(No Model.) 2 Sheets—Sheet 1.

A. VANSTEENKISTE.

DECORTICATOR.

No. 510,304. Patented Dec. 5, 1893.

Fig. 2.

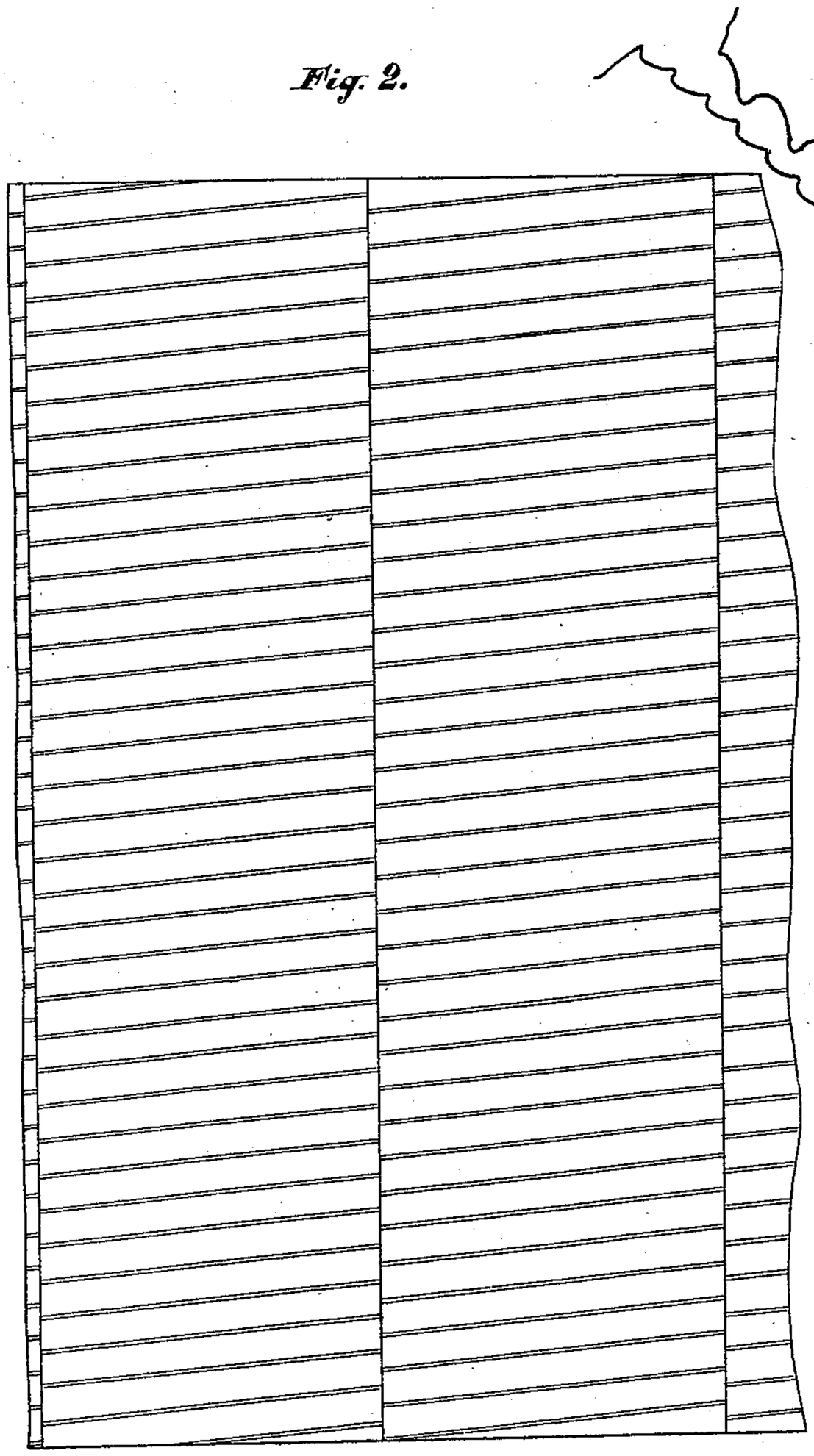

Fig. 1.

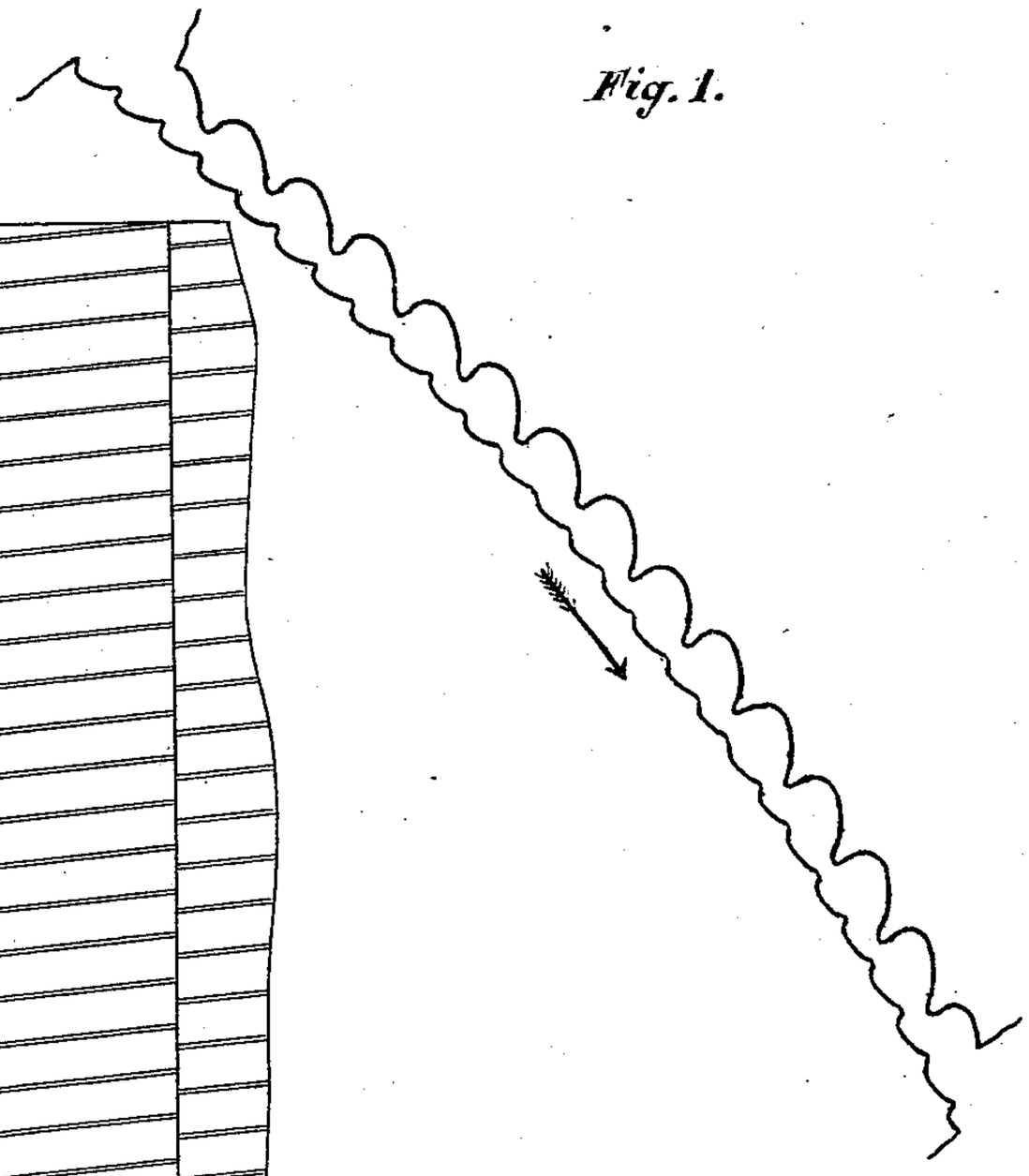

Fig. 5.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

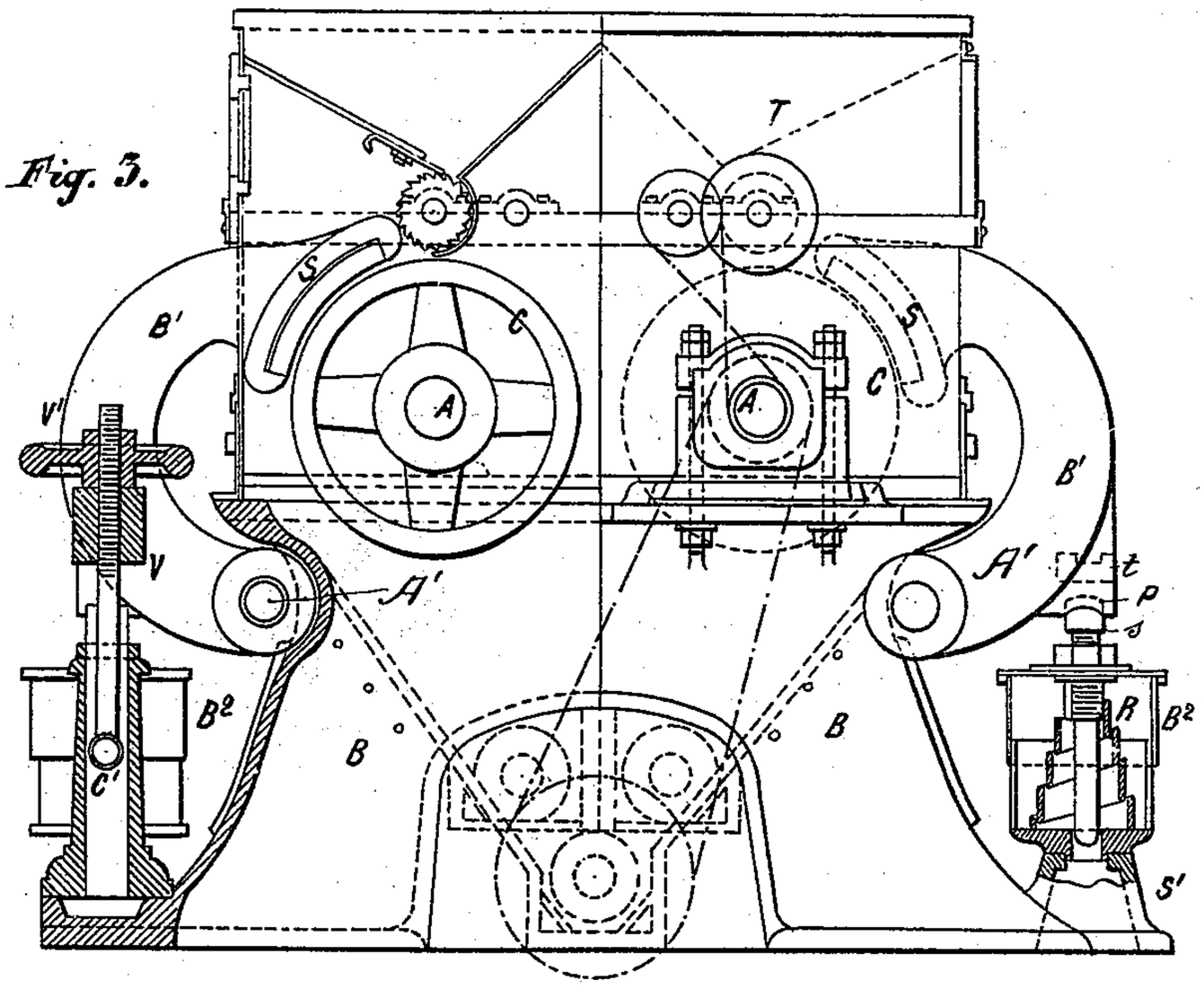
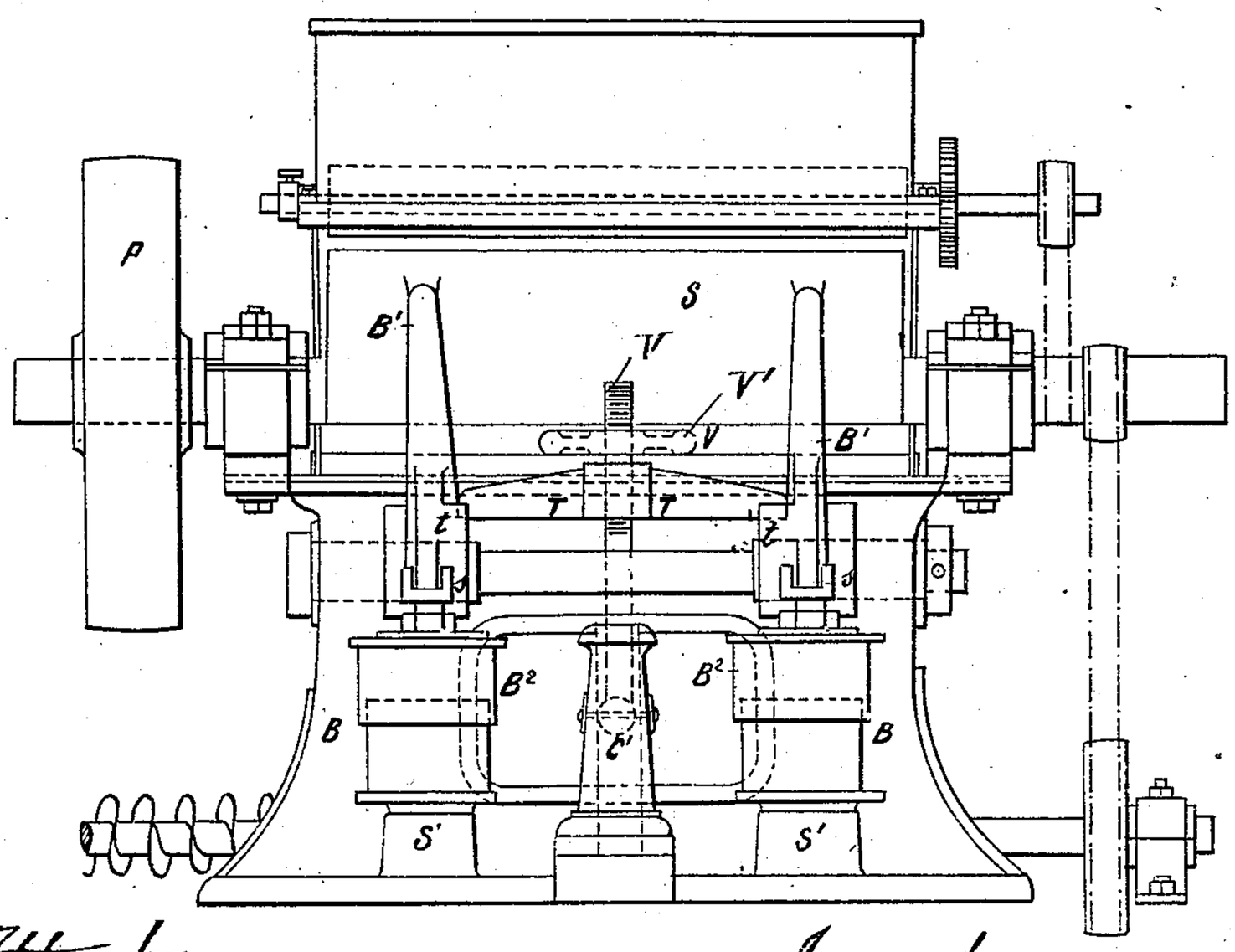


Fig. 4.



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UNITED STATES PATENT OFFICE.

ACHILLE VANSTEENKISTE, OF BRUSSELS, BELGIUM.

DECORTICATOR.

SPECIFICATION forming part of Letters Patent No. 510,304, dated December 5, 1893.

Application filed January 27, 1890. Serial No. 338,281. (No model.) Patented in Belgium July 31, 1889, No. 87,220; in England September 6, 1889, No. 14,087; in France December 10, 1889, No. 189,384, and in Luxemburg December 13, 1889, No. 1,223.

To all whom it may concern:

Be it known that I, ACHILLE VANSTEENKISTE, a subject of the King of Belgium, residing at Brussels, in the Kingdom of Belgium, have invented certain new and useful Improvements in Decorticators, (for which no foreign patents have been obtained, except in Belgium July 31, 1889, No. 87,220; in Great Britain September 6, 1889, No. 14,087; in France December 10, 1889, No. 189,384, and in Luxemburg December 13, 1889, No. 1,223,) of which the following is a specification.

This invention relates to a method of and apparatus for decorticating and disintegrating grain, in which the grain is operated upon in a manner which allows of the removal of the outer pellicle or covering at a single operation and without compressing, splitting or otherwise affecting the kernel, which is thus obtained in its entirety or in its constituent parts without having experienced any loss in quantity or quality, so as to yield the maximum amount of flour of first quality which it is possible to obtain from the grain.

For effecting a perfect decortication, that is to say, the removal of the pellicle or covering from the kernel, it is necessary so to form the acting surfaces that the grain is not subjected to constant and useless pressures which breaks it up into fragments without removing the pellicle, but is only subjected to slight passing pressures of a nature to loosen the pellicle on the kernel, so that it eventually splits open, and leaves the kernel in its entirety. The result is obtained by the apparatus which forms the subject of the present invention, the functions of which are based upon the combination of differential cannelures upon the acting convex and concave surfaces.

In the accompanying drawings:—Figure 1 shows in cross-section on an enlarged scale the arrangement and form of the cannelures of the surfaces operating in combination. Fig. 2 shows in longitudinal elevation the arrangement of the cannelures on the concave surface. Fig. 3 is a side view, and Fig. 4 is a longitudinal elevation of the entire apparatus. Fig. 5 is a side elevation of one of my improved cylinders.

In this apparatus it is the peculiar arrangement and form of the cannelures of the concave surface, in combination with those of the cylinder which allow of the before-described temporary pressures being exercised on the grain, whereby the pellicle is separated from the kernel. The cannelures of the concave surface have a peculiar profile, the one side rising approximately in a straight line, which unites at the bottom with the curved sloping surface of the other side of the next cannelure while the upper end or summit is rounded instead of being sharp. The groove bottom between the cannelures is of sufficient width and depth to allow the grain to lie therein without being acted upon until it arrives at the summit of the cannelure when it is acted upon by the convex surface of the cylinder until on passing beyond the summit it falls into the next groove. This temporary action of the grain is exerted by the cannelures of the cylinder which have a configuration precisely similar to those of the concave surface, the straight and concave sides extending in the same direction from the summits of the cannelures on both their contiguous faces; but, the cannelures of the cylinder are much reduced in size, this being necessary for preventing part of the grain from passing between the cannelures without having been subjected to the temporary pressure. On the other hand, the grooves of the concave surface must not exceed certain dimensions because otherwise the grain might remain in the same groove and never rise to the tops of the cannelures so as to be subjected to the pressing action. The most practically useful dimensions as proved by experiments are, for the cylinder; height one millimeter, distance between the summits of two cannelures three and one-fourth millimeters for the concave surface; height two millimeters distance between the summits of the cannelures five millimeters. The grooves and cannelures are formed to follow a helical line forming an angle of about twenty degrees with the axis of the cylinder, and as the grooves of the cylinder lie in the opposite direction to those of the concave surface the two sets intersect each other at an angle of about forty degrees. Practice has shown that under these conditions no grain will escape

the pressure of the cylinder and it cannot rest intact in the groove of the concave surface. In order to render the work more perfect, the grooves and cannelures of the concave surface are constructed in sections, the positions of the grooves of one section alternating with those of the contiguous ones, so that each cannelure of one section is opposite a groove of the next one, as shown in Fig. 2. This arrangement multiplies the number of pressures in that a grain arriving at the end of one section does not fall onto the following cannelure but into that which is in line with the grain, so that the effect is repeated oftener, and is more perfect.

It should be mentioned that the special profile of the cannelure is of great importance for the perfect realization of the work, because if instead of being hollowed at one side it were straight like the hypotenuse of the right-angled triangle, the groove would not be sufficiently deep and the grain would be subject, as in the old and well-known constructions, to a constant pressure and would be crushed and split. On the other hand, a narrower cannelure cannot be used, that is to say, having both sides nearly straight, because in that case it would be too weak and would break under the action of the cylinder upon the grain, while with the form described the ridge is wide and strong at the base and effectually resists the pressure put upon it. The peculiar arrangement of the grooves with a view to subjecting the grain to temporary pressure, for loosening the pellicle from the kernel being thus determined, it will be readily seen that the desired action can only take place when the concave surface is situated over the upper part of the cylinder, so that the grain in the grooves always falls upon the periphery of the cylinder, the smaller grooves of which then cause the grain to pass on to the rounded summits of the cannelure of the concave surface, while subjecting them to the desired temporary pressure. In order to facilitate the passage of the grain between the two surfaces the straight sides of the cannelures are presented to the hollow sides of the ridges of the concave surface. It will be evident that if this were arranged at the lower part of the cylinder, the grain would remain intact in the grooves without being subjected to any action.

It would not be practicable to cover the whole of the upper surface of the cylinder with the concave surface, because the cylinder turning in one direction, to the right, for instance, would tend to raise from the left hand the disintegrated particles, which, instead of falling would produce crushing and heating in the right hand part. The correct position of the concave surface will therefore be on one of the upper quadrants of the cylinder, being restricted to a length less than forty-five degrees of that surface. By this arrangement all of the grooves will deliver the grain onto the periphery of the cylinder, and the disintegrated material will pass freely away from the lower side, the cylinder being made to turn in this direction.

Instead of being constructed of one piece, with alternating cannelures, the concave surface is by preference constructed in sections of about fifty millimeters length, which are inserted side by side in a cast iron segmental box S with dove-tail sides, so as to hold the sections. As it is also very important that the surface formed by the summits of the concave cannelures should be maintained accurately parallel or concentric to those of the cylinder C, the latter is fixed on a strong shaft A which turns in fixed bearings, and the adjustment of the sector S is not effected, as is usual, in guides placed vertically to the cylinder surface by means of sliding blocks which are actuated by independent adjusting screws, but is effected in the direction of a circular arc, for which purpose the frame is formed in one with two curved arms B′, B′, having at their lower ends strong trunnions formed on the end of a strong shaft A′ mounted parallel to A in bearings formed in the framing so that the whole constitutes a strong rigid system. The concave surface is supported in the position shown by two strong spiral springs R which rest on a bed-plate S′, and press with saddle-pieces *s* against lugs *p* on the arms B′. The springs R are inclosed in suitable boxes B^2 and they can be put under more or less compression according to the nature of the grain to be acted upon. For this purpose the lugs *p* have lateral projections *t* on which bear the ends of a cross beam T on which acts the screw V, so as to move the arms for the purpose of bringing the concave surface S nearer to or farther from the cylinder. The screw V passes through the center of the cross beam T and has screwed upon it above the latter the wheel-nut V′ which is consequently made to press the beam downward with more or less force. The lower end of the screw is secured in a column situated between the two springs R.

In the present example the machine is shown as a double or twin one, the framing carrying two cylinders with their concave surfaces. Above each cylinder is arranged a supply hopper T′ with distributing roller while the products resulting from the treatment pass into a chute below but common to both cylinders, and discharge in a conveying worm of known construction. It will be seen that by the spring adjustment of the concave surfaces, the temporary pressures to which the grain is subjected is of an elastic nature, thereby adding to the efficacy of the decorticating action, the concave surfaces in yielding somewhat being subject to a slight pulsating movement as the grain passes from the grooves to the top of the ridges, and thence into the following groove.

Having now particularly described and as-

certained the nature of the said invention and in what manner the same is to be performed, what I claim is—

1. The herein described process of decorticating and disintegrating grain into its constituent parts, which consists in exposing the grain to a series of rapidly recurring independent spring pressures and thus opening and removing the skin and delivering the kernel or its constituent parts.

2. In an apparatus for decorticating grain, the combination of a revolving grinding roll and a co-operating concave, both having corrugations on their contiguous faces of substantially the same outline and consisting essentially of a straight side, a rounded ridge and a concave side, the straight and concave sides extending in substantially the same direction from the ridges of the contiguous faces of both members, whereby the grain is subjected to rapid recurring pressures as it passes the ridges, substantially as explained.

3. In an apparatus for decorticating grain, the combination of a revolving grinding roll and a co-operating concave, both having corrugations on their contiguous faces of substantially the same outline and consisting essentially of a straght side, a rounded ridge and a concave side, said parts being arranged in substantially the same direction and the corrugations of the rolls being smaller than the corrugations of the concave, substantially as herein set forth.

4. The combination with the revolving cylinder and the concave having the corrugations of substantially the form described whereby the grain receives the rapidly recurring pressures; of the arms B′, B′, mounted on the shaft A′ parallel to the cylinder and provided with the yielding spring for keeping the concave in working relation to the cylinder, and facilitate the temporary pressure operation without crushing the grain, as set forth.

5. The combination of the cylinder, the concave, the pair of pivoted arms supporting the concave, the shoulders on said arms, the springs under said shoulders, the yoke upon said shoulders, and the screw and nut for regulating the distance between the yoke and frame, substantially as set forth.

ACHILLE VANSTEENKISTE.

Witnesses:
AUG. JOERISSEN,
GREGORY PHELAN.