H. A. CAMPBELL.

GRAIN SEPARATOR.

APPLICATION FILED AUG. 24, 1908.

945,487.

Patented Jan. 4, 1910.

4 SHEETS—SHEET 1.

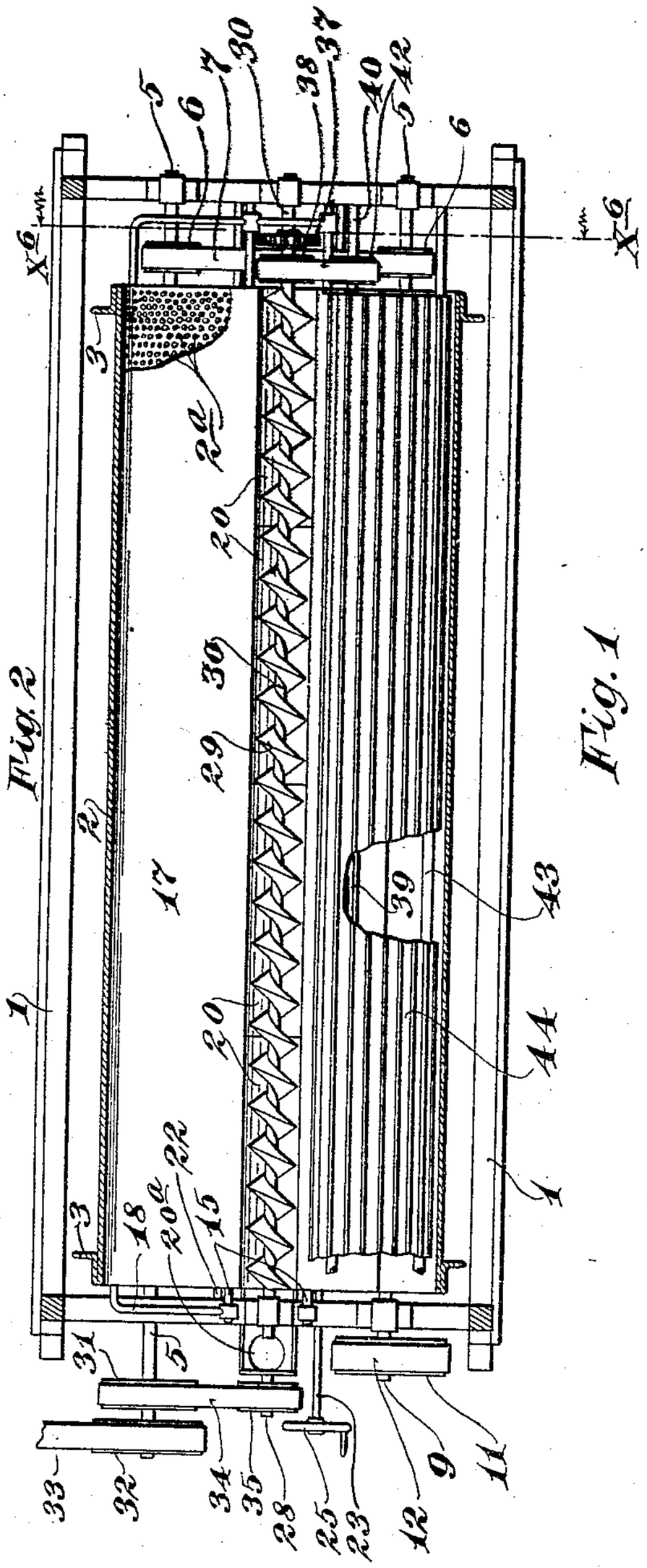

Fig. 2

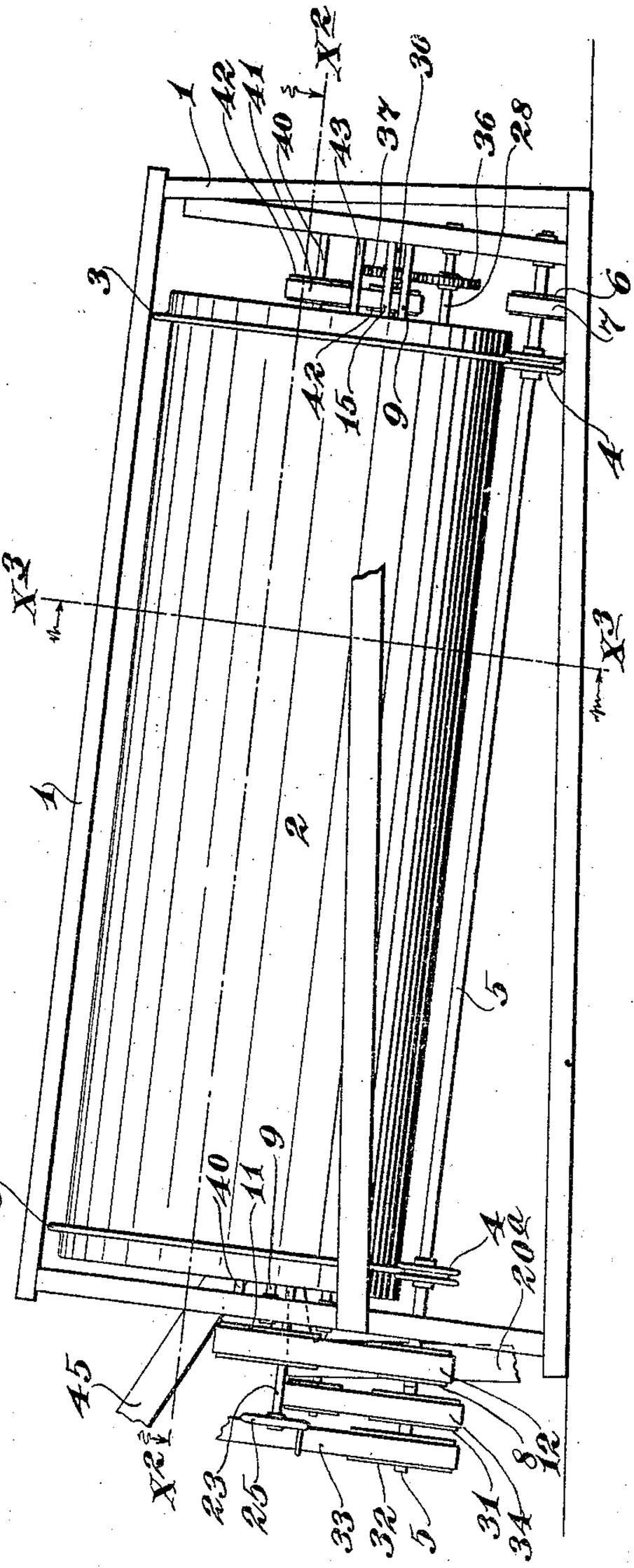

Fig. 1

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4 SHEETS—SHEET 2.

Fig. 3

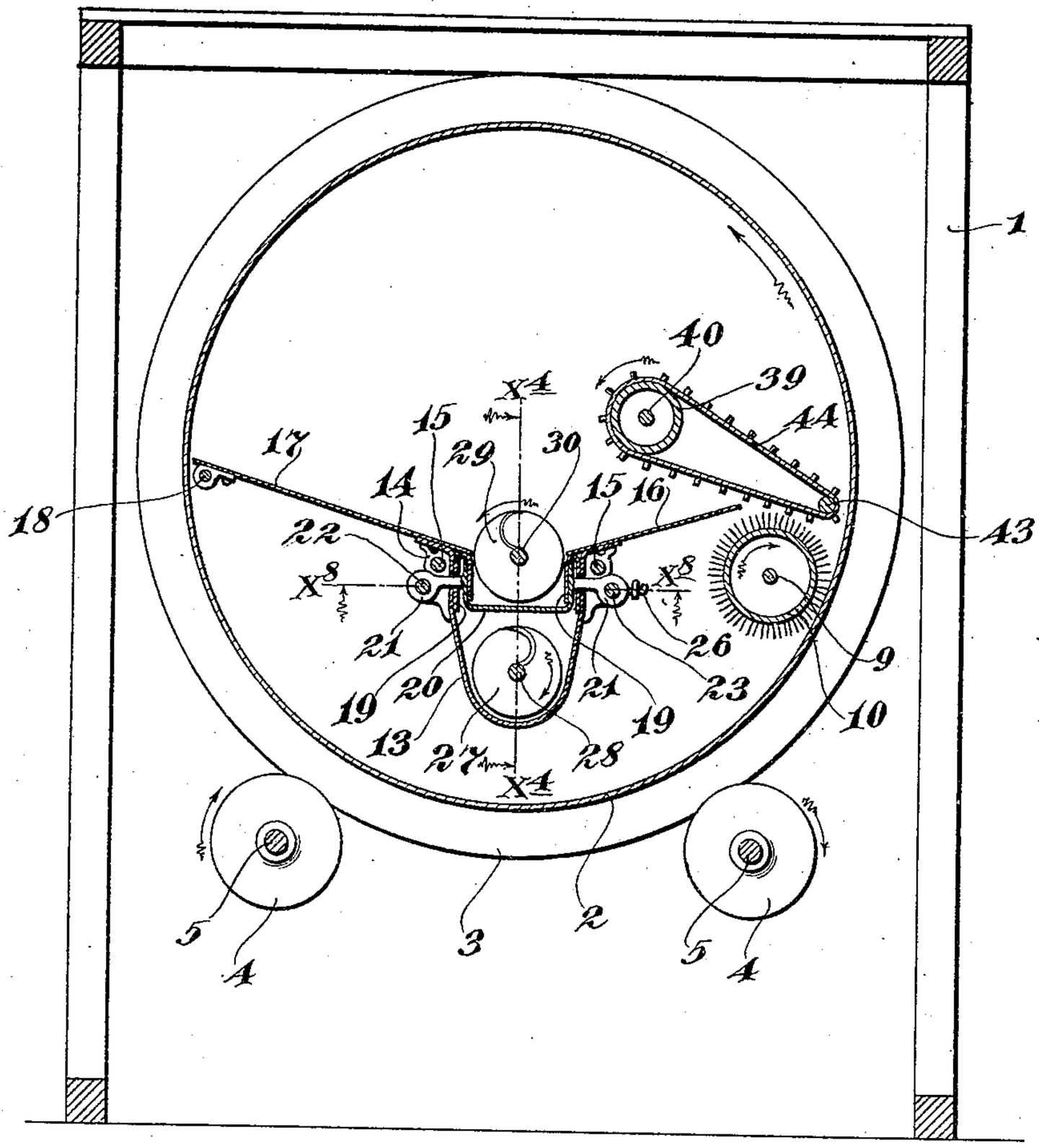
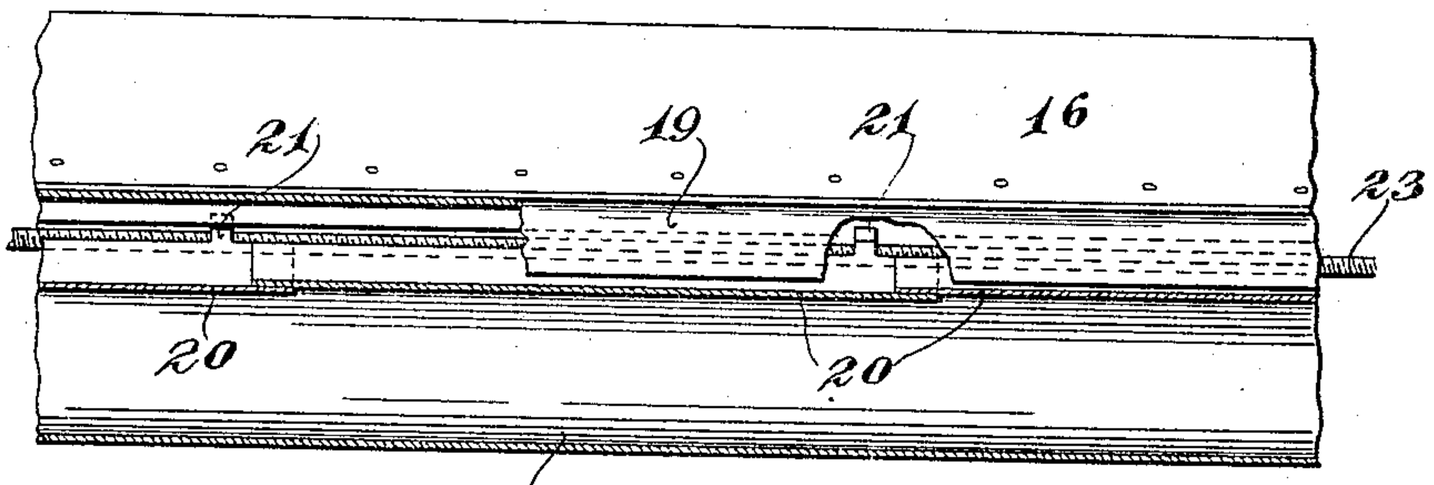


Fig. 4



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4 SHEETS—SHEET 3.

Fig. 7

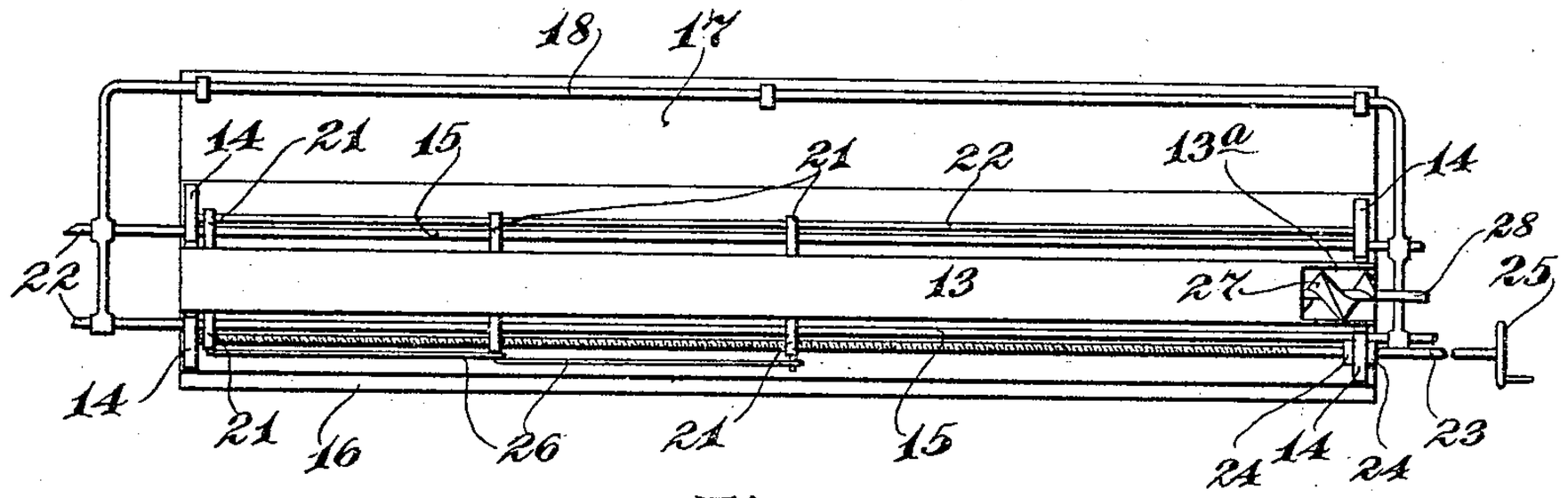


Fig. 8

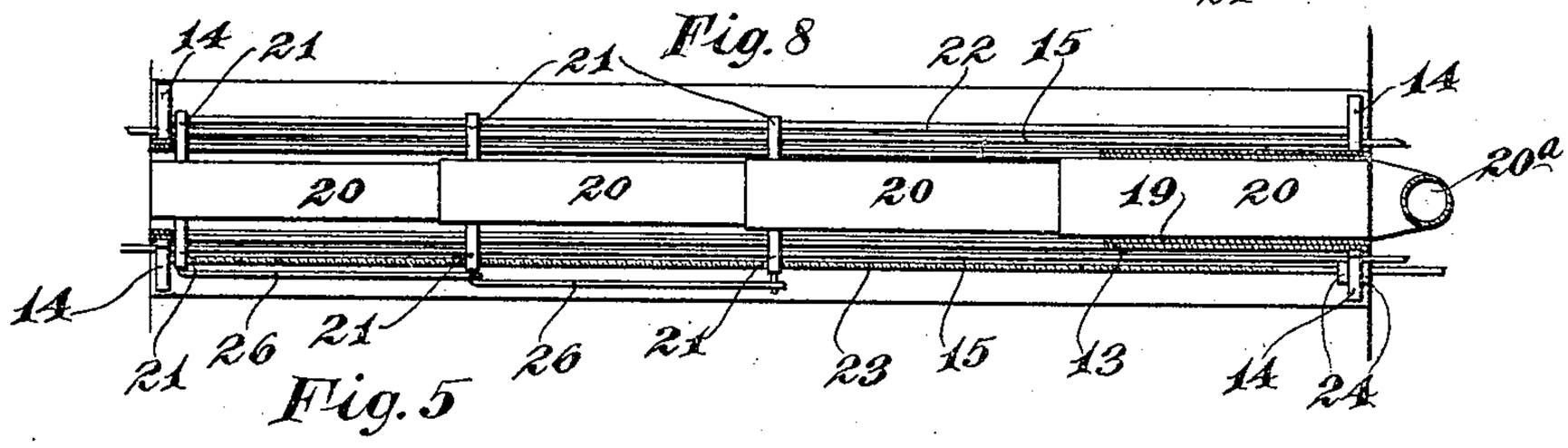


Fig. 5

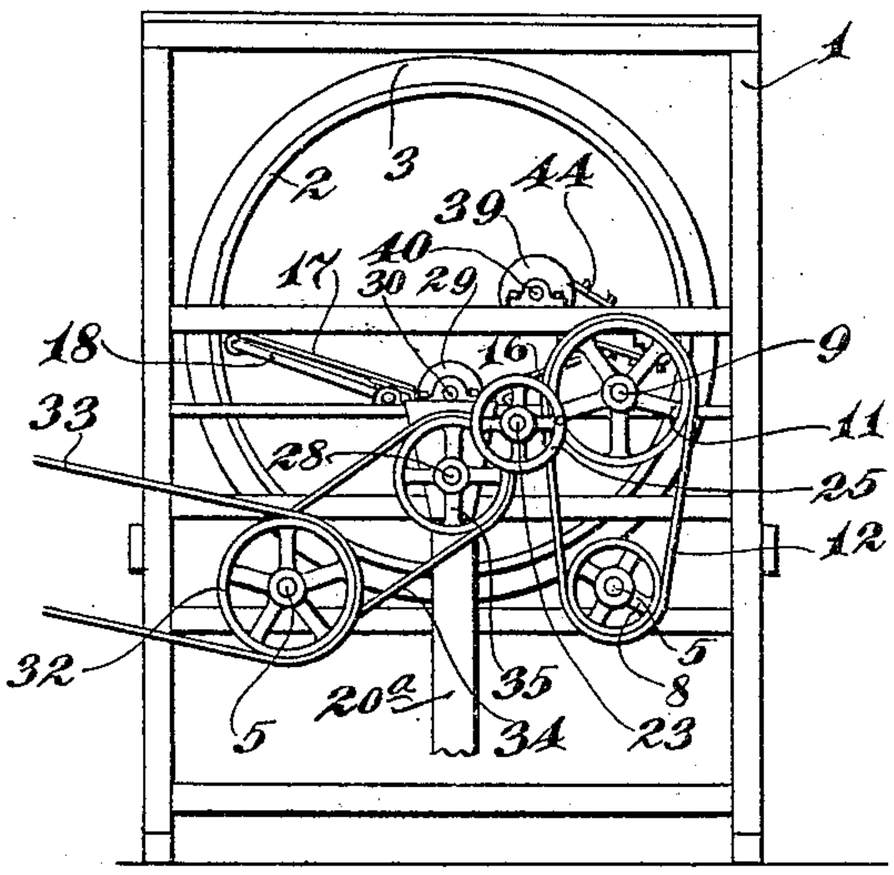


Fig. 6

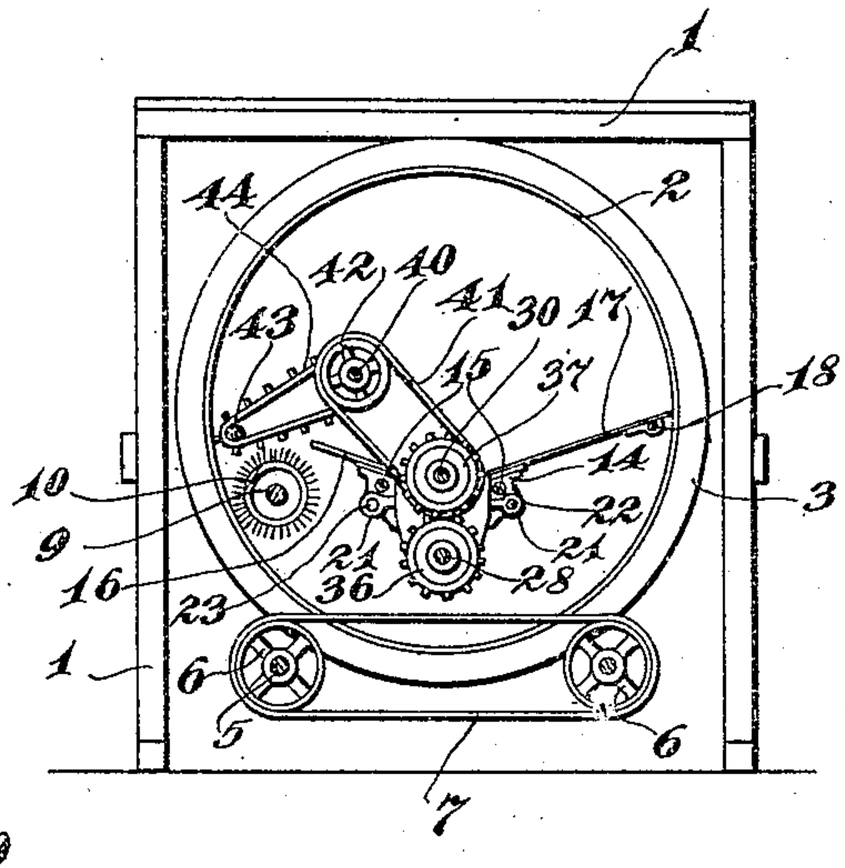
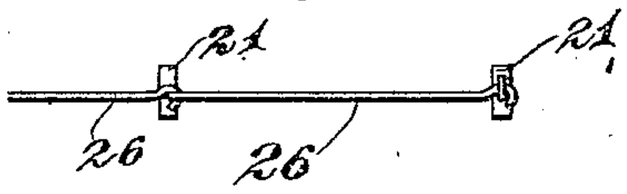


Fig. 9



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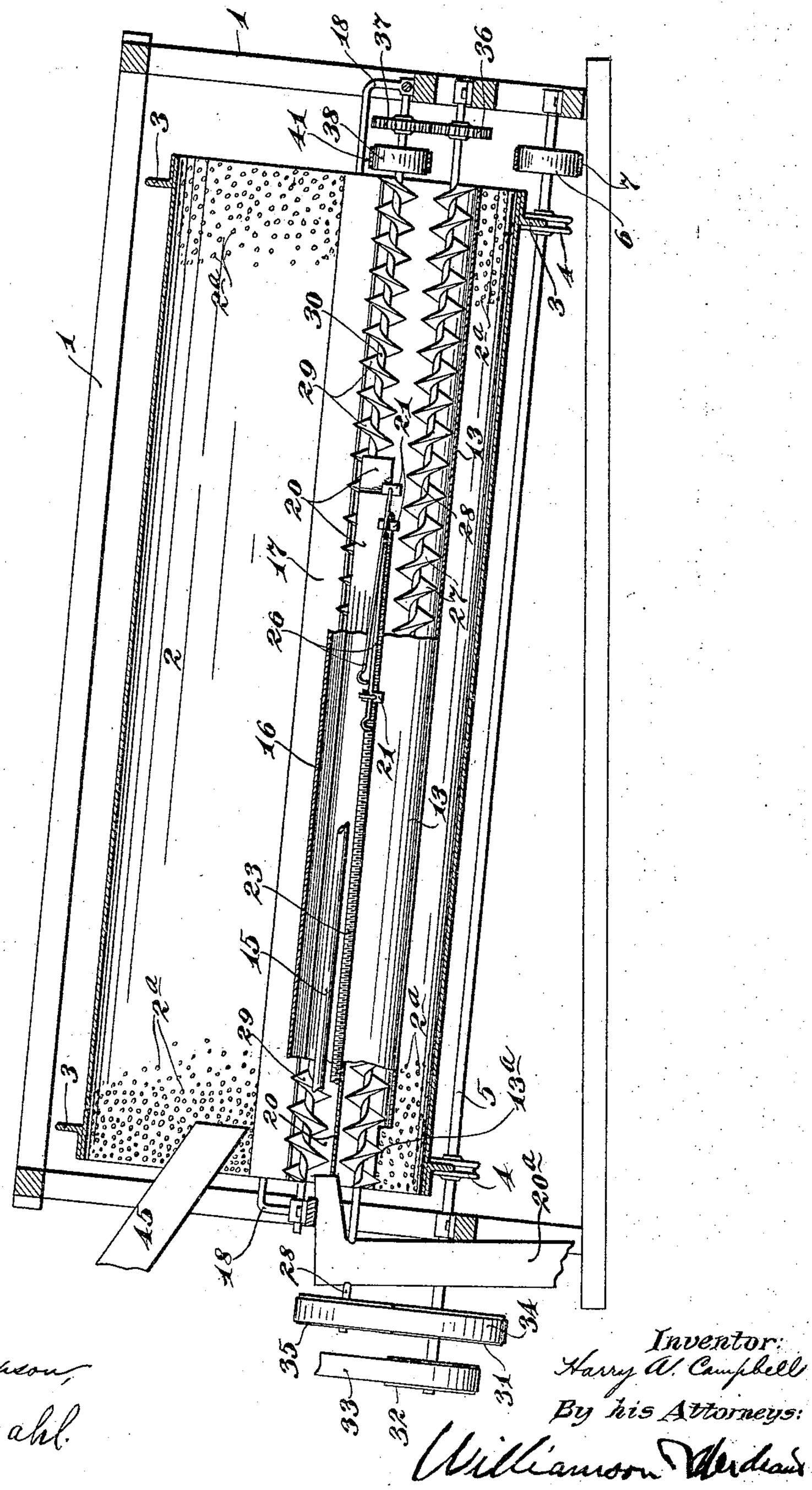
4 SHEETS—SHEET 4.

Fig. 10



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UNITED STATES PATENT OFFICE.

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GRAIN-SEPARATOR.

945,487. Specification of Letters Patent. **Patented Jan. 4, 1910.**

Application filed August 24, 1908. Serial No. 449,320.

To all whom it may concern:

Be it known that I, HARRY A. CAMPBELL, a citizen of the United States, residing at River Falls, in the county of Pierce and State of Wisconsin, have invented certain new and useful Improvements in Grain-Separators; 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 appertains to make and use the same.

My present invention has for its object to provide an improved machine especially adapted for the separation of grains and seeds, which vary in form, and to this end, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

This invention was especially devised as an improvement on the machine disclosed and broadly claimed in my prior patent #896,891, issued of date Aug. 25, 1908.

In the accompanying drawings which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings: Figure 1 is a view in side elevation with some parts broken away, showing the improved machine. Fig. 2 is an approximately horizontal section taken on the line x^2 x^2 of Fig. 1. Fig. 3 is a transverse vertical section taken on the line x^3 x^3 of Fig. 1. Fig. 4 is a fragmentary view in vertical section taken longitudinally of the machine, approximately on the line x^4 x^4 of Fig. 3, some parts being broken away. Fig. 5 is a front end elevation of the machine. Fig. 6 is a transverse vertical section taken on the line x^6 x^6 of Fig. 2. Fig. 7 is a bottom plan view of the hopper and spout mechanism removed from the machine. Fig. 8 is a horizontal section taken approximately on the line x^8 x^8 of Fig. 3. Fig. 9 is a detail view in side elevation, showing several coupling rods which connect the sections of the sectional trough of the hopper; and Fig. 10 is a view principally in longitudinal vertical section taken centrally through the machine, with some parts broken away.

The operative parts of the machine are all supported directly or indirectly from a rectangular skeleton frame work 1.

The numeral 2 indicates a drum or cylinder which has open ends and is rotatively mounted within the frame 1 and is set on an axis that inclines slightly in a direction from the receiving toward the delivery end thereof. To thus mount the said drum, it is preferably provided with annular peripheral flanges or hoops 3 that run on grooved supporting and driving wheels 4, which wheels are carried by inclined driving shafts 5 mounted in suitable bearings on the end portions of the frame work. At the delivery end of the drum, the shafts 5 are provided with pulleys 6 over which runs a belt 7 that causes the said shafts to rotate in unison in the same direction. At the receiving end of said drum, one of the said shafts 5 is provided with a pulley 8.

Mounted on suitable bearings on the end portions of the frame 1 and extending through the drum on the rising side thereof, is a shaft 9 that carries a brush 10 arranged to work against the inner surface of the said drum. At the receiving end of the drum, this shaft 9 is provided with a pulley 11, over which and the pulley 8, a belt 12 runs to impart rotary motion to the brush 10, in the direction of the arrow mark thereon, when the drum is rotated in the direction with the arrow marked adjacent thereto in Fig. 3.

In this improved machine as in the machine disclosed in my prior patent, the inner surface of the drum 2 is formed with pockets or indentations 2^a, see Fig. 2, that are of such size and shape that they will receive the wheat kernels or berries but will not receive the oat kernels or berries, which latter are of such length that they will extend out of or span across the said pockets or indentations.

Extending longitudinally through the drum 2 considerably below the axis thereof, is a sheet metal trough 13, approximately the same length as the said drum. This trough at its upper edges is rigidly secured to small brackets 14, through which as shown, supporting rods 15 are passed, the ends of the said rods being rigidly secured to the end portions of the frame work 1. Inclined hopper plates 16 and 17 are rigidly secured at their inner edges to the upper flanged edges of the trough 13. The plate 16 terminates above the brush 10, while the plate 17 extends outward into close engagement with the downwardly moving side of the drum, and is shown as further supported by a rod 18, the ends of which are rigidly secured to the end portions of the frame work 1. Approximately U shaped inverted sheet metal channels 19 are rigidly secured

to the upper side portions of the trough 13 and are overlapped by the inwardly projecting lower edges of the hopper plates 16 and 17. These channel strips 19 are preferably of the same length as the trough 13 and hopper plates 16 and 17.

An upper trough made up of a multiplicity of overlapped channel shaped sheet metal sections 20 is located in the upper portion of the trough 13 with the upper flanges of its sections working in the channels of the channel strips 19. The side portions of these trough sections 20 are rigidly secured to the inwardly projecting arms of bearings 21, that are arranged to slide in suitable slots cut in the sides of the trough 13 and channel strips 19. The bearings 21 at the left in respect to Fig. 3, are arranged to slide loosely on a rod 22 that extends longitudinally through the drum 2, with its ends rigidly secured to the end portions of the frame work 1. Extending longitudinally through the drum on the right-hand side thereof, as shown in respect to Fig. 3, is a long screw threaded rod 23, which in position corresponds to the rod 22. This rod 23, see Figs. 7 and 8, is passed loosely through one of the bearings 14 that is at the receiving end of the machine and is swiveled thereto, that is, is held against endwise movement, by collars 24. This threaded rod 23 has threaded engagement with the bearings 21 that is at the delivery end of the trough and which is shown at the left of the Figs. 7 and 8, the said views being inverted end for end. Said rod 23 is passed loosely without threaded engagement through all of the other bearings 21 that are on that side of the trough 13. At its outer end, the threaded rod 23 is provided with a hand wheel 25 by means of which it may be rotated to positively move the delivery end section of the spout 20 longitudinally of the drum and of the underlying trough 13. The bearings 21, which as shown are on the right hand side of the trough 13 in respect to Fig. 3, are connected by coupling rods 26, the ends of which are hooked and loosely engaged, see Figs. 7, 8 and 9, so that they will permit the sections of the spout 20 to be slid together but will limit their separating or extending movements. Otherwise and more particularly stated, when the delivery section of the spout 20, to-wit, that section which in Fig. 8 is shown at the extreme left, is moved toward the right by adjustments of the screw rod 23, the second section from the delivery end will remain stationary until the bearings 21 of the positively moved delivery section is moved against the bearings 21 of the second section, after which the two spout sections will move together. As is evident, when the trough 20 is shortened up, the stock passing therethrough will be delivered onto the lower trough 13. When the spout 20 is shortened up and its delivery end section is then moved toward the right in respect to Fig. 8, the said section will move alone until the hooked end of its coupling rod is engaged with the cooperating end of the coupling rod of the second section, after which said coupling rods will cause the two sections to move together to lengthen out the sectional spout.

As shown in Fig. 7, the lower trough 13 at the receiving end of the drum, has its bottom cut away as shown at 13ª, to afford a discharge passage.

Extending longitudinally through and working in the trough 13, is a spiral conveyer or feed screw 27, the shaft 28 of which, is journaled in suitable bearings on the end portions of the frame work 1. Also extending through and working in the sectional feed trough 20, is a spiral conveyer or feed screw 29, the shaft 30 of which, is journaled in suitable bearings of the frame work 1.

The roller shaft 5 which is shown at the left in respect to Figs. 3 and 5 and at the right in respect to Fig. 6, is provided at the receiving end of the drum with pulleys 31 and 32. A power driven belt 33 runs over the pulley 32 to impart rotary motion to the said roller shaft 5. A belt 34 runs over the pulley 31 and over the pulley 35 on the shaft 28 of the lower feed screw 27 to impart rotary motion to the latter.

At the delivery end of the drum, the screw shafts 28 and 30 are provided respectively with intermeshing spur gears 36 and 37 to transmit rotary motion from the former shaft to the latter, see particularly Fig. 6. At the delivery end of the drum, the upper shaft 30 is provided with a pulley 38 for a purpose which will presently appear.

Extending longitudinally through the drum just above the hopper plate 16, is a roller 39, the shaft 40 of which is journaled in suitable bearings on the end portions of the frame work 1. A belt 41 runs over the pulley 38 just noted, and over the pulley 42 on the said shaft 40. A small rotary roller or idle shaft 43, extends through the drum above the brush 10 close to the upwardly moving side of said drum which has its ends loosely journaled in suitable bearings on the end portions of the frame work 1. A wide endless belt conveyer or apron 44 runs over the rollers 39 and 43. In width, this conveyer 44 is approximately co-extensive with the length of the drum.

That section of the sectional trough 20 which is at the receiving end of the drum, is rigidly secured to the adjacent end portion of the frame work 1, and is provided outside the drum, with a depending discharge spout 20ª.

The mixed grains or materials to be separated, are delivered into the lower portion of the receiving end of the drum 2, as shown, by

means of an inclined spout 45. When the drum 2 is rotated in the direction of the arrow marked on Fig. 3, the wheat kernels or berries which fall into the pockets 2ª thereof, will be carried upward and above the brush 10 and above the receiving portion of the endless apron 44, and will be dropped into the latter and thereby carried either directly into the sectional trough 20 or into the hopper plate 16 and from thence into said spout. A considerable portion of this wheat however, will be carried by the pockets of the drum upward and over to a point where it will fall either directly onto the sectional trough 20 or onto the hopper plate 17 and from thence onto said trough 20. The conveyer or endless apron 44 is an important feature because it picks up a large amount of the wheat which otherwise would be permitted to roll or drop back to the bottom of the drum. At or near the delivery end of the drum, some oats will be carried upward by the drum and on the apron 44. Hence, it is important to so adjust the sectional trough 20 that only clean wheat will be delivered into the same, while mixed wheat and oats will be delivered into the lower trough 13. By the feed screw 29 the clean wheat will be carried in the sectional trough 20 toward the receiving end of the drum and will be discharged from said trough through its spout 20ª; while the mixed wheat and oats dropped into the trough 13 will by the feed screw 27, be carried toward the receiving end of the drum and will be dropped back into the receiving end of said drum through the discharge passage 13ª, and hence, will be again subjected to the separating action of the drum. The main body of the oats and other foreign materials will not be carried by the drum upward on the apron 44, but will be discharged out of the delivery end of the said drum. The purpose of the rotary brush 10 is to brush downward and out of the pockets of the drum, oats which will sometimes partly enter or catch into the pockets 2ª of the drum. The brush will perform this function without dislodging the wheat because the oat kernels, as well known, have a fuzz or beard which will catch in the brush, while the wheat kernels are comparatively very smooth and furthermore, will more completely lodge within the pockets.

What I claim is:

1. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, a conveyer working in said hopper and operated to feed the material caught in said hopper toward the receiving end of said drum, and an endless conveyer working in said drum on the rising side thereof and arranged to deliver the material carried upward by said drum, into the said hopper.

2. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and having upper and lower longitudinally extending troughs, the upper of which troughs, overlies and partly covers said lower trough but terminates at the delivery end of the drum short of the lower trough and is arranged to deliver the material caught therein out of the receiving end of the drum, and the lower of which troughs, is arranged to deliver the material caught thereby back into the receiving end of the drum.

3. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and having upper and lower longitudinally extended troughs, the upper of which troughs overlies and partly covers said lower trough but terminates at the delivery end of the drum short of the lower trough and is arranged to deliver the material caught therein out of the receiving end of the drum, and the lower of which troughs, is arranged to deliver the material caught thereby back into the receiving end of the drum, and spiral conveyers working within the said upper and lower troughs.

4. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with an adjustable trough made up of overlapping and telescoping sections.

5. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with upper and lower troughs, the former of which overlying and partly covering said lower trough and said lower trough being arranged to deliver material caught thereby into the receiving end of the drum, and the upper of which troughs is longitudinally adjustable and is arranged to deliver the material caught thereby out of the receiving end of the drum.

6. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with a longitudinally adjustable trough arranged to deliver the material caught thereby out of the receiving end of the drum, and with endless conveyer within said drum working on the rising side thereof, and arranged to deliver the material caught thereby to the said hopper.

7. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with longitudinally adjustable trough sections independent of said hopper and arranged to

deliver the material caught thereby out of the receiving end of the drum, and a spiral conveyer working in the said trough sections.

8. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with a trough made up of overlapping sections arranged to deliver the material caught thereby out of the receiving end of the drum, bearings connected to the sections of said trough, and guide rods coöperating with said bearings to support said trough sections, one of which guide rods is threaded, is rotatively mounted and has threaded engagement with one of the said bearings.

9. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with a trough made up of overlapping sections, bearings secured to the trough sections, coupling rods limiting the trough extending movements of said trough sections, and guide rods coöperating with said bearings to support said trough sections, one of which guide rods is threaded, is rotatively mounted and has threaded engagement with one of the said bearings.

10. In a machine of the kind described, the combination with an inclined rotary drum, of a hopper within said drum supported independently thereof, and provided with upper and lower troughs, the latter of which is arranged to deliver material caught thereby back into the receiving end of the drum, and the former of which troughs is made up of overlapping longitudinally adjustable sections, and is arranged to deliver the material caught thereby out of the receiving end of the drum, spiral conveyers working in said troughs, bearings connected to the sections of said trough, and rods coöperating with said bearings to support the trough sections, one of which guide rods is rotatively mounted and has threaded engagement with one of the said bearings.

11. In a machine of the kind described, the combination with an inclined rotary drum having pockets or indentations in its inner surface, of a hopper within said drum supported independently thereof, having upper and lower troughs, the lower of which is arranged to deliver material caught thereby back into the receiving end of the drum, and the upper of which troughs at the delivery end of the drum, terminates short of the said lower trough and is arranged to deliver the material caught thereby out of the receiving end of the drum, means for adjusting said upper trough longitudinally, and a conveyer working in said drum on the rising side thereof, and arranged to deliver material caught thereby into the said hopper.

12. In a machine of the kind described, the combination with an inclined rotary drum having pockets or indentations in its inner surface, of a hopper within the said drum supported independently thereof, and having a trough arranged to deliver material caught thereby out of the receiving end of the drum, a brush working in said drum on the rising side thereof, and an endless conveyer also within said drum on the rising side thereof located above the said brush and arranged to deliver material caught thereby into the said hopper.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY A. CAMPBELL.

Witnesses:
JAY H. GRIMM,
LUCY HILL.