Nov. 11, 1947. W. R. KENNEDY 2,430,572

OVERLAPPING DISC-TYPE HULLING MACHINE

Filed Sept. 1, 1944 2 Sheets-Sheet 1

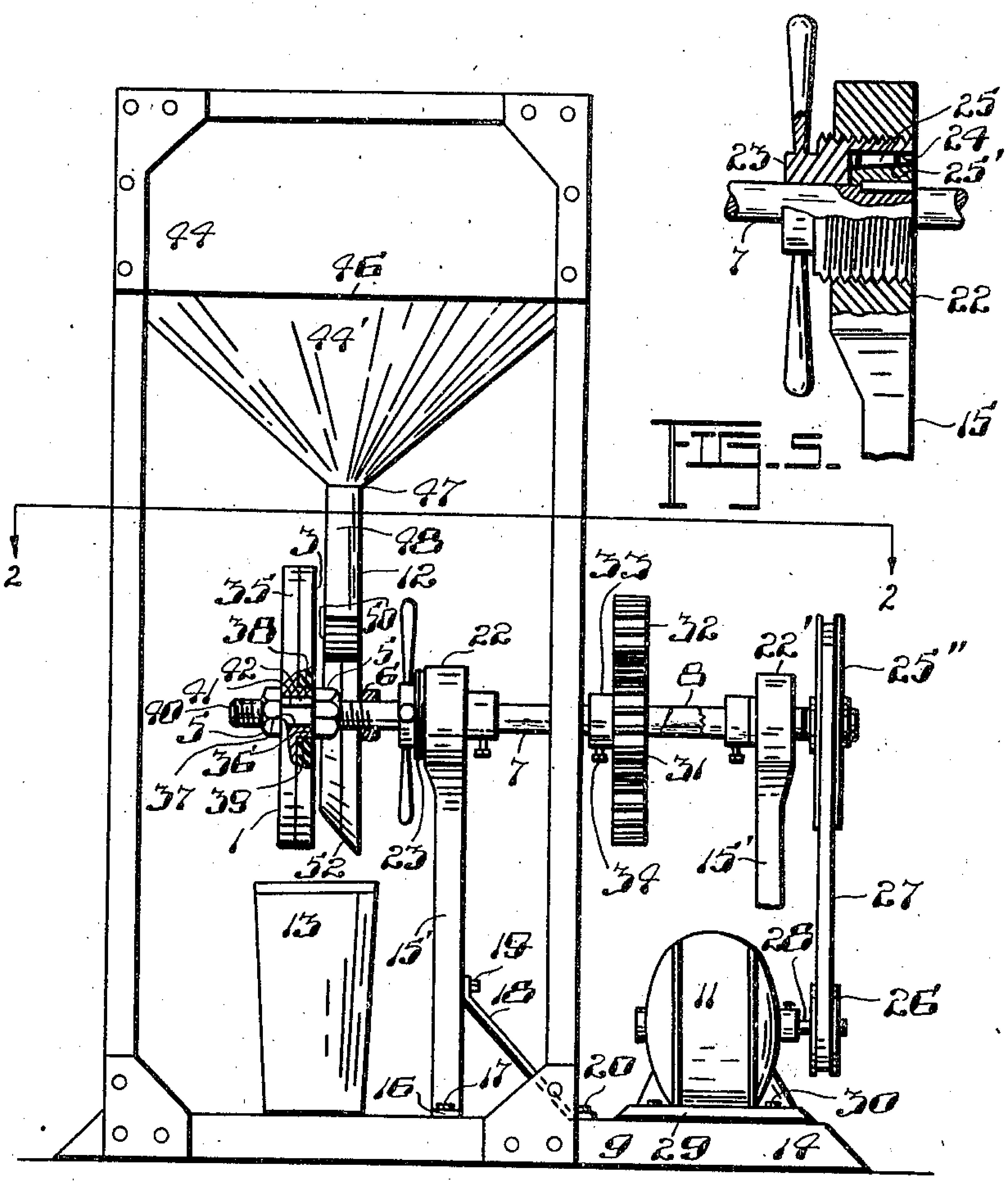

FIG. 5.

FIG. I.

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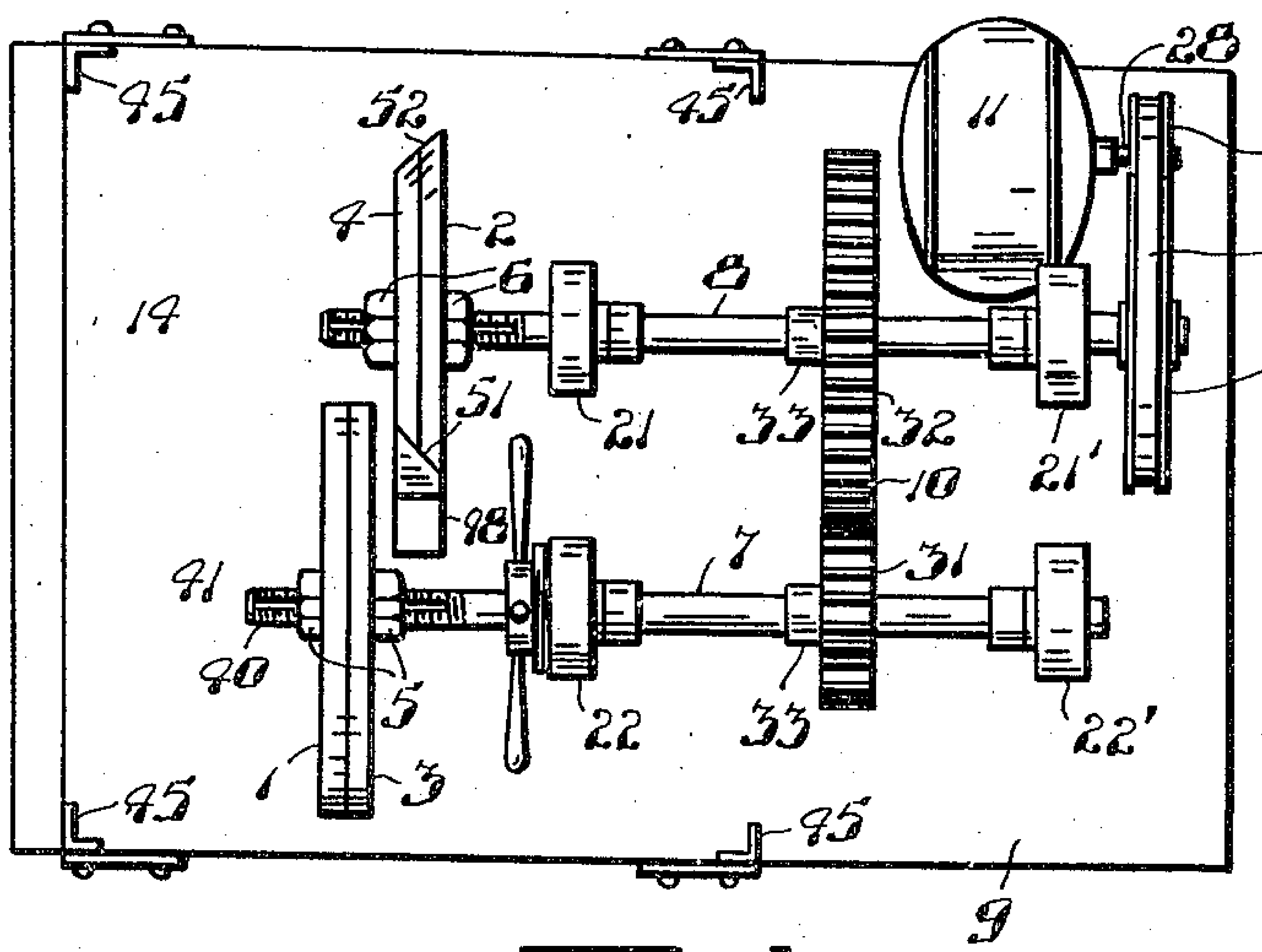

FIG. 2.

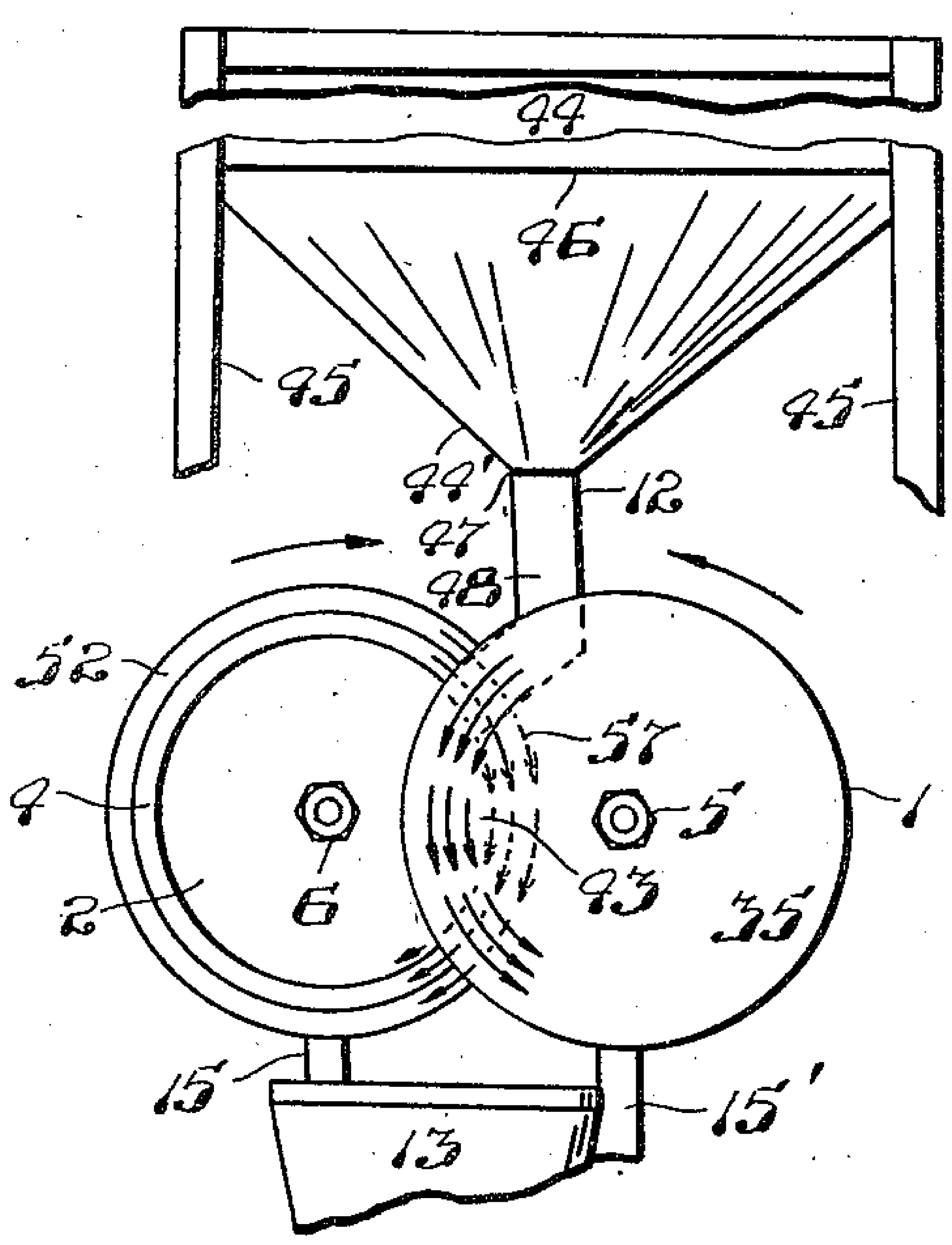

FIG. 3.

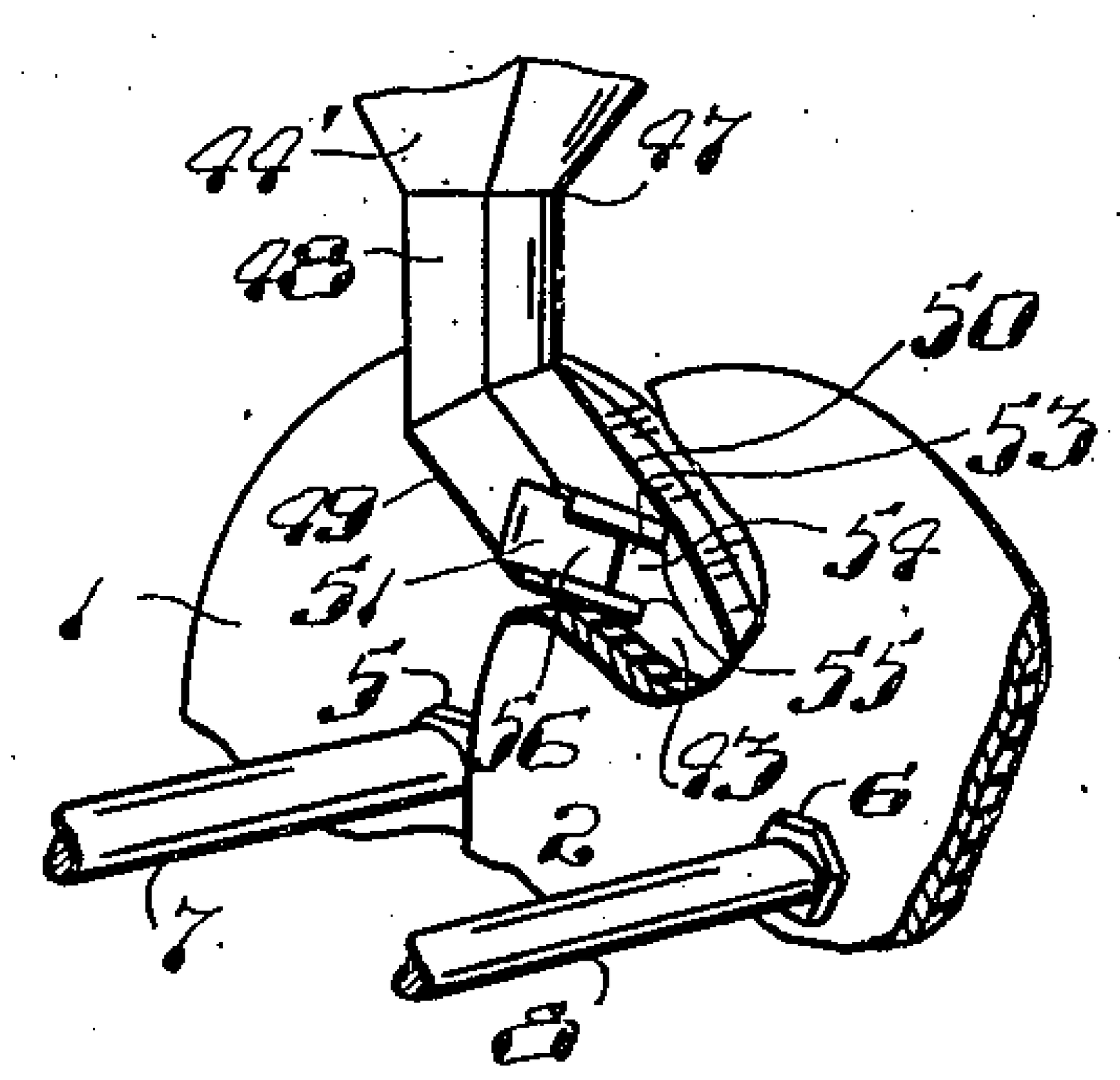

FIG. 4.

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Patented Nov. 11, 1947

2,430,572

UNITED STATES PATENT OFFICE

2,430,572

OVERLAPPING DISC-TYPE HULLING MACHINE

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Substituted for application Serial No. 268,420, April 17, 1939. This application September 1, 1944, Serial No. 552,256

1 Claim. (Cl. 146—296)

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My invention relates to an improved device for hulling various grains, nuts and the like, and a principal object of my invention has been to provide a device of the character herewithin described which, particularly in the case of wild rice, will completely remove the hulls from the kernels of grain without breaking or damaging the kernels in any way.

A further object of my invention is to provide a device of the character herewithin described which may be readily adjusted to handle different types of grain and different conditions of wild rice.

With the above more important objects in view and such other minor objects as may appear as the specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevational view of my invention.

Figure 2 is a sectional plan view of the same taken along the line 2—2 of Figure 1.

Figure 3 is a partial front elevational view of my invention.

Figure 4 is a detailed perspective view illustrating the structure of my grain feeding assembly.

Figure 5 is a fragmentary detail illustrating my disc space-adjusting means.

In the drawings like characters of reference indicate corresponding parts in the different figures.

With reference to the accompanying drawings it will be seen that the essence of my invention lies in the provision of a pair of hulling discs 1 and 2, which are provided with frictional facing material 3 and 4 preferably of crepe rubber secured upon adjacent sides thereof and secured by the nuts 5 and 6 upon the shafts 7 and 8, which are rotatably mounted upon a supporting framework 9 in the manner illustrated.

A transmission mechanism 10 is provided extending between the shafts 7 and 8 such that the disc 2, the perimeter of which is bevelled, rotates only half as fast as the disc 1 when the shaft 8 is driven by a motor 11. In operation the grain is fed between the frictional facing material 3 and 4 by the grain feeding assembly 12 and the difference in rotative speeds of the two discs 1 and 2 causes the hulls or husks to be, as it were, twisted off of the kernels as the grain passes between the overlapping portions of the discs, after which, hulls and kernels are received in the container 13 and may be separated in a fanning mill in the conventional manner.

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Proceeding now to describe the various components of my invention more particularly, it will be seen that the framework 9 is comprised of a rectangular bed plate 14, upon the surface of which two pairs of upright and aligned standards 15, 15′ are positioned in rectangular relationship and are provided with horizontally disposed bracket portions 16 formed integrally upon their lower ends, which are secured by the bolts 17 to the surface of the plate 14. Also, to add to the rigidity of each of the standards 15, 15′, a diagonally disposed brace 18, positioned in a vertical plane perpendicular to the bracket portions 16, is secured at its upper end to the mid-portion of the standard by the bolt 19 and at its lower end to the surface of the bed plate 14 by the bolt 20. The parallel and horizontally disposed shafts 7 and 8 are each rotatably mounted in one of two pairs of aligned and spaced bearings 21 and 21′, 22 and 22′, which are secured integrally upon the upper ends of the pairs of standards 15 and 15′ respectively. Structural provision is made for limited longitudinal adjustment of the shaft 7 for varying the spacing of the disc 1 with respect to the disc 2 while the machine is running (see Figure 5) consisting in the externally screw-threaded boss 23 to which is attached a hand-wheel, the boss therefore being rotatable and containing within the surface 24 thereof a roller bearing race just wide enough to seat the tapered roller bearings 25 which ride on the tapered race 25′ keyed for rotation with the shaft 7. If therefore it is desired to increase the space between the discs this may be accomplished simply by rotating the handwheel so that the boss 23 moves to the left taking with it the rollers 25. The shaft will then end-shift of its own accord.

At this point it may be noted that the shaft 8 is somewhat longer than the shaft 7 and the right hand end thereof with respect to Figures 1 and 2 of the accompanying drawings, projects somewhat beyond the adjacent bearing 15 to have a relatively large pulley wheel 25″ secured

thereon, which is aligned with a relatively small pulley wheel 26, over both of which an endless transmission belt 27 extends. The pulley wheel 26 is of course, secured upon the drive shaft 28 of the motor 11, the base 29 of which is solidly secured by the bolts 30 to the bed plate 14. The transmission mechanism 10 which is positioned centrally between the supporting bearings 21 and 22, upon each of the shafts 7 and 8, consists essentially of a relatively small gear wheel 31 which is mounted upon the shaft 7 and is in engagement with a relatively large gear wheel 32 mounted upon the shaft 8. Each of the gear wheels 31 and 32 has a concentric collar 33 formed integrally with the hub thereof in the wall of which a set screw 34 is threadably secured to enable each gear to be secured solidly to the shaft upon which it is mounted.

With more particular reference to Figure 1 of the accompanying drawings in which a breakaway view of the hulling disc 1 is illustrated, this member will be seen to be comprised of a circular plate 35 having a circular boss 36 formed centrally upon one side thereof and a centrally drilled aperture 37 extending therethrough, in the wall of which a key seat 38 is cut. The facing material 3 then is secured in any conventional manner such as by a suitable adhesive, upon the same side of the plate 35 as the boss 36 and is provided with an aperture 39 formed centrally therein to accommodate the boss 36 and permit the outer surface of the element to lie flush with the end of the boss. The end portion 40 of the shaft 8 is threaded and provided with a longitudinally extending key way 41 cut therein, in which a key 42 is slidably positioned and designed to be engageable with the key seat 38 formed in the disc 1, which is slidably mounted upon the threaded portion 40 of the shaft and is adjustably secured thereon by the nuts 5.

The hulling disc 2 is constructed and mounted upon the shaft 8 in the same manner as the disc 1 with the exception that in this case the disc 2 is mounted upon the shaft 8 such that the frictional facing element 4 is adjacent the element 3 and the perimeters of the disc 2 and element 4 are inwardly bevelled towards the adjacent end of the shaft 7. As is clearly seen, both discs 1 and 2 are offset slightly with respect to one another and overlap over the portions of their areas which is designated by the numeral 43.

My grain feeding assembly 12 is comprised of an open topped and rectangular sided hopper 44 which is secured at the corners thereof to the upper ends of four upright angle irons 45, the lower ends of which are secured to the bed plate 14. The bottom 44' of the hopper 44 is of the configuration of an inverted pyramid and is secured about its upper peripheral edge 46 to the lower edges of the sides of the hopper 44. The inverted apex of the bottom of the hopper 44 is truncated to form an aperture 47 in which is secured the upper end of a rectangular conduit 48, the lower portion 49 of which has one side 50 thereof lying flush with the face of the frictional element 3 and is angled abruptly into axial alignment with the radius of the disc 2 at a point adjacent the upper end of the overlapping area 43 of the facing elements 3 and 4. The lower end face 51 of the portion 49 of the conduit 48 is spaced apart and parallel to the bevelled edge 52 of the disc 2 and has formed therein a rectangular aperture 53, which extends into intersection with an aperture 54 formed in the side 50 of the conduit which lies flush with the face of the element 3. Finally, a pair of parallel spaced channels 55 are formed upon the side edges of the aperture 53 and a slidable panel 56 is secured therein.

With the motor 11 in operation and driving the discs 1 and 2 in the direction indicated by the arrows, the operation of my invention will now be seen to lie in drawing back the panel 56 to permit a suitable flow of grain from the hopper 44 to be drawn between the overlapping portions of the frictional elements 3 and 4, where as has been previously pointed out, the reduced speed of rotation of the element 4 in comparison to that of the element 3, imparts an unusual twisting movement to the hulls and effects their removal without damage to the kernels of the grain. In the hulling of wild rice, for which my invention has been more particularly designed, I have found that crepe rubber is a most satisfactory material for the facing elements and that a transmission system 10 to give a speed ratio of 2:1 for the discs 1 and 2 respectively is very satisfactory. Obviously, however, the adjustment of the speed of rotation of the discs, clearance between the facing elements 3 and 4, etc., may be varied and employed to suit different grains and circumstances without the exercise of further invention.

In the accompanying Figure 3 I have illustrated diagrammatically the manner in which the respective lines of motion 57 intersect transversely or obliquely as they traverse the overlapping hulling or husking area 43. It is the effective interaction of the hulling surfaces within the limits of the overlapping area thereof which imparts through the grain the necessary torsion by means of which the hulls or husks are removed without damage to the kernels.

Since many modifications can be made in the invention herein described and since the accompanying drawings have been prepared only to illustrate the relative arrangement and interaction of parts and not with regard to accuracy of dimensions for manufacturing purposes which in view of this disclosure I consider to entail merely mechanical skill together with the skill of the mechanical draftsman, and since many apparently widely different embodiments of this ininvention may be made within the scope of the accompanying claim without departing from the spirit and scope of the same it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense and I desire only such limitations placed thereon as justice dictates.

This application is a substitute for application 268,420, filed April 17, 1939.

What I claim as my invention is:

A machine for hulling small grain and particularly wild rice, comprising in combination a framework, a pair of horizontal and parallel shafts journalled thereupon, a vertically positioned disc secured for rotation upon each of said shafts, one of said discs being in advance of the other and overlapping the same, the overlapping portion of the surface of the advanced disc and the portion of the surface of the other disc overlapped thereby being hulling surfaces, both of said surfaces lying in a plane at right angles to the axes of rotation of said disc, the perimeter of one of said discs being bevelled inwardly towards the plane of the other disc, a hopper, a wedge-shaped discharge spout extending between said discs and having surfaces comple-

mentary to said bevelled perimeter of the one disc and the hulling surface of the other disc, one of said discs travelling clockwise and the other anticlockwise, one of said discs also travelling at a greater rate of speed.

WILLIAM R. KENNEDY.

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