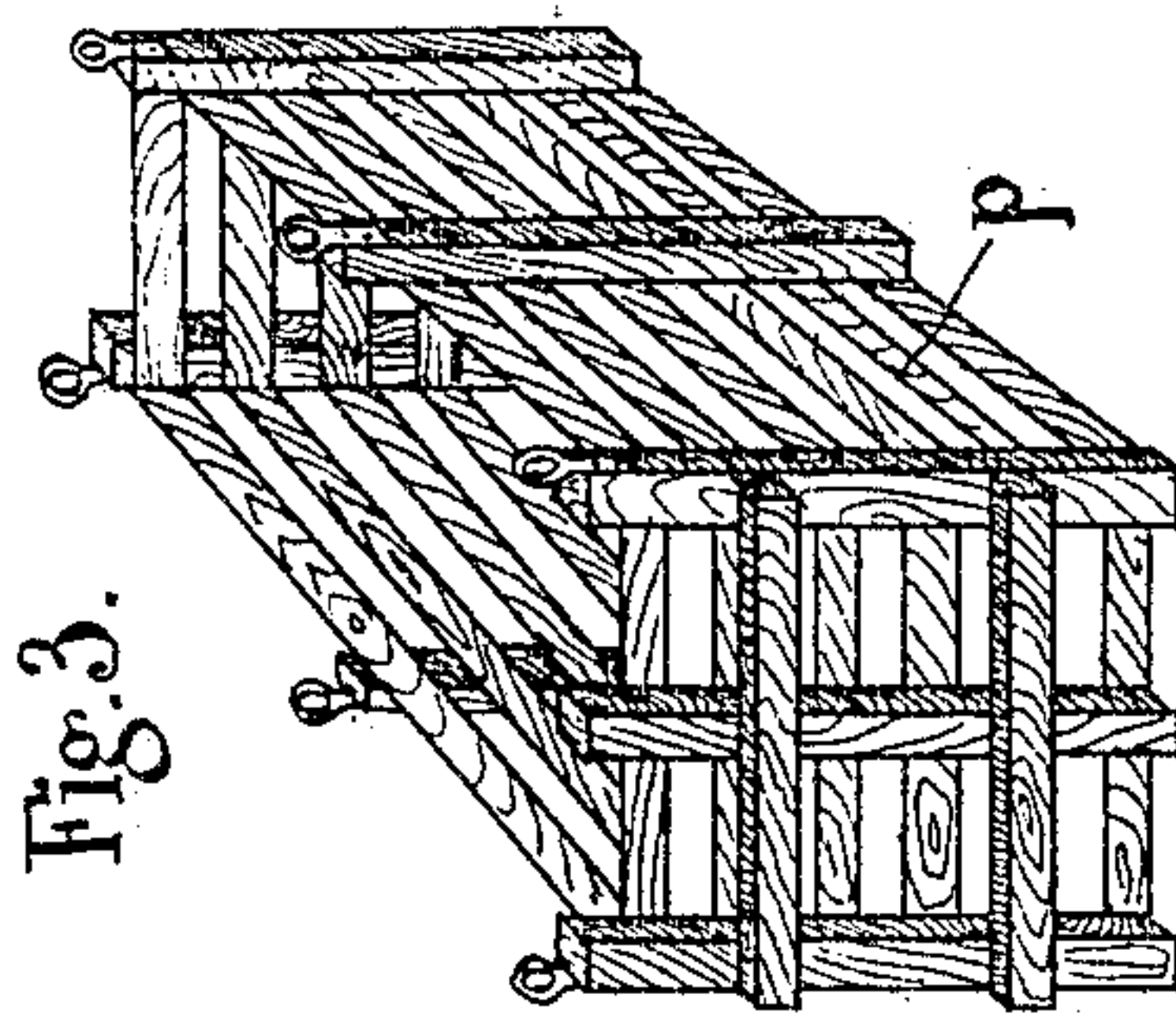
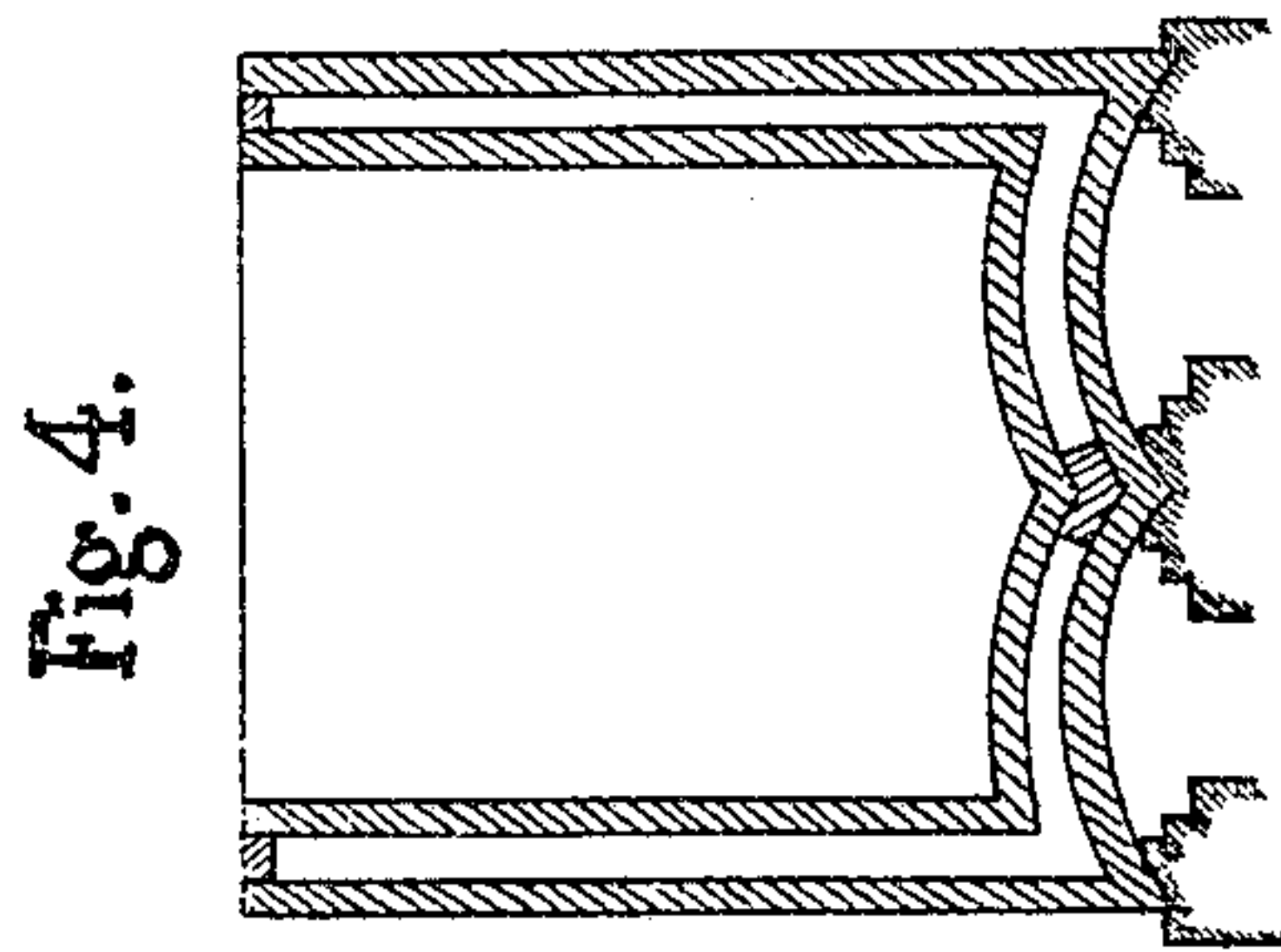
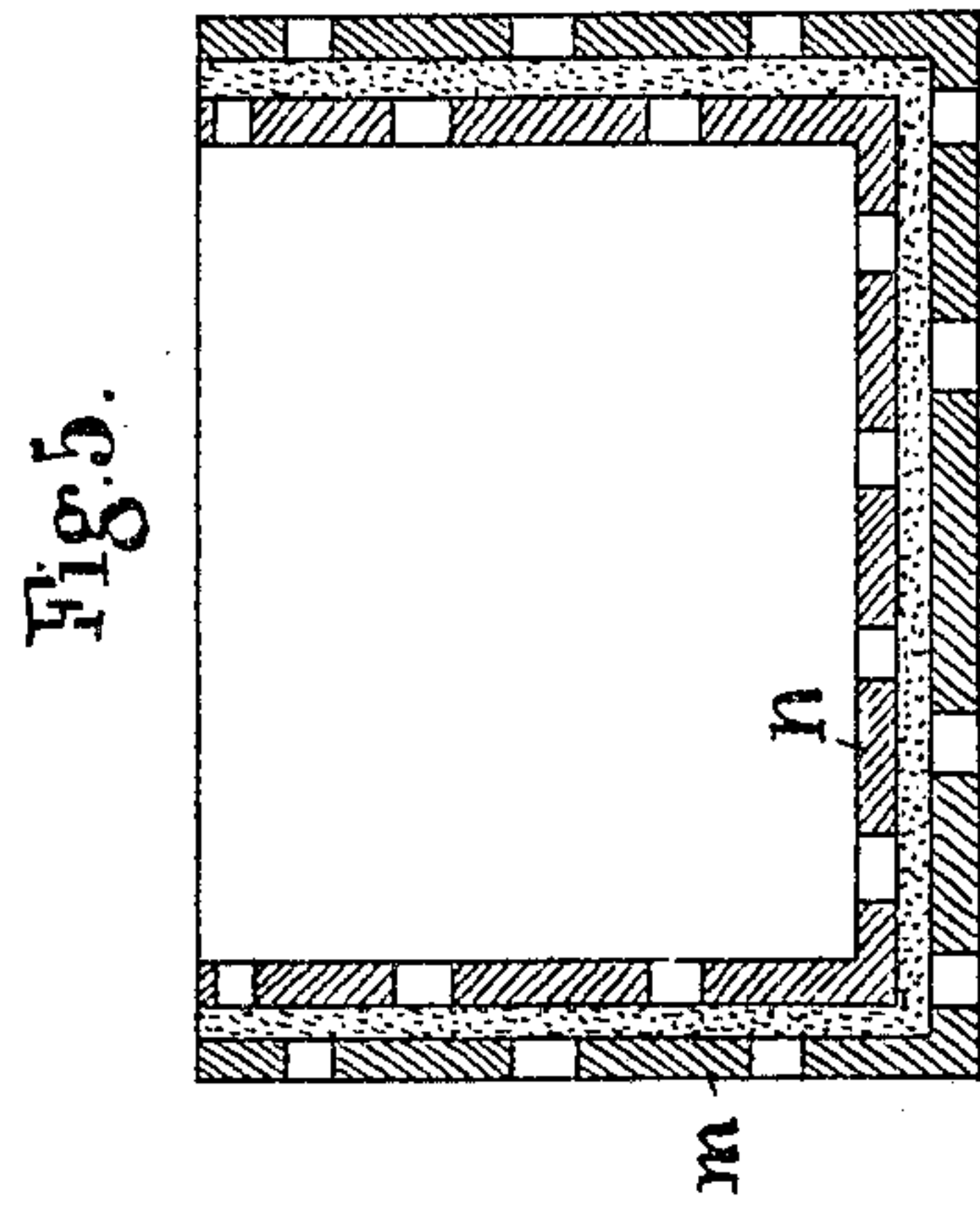
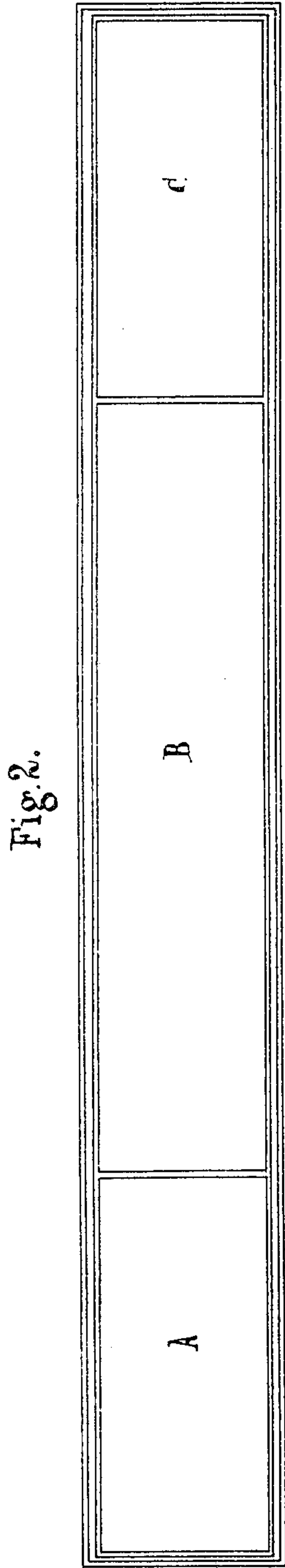
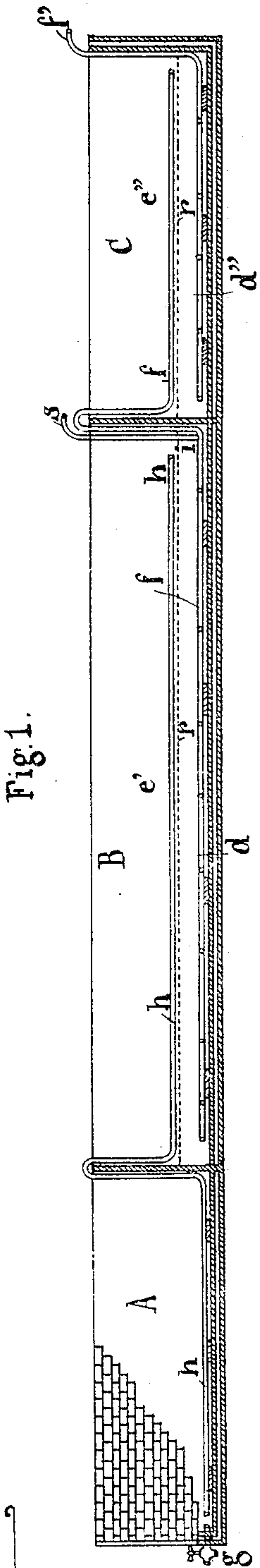
No. 799,281.

PATENTED SEPT. 12, 1905.

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PROCESS OF RETTING FLAX.

APPLICATION FILED SEPT. 3, 1904.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## PROCESS OF RETTING FLAX.

No. 799,281.

Specification of Letters Patent.

Patented Sept. 12, 1905.

Application filed September 3, 1904. Serial No. 223,204.

*To all whom it may concern:*

Be it known that we, CONSTANT VANSTEENKISTE and LUCIEN LEGRAND, subjects of the King of Belgium, residing at Antwerp, Belgium, have invented a new and useful Improved Process of Retting Flax; and we do hereby declare the following to be a full, clear, and exact description of the same.

The operation of retting flax consists in disengaging (deglutinating) the bark or rind of the stalk from the filamentous parts, said operation dissociating also said filaments partially or more or less completely. The substance uniting the filaments or fibers of a stalk and causing said filaments to adhere to the straw of the stalk is commonly called "pectose" and comprises two distinct kinds of gluing materials—viz., one, a gum, which is soluble in water, and another, a resin, insoluble in water, which is to be previously decomposed to become soluble. When said resinous gum is submitted to the retting action, it is caused to ferment and decompose to a glutinous substance which is soluble in water by the action of the so-called "granulobacter" or "retting" bacillus. In order to accelerate the retting operation and obtain a perfect work, it is necessary to enable the granulobacter to act without vexation or obstacle. In the retting processes heretofore known said granulobacter has been counteracted and even paralyzed by the presence of hostile microbes and also by the non-evacuation of the secretions of the granulobacter itself.

Heretofore the operation of retting flax has not been scientifically understood and the improvements made in retting processes could not avoid the objections for the reason that the nature of said objections has not been properly known.

Any one of the existing processes of retting flax is objectionable in that it is materially impossible to obtain thereby a regular and defectless retting notwithstanding the long time during which the flax is submitted to the retting action. Furthermore, any one of the old processes does not permit of retting during more than six months of a year. The dew-retting process is worthless and causes the loss of a large part of the value of flax. The stagnant-water-retting process is equally worthless and not employed for retting flax of superior quality, and the flowing-water-retting process, actually known as the best, is

furthermore objectionable in that it can be employed only for retting flax which is one year old, whereby considerable capitals are made fruitless. The flowing-water-retting process must be repeated several times for the purpose of attaining a superior result, whereby several manipulations are required, the flax being thus several times exposed to possible accidents during the retting process as well as during the subsequent drying process. When the flax is completely retted, the outside thereof is coated with a glutinous substance, and wherever the same is touched, either by the workman's hand or otherwise, the fiber is deteriorated and will be found afterward in the waste material. It will be understood that if the operation is repeated several times the risk of deterioration occurs equally several times, which is objectionable.

The object of our present invention is to provide an improved process of retting flax, based upon the scientific comprehension of retting and capable of being applied everywhere and in good conditions, the work being rapid, regular, and inexpensive.

In order to facilitate the comprehension of our invention, reference is had to the accompanying drawings, showing an apparatus for carrying the improved process into practice.

Figure 1 is a vertical longitudinal section of the apparatus. Fig. 2 is a plan view of same with certain parts removed. Fig. 3 is a perspective view of a receptacle intended to contain the flax during the operation. Fig. 4 is a vertical cross-section of the tank, and Fig. 5 is a vertical cross-section through a filter hereinafter referred to.

The apparatus serving to carry out the improved process consists of a longitudinal tank divided into three compartments A B C, Fig. 1, the compartment A of which is the scouring-tank, the compartment B being the retting-tank proper, and the compartment C being the final retting or washing tank. The compartments B and C are divided horizontally into two compartments by means of partitions *rr*, preferably made of jute or Indian grass. The lower compartments *d' d''* act as porous vessels and contain the fresh water brought thereto through pipes *f f'*. The upper compartment *e'* of the tank B is the retting-tank proper and contains the retting-water or the broth of microbes, maintained at a uniform temperature,



density, and quantity of ferments. The bundles of flax are placed vertically into suitable boxes *p*, Fig. 3, made of wooden laths. Said boxes are raised by means of a winch or the like arranged on a car or otherwise. A large filter, Fig. 5, formed of two perforated receptacles *m n*, arranged within one another and separated by a small space filled with filtering material, serves to clear the water before the same enters the tank C, and is arranged outside the same at a point to receive the water coming from any source.

The improved process is based scientifically upon the bacterio-biology of the retting ferment or granulobacter, as will be presently described.

The box *p*, filled with flax, as already described, is lowered mechanically into the scouring-tank A, wherein the soluble substances are dissolved in the water contained in said tank. During the dissolution the box *p* is raised and lowered repeatedly in order to perfectly wash the gum away, it being understood that the same result may be obtained by any other movement. The perfect, uniform, and regular scouring (removing of gum) is the principal condition of a good retting. If all the stalks are not perfectly scoured, the microbe of lactic acid will be quickly developed in the gummy dissolution, and said microbe is an enemy to the retting-ferment which is to be developed. It is therefore necessary that the soluble gum of the pectose be completely dissolved and uniformly removed from the whole mass. In any other existing process of retting flax said scouring operation is entirely unknown.

In our improved process the retting action begins immediately after the introduction of flax into the retting-tank B, while in the old process said action does not take place until the retting-ferment has overcome the hostile ferment, which results in a considerable loss of time and great irregularities in the retting, the large stalks being overretted, and therefore excessively weakened, while the thin stalks are too slightly retted. In any one of the old processes the only possibility of accelerating the retting action consists in evacuating the prejudicial ferments by continuously renewing the water. However, it is impossible to regularly renew the water at the center of the bundles and around the same.

In practicing our improved process the scouring-tank A is filled with water coming from the retting-tank B, said water being still suitable for scouring purposes. The scouring of flax being completed, the boxes *p* are removed from the tank A and lowered into the tank B. The bath is maintained at a constant yield of retting-ferments, and for this reason the retting—that is, the decomposition of insoluble resinous gum—begins immediately after the flax is introduced into

the tank. During the operation the box is raised and lowered several times for the purpose of obtaining a perfect and regular retting. Without these movements the secretions of the bacillus would be differently concentrated between the bundles of thick and thin stalks, and as the bacillus cannot be developed in its own secretions the retting action would be irregular. It is therefore necessary to remove said secretions and to mix fresh water to the overcharged water in suitable proportions. The movements given to the box containing flax serve also to mix the oxygen of atmospheric air to the retting-water, whereby the action of the retting-ferment is highly increased. It is manifest that oxygen may be mixed to the water in any other way. In no one of the existing processes is atmospheric air introduced into the bath, nor is the flax agitated. The flax being retted to the desired degree, it is removed from the tank B and immersed in the tank C, wherein the retting action is completed and the flax becomes gold-yellow colored and loses its disagreeable smell of butylic acid. In said tank C, containing clear water, is furthermore washed off the coloring substances, said operation requiring but a small amount of water, the water being brought from the tank C to the tank B and from the tank B to the tank A, and finally can be used as manure. As already described, the tanks B and C are divided into compartments *d' e'*, *d'' e''* by means of porous partitions *r r*. The fresh clear water coming from the filter *m n* is introduced into the tank C through the pipe *f'*, having a perforated horizontal branch near the bottom of the lower compartment *d''*. From the tank C the water flows through the siphon-pipe *f* into the lower compartment *d'* of tank B, a pipe *s* being connected to said siphon-pipe for the purpose of mixing clear water to the water coming from the tank C. The slight and regular pressure of water under the porous partitions *r r*, the action of diffusion, and the difference of density result in an intimate mixture and therefore in a regular dilution of the retting-bath. The saturated water of the retting-bath flows through the siphon-pipe *h* into the scouring-tank A, whence it is finally evacuated through *g* after each scouring operation. When said tank A is emptied, it will be refilled automatically through the pipe *h*, through which water flows from the tank B into the tank A.

The water used in our improved process may be condensation-water at a given degree of heat.

The flax retted by our improved process is more quickly dried, and the gelatinous substance is dissolved, decomposed, and removed. It will be seen that the retting action is complete with a single operation, while in the actual processes several operations are required. However, for extra flax the same



may be reimmersed during a few minutes, the oxidation of the pectose at the atmosphere being thus advantageously utilized.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The process of retting flax, which consists in putting flax to be retted into a suitable receptacle, lowering the same mechanically into a tank filled with water for scouring purposes, raising and lowering said receptacle repeatedly and by any suitable means, introducing the flax-containing receptacle into a second tank—the retting-tank proper—also filled with water containing a constant amount of ferments, raising and lowering the receptacle repeatedly in said retting-tank, and immersing said receptacle into a third washing or rinsing tank, substantially as set forth.

2. The process of retting flax, which consists in putting the flax successively into a scouring-tank, a retting-tank, and a rinsing-tank, admitting fresh water into the rinsing-tank, and causing said water to flow successively from the rinsing-tank through the retting and scouring tanks, substantially as set forth.

3. The process of retting flax, which consists in putting the flax successively into a scouring-tank, a retting-tank, and a rinsing-tank, admitting fresh water into the rinsing-tank, and causing said water to flow successively from the rinsing-tank through the retting and scouring tanks, said rinsing and retting tanks being divided into horizontal compartments by means of a pervious linen or other suitable material under which water is

admitted before it reaches the material to be treated, substantially as set forth.

4. The process of retting flax, which consists in putting the flax successively into a scouring-tank, a retting-tank, and a rinsing-tank, admitting fresh water into the rinsing-tank, and causing said water to flow successively from the rinsing-tank through the retting and scouring tanks, and admitting also fresh water into the retting-tank in addition to the water from the rinsing-tank, substantially as set forth.

5. The process of retting flax, which consists in putting the flax to be retted into a suitable receptacle, lowering the same mechanically into a tank filled with water for scouring purposes, raising and lowering said receptacle repeatedly and by any suitable means, introducing the flax-containing receptacle into a second tank—the retting-tank proper—also filled with water containing a constant amount of ferments, raising and lowering the receptacle repeatedly in said retting-tank, and immersing said receptacle into a third washing or rinsing tank, heating the retting-water to a given temperature, and maintaining the same by any suitable means, substantially as set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

CONSTANT VANSTEENKISTE.  
LUCIEN LEGRAND.

Witnesses:

FRANÇOIS HANSON,  
G. DE LERTY.