

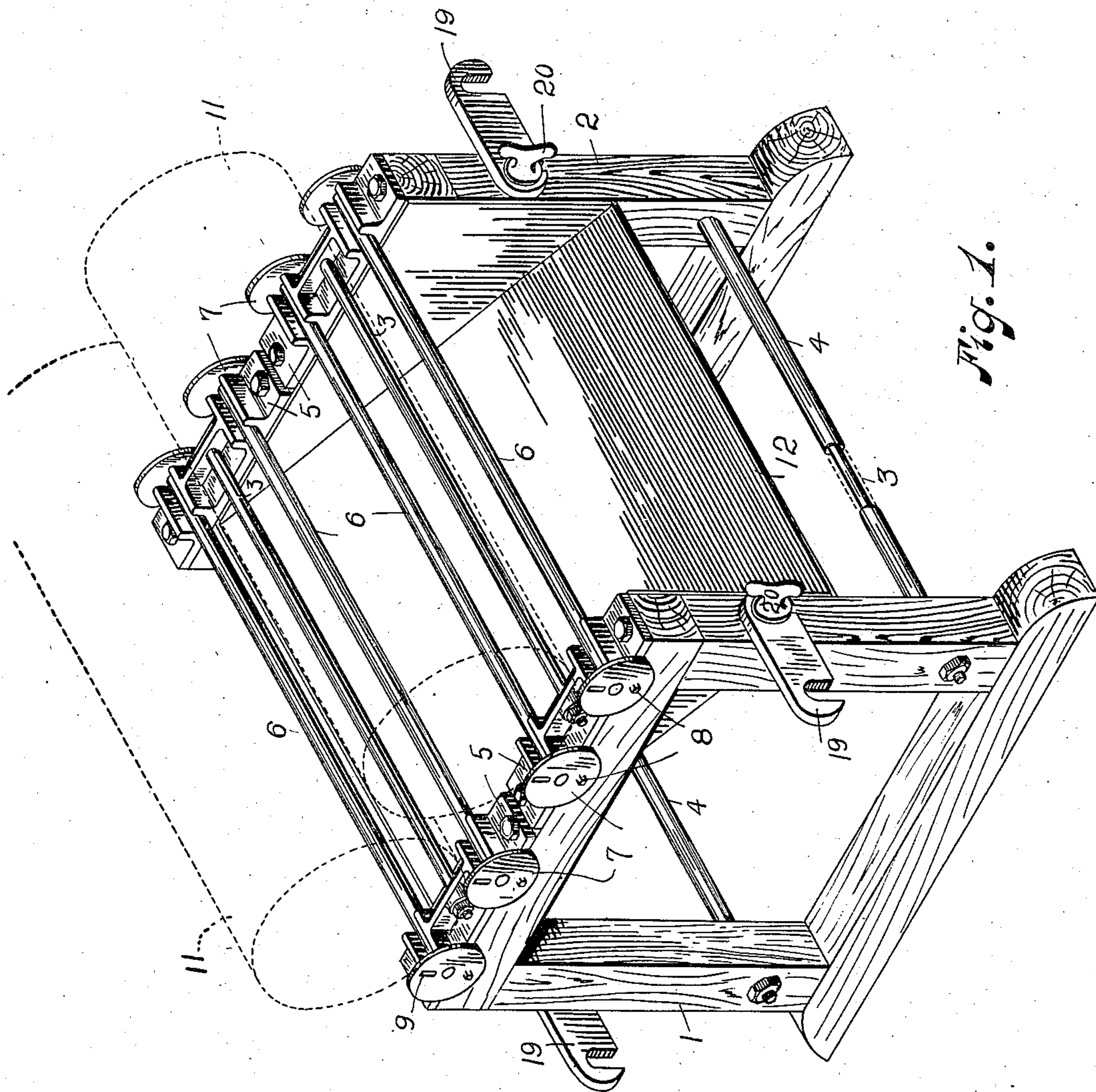
No. 891,225.

W. C. ANDERSON.
FRUIT GRADER.

PATENTED JUNE 23, 1908.

APPLICATION FILED APR. 11, 1905.

4 SHEETS—SHEET 1.



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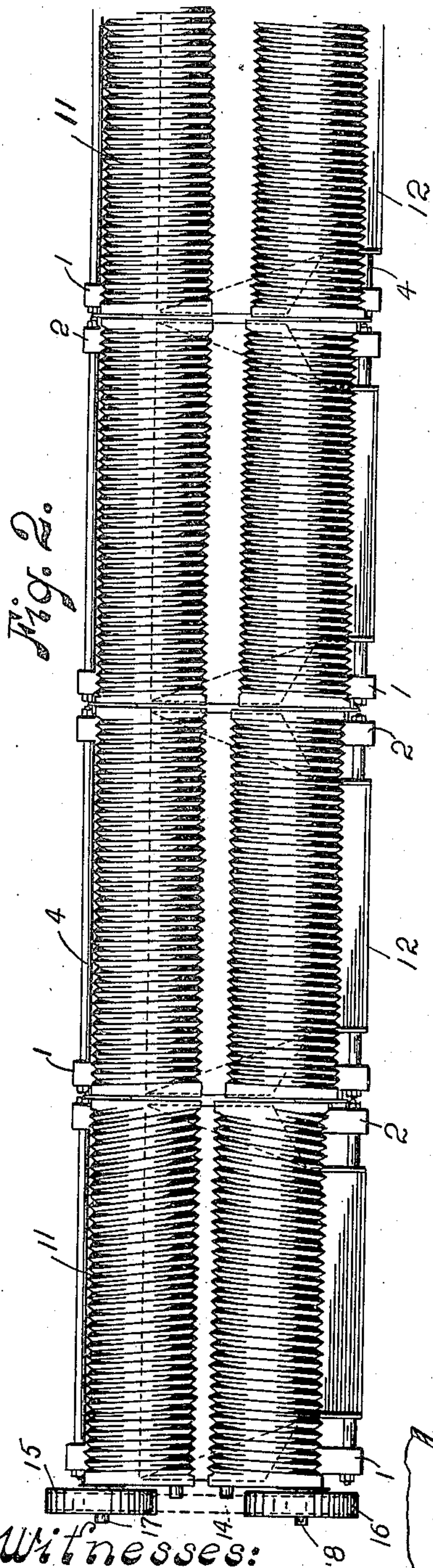


Fig. 2.

Fig. 3.

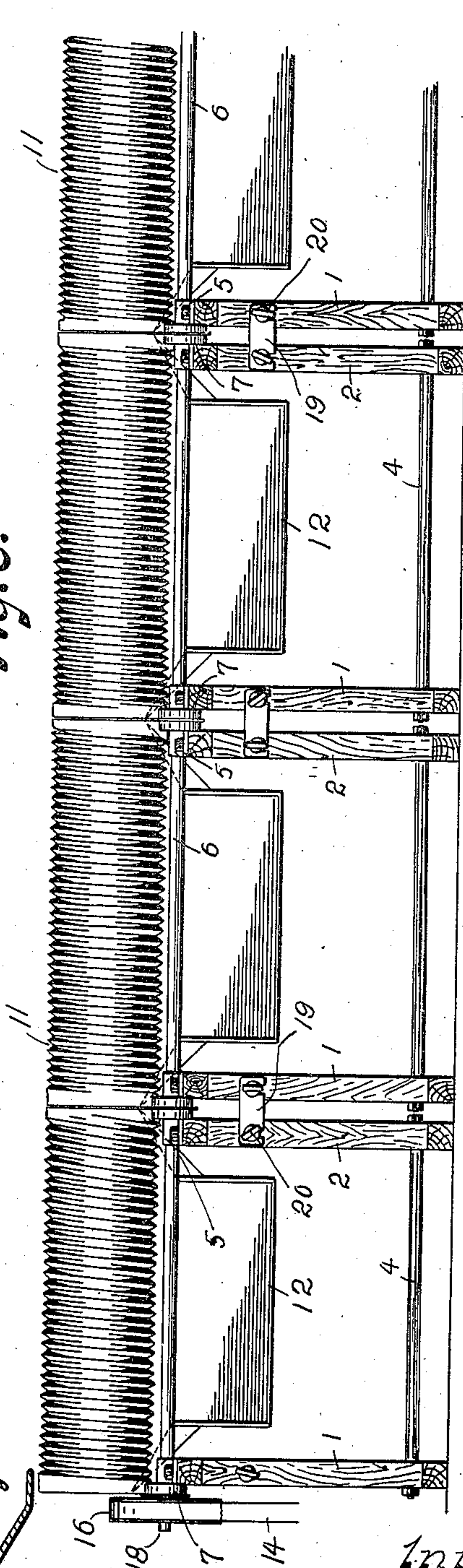
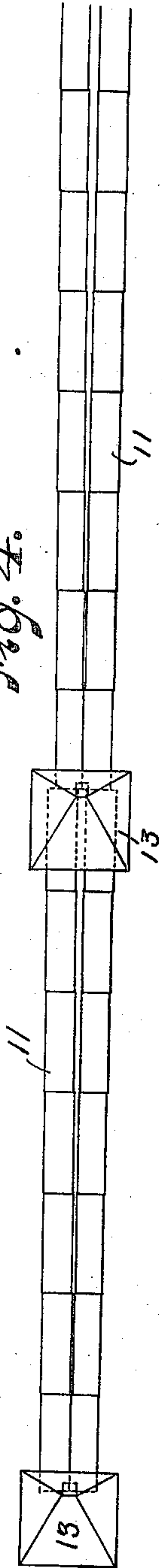


Fig. 4.



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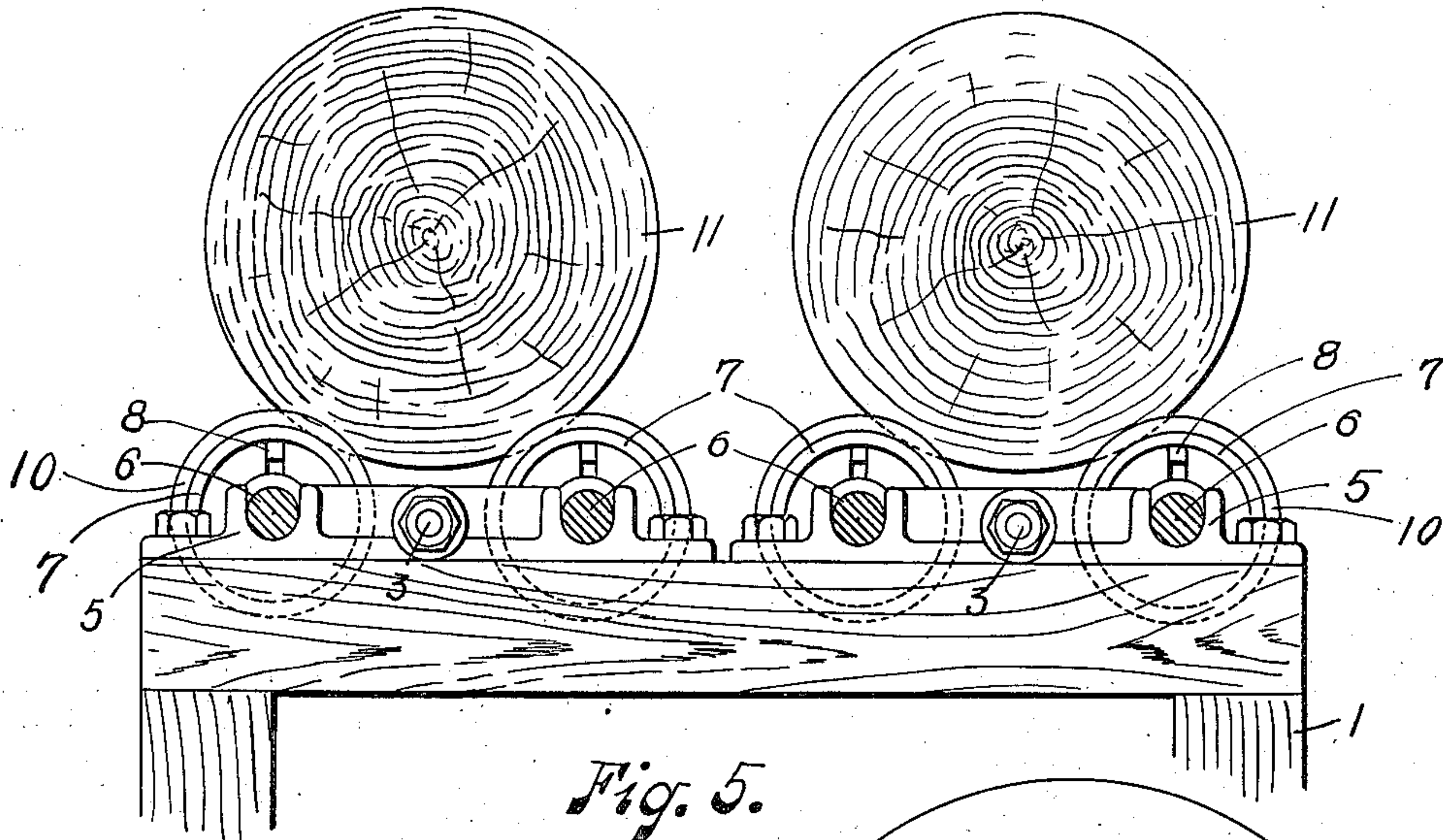


Fig. 5.

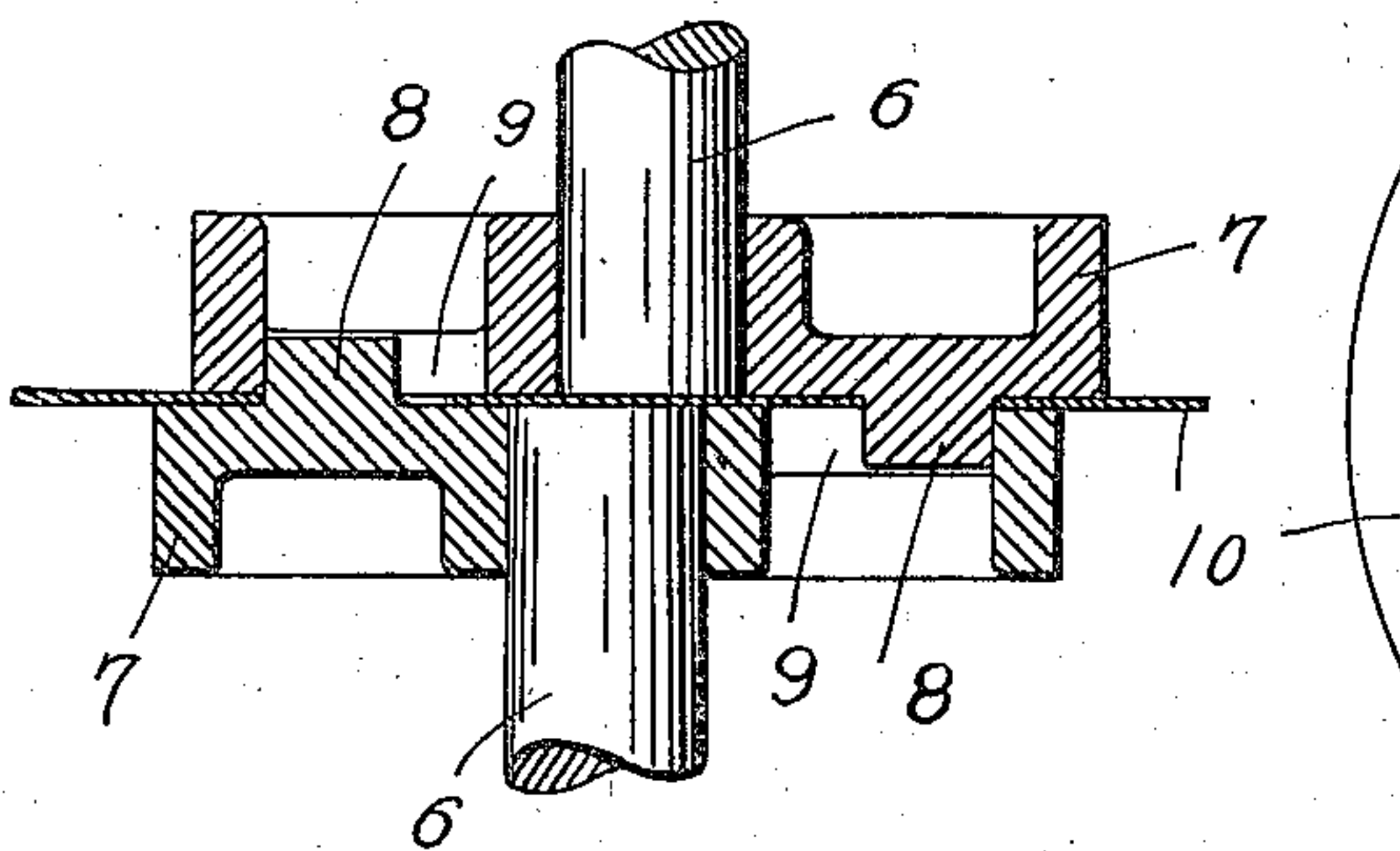


Fig. 6.

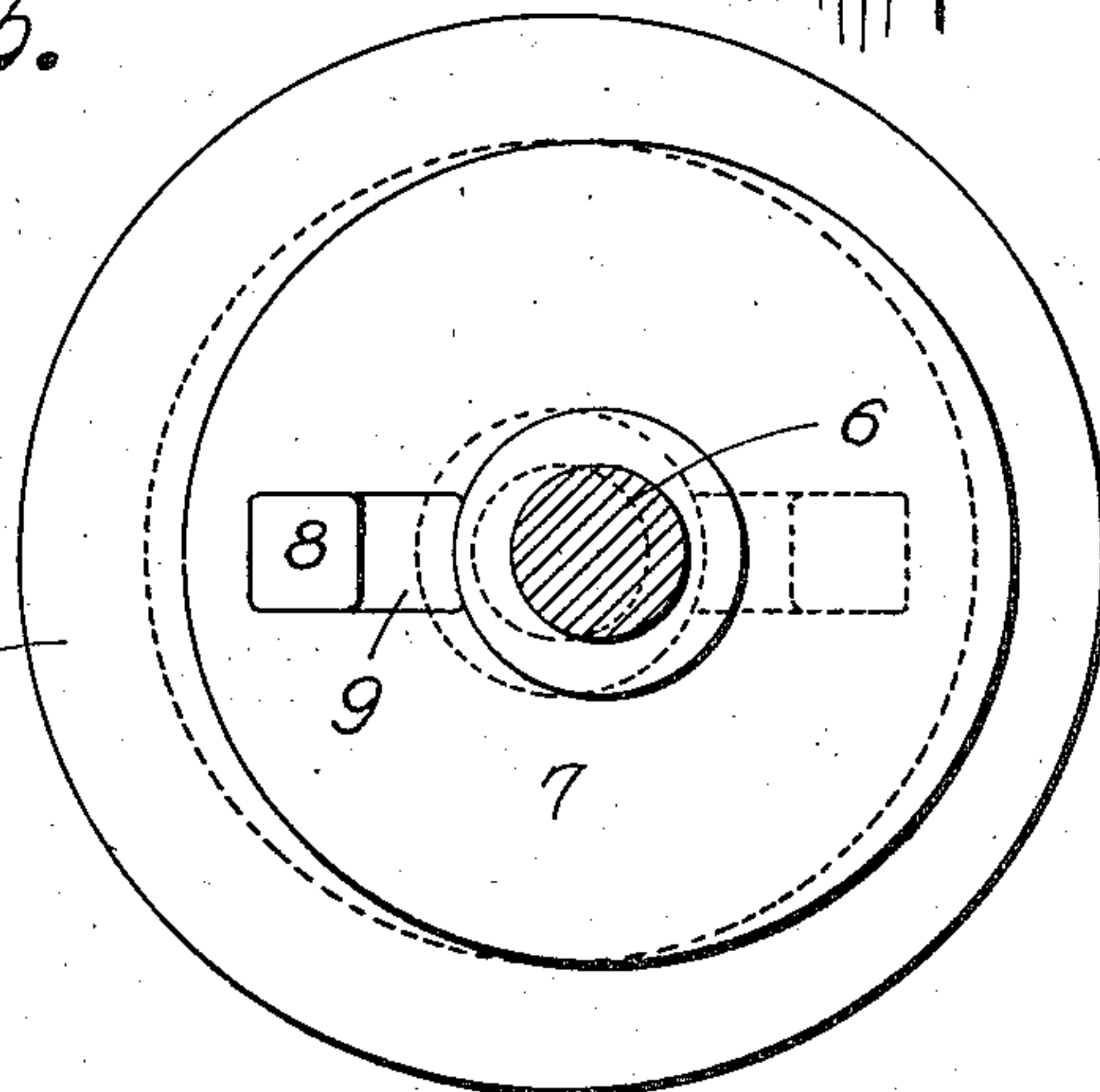
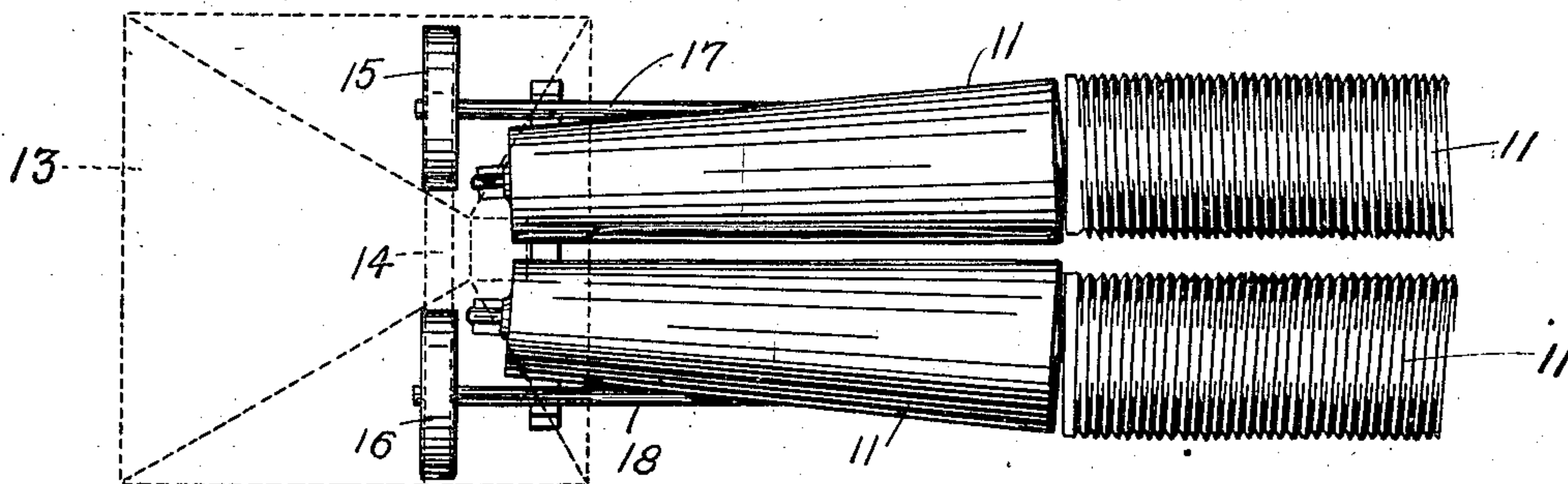


Fig. 7.



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Fig. 8.

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4 SHEETS—SHEET 4.

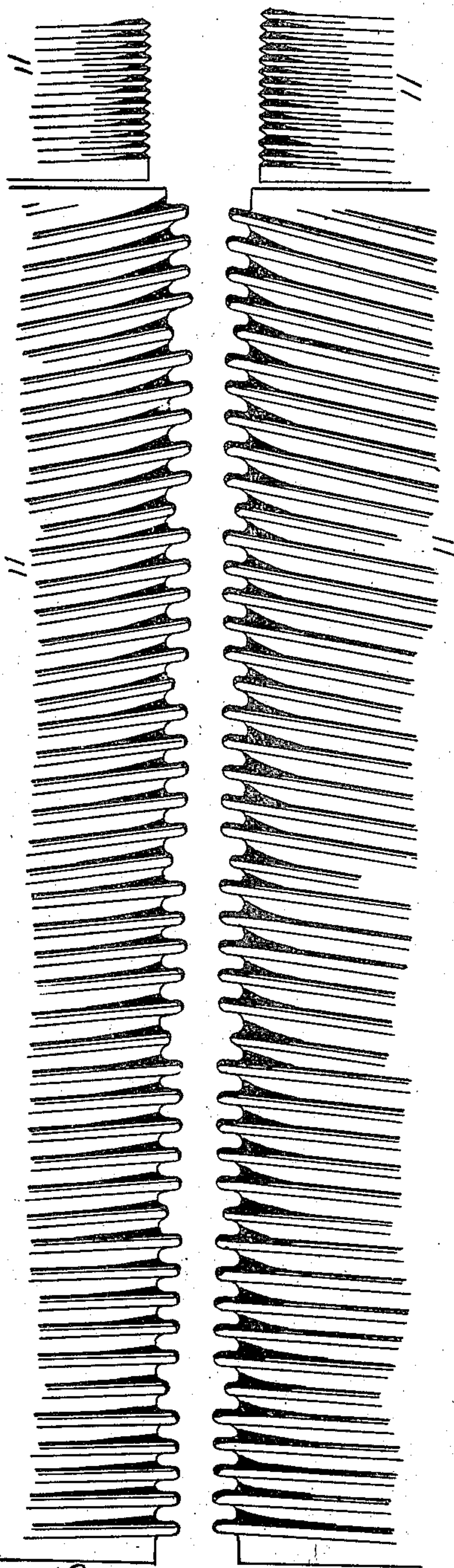


Fig. 9.

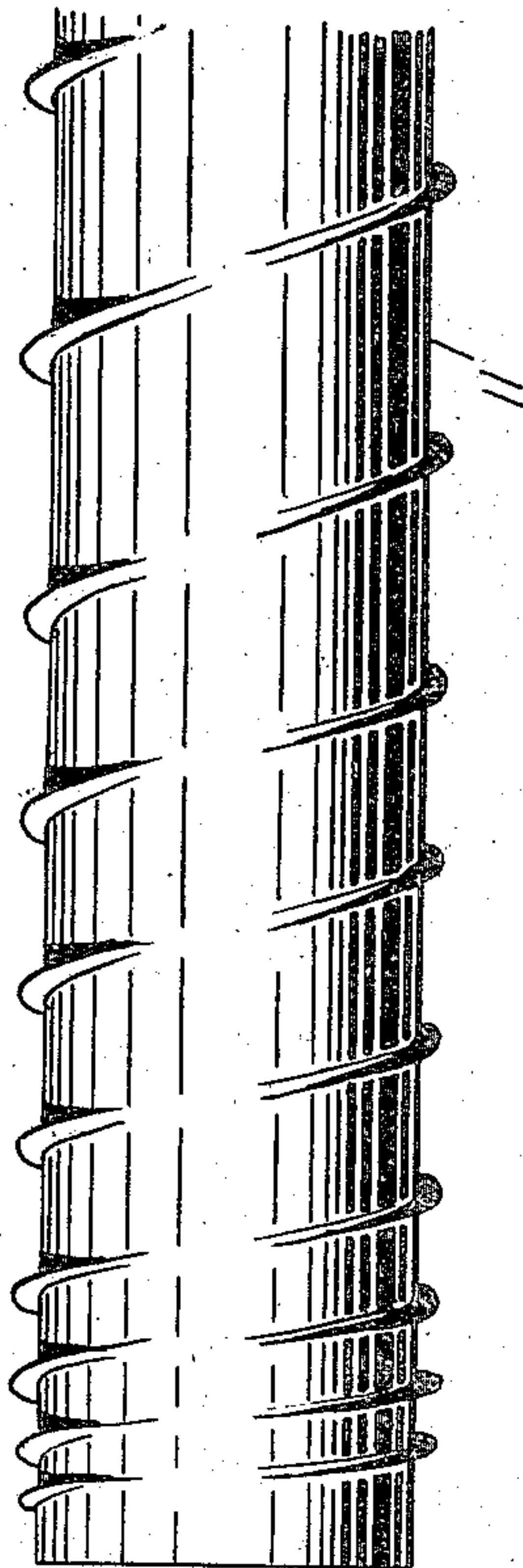


Fig. 11.

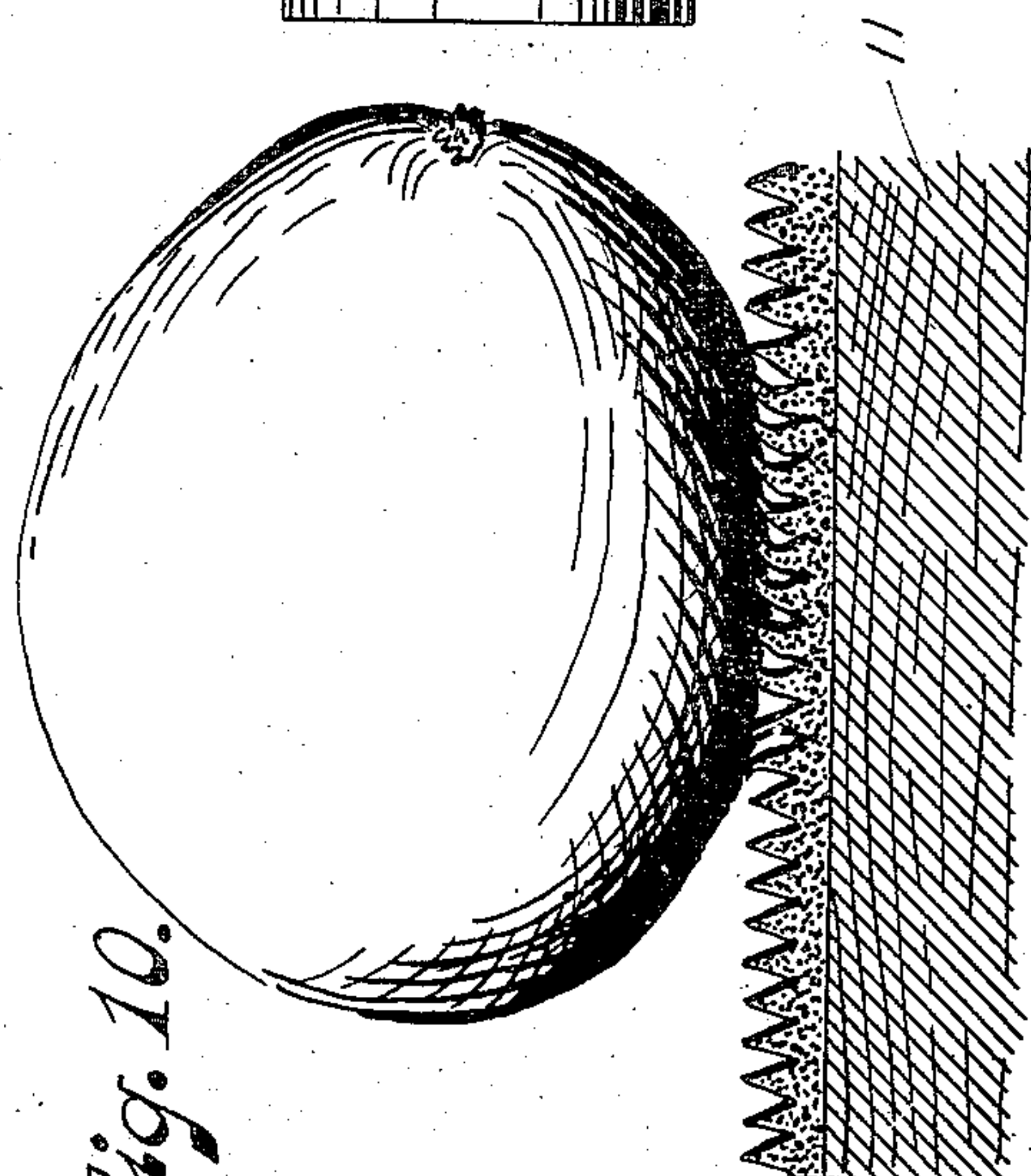


Fig. 10.

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UNITED STATES PATENT OFFICE.

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FRUIT-GRADER.

No. 891,225.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed April 11, 1905. Serial No. 255,003.

To all whom it may concern:

Be it known that I, WILLIAM C. ANDERSON, citizen of the United States, residing at San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Fruit-Graders; and I do hereby declare the following to be a full, clear, and exact description of the same.

10 This invention relates to a device for grading or sizing substances and materials made up of discrete particles or separate units.

The form of the device which will be used herein to illustrate this invention is particularly adapted to grading fruits, vegetables, 15 nuts and the like.

The common practice heretofore has been to provide separate machines especially adapted to handle each distinct type of fruit, 20 vegetables, nut or the like.

One of the objects of the present invention is to provide in a single unified structure, a device capable of grading practically all characters of fruit, vegetables, nuts and the 25 like, either in their natural states or as prepared for consumption, regardless of shape, texture and substance of the units.

The difficulties in the problem, the solution of which is presented in the present invention, are not confined to variations in form, though these range from the spherical orange to the elongated cucumber. Many of the materials operated upon are of a sticky, gummy, juicy and otherwise messy character. 35 Further; the character of the help necessarily employed in the industries involved, make absolute simplicity a requirement almost equal in importance to efficiency.

In many of the fruit sections, the ranches 40 are of small area, from ten to twenty acres each, and many of the large fruit ranches are blocked into areas of about the same size, each devoted to a specific class of fruit or product. This segregation of areas both in individual and separate ownerships, renders 45 it desirable that a device of this character should be readily movable from place to place. In other words, that it shall be a knockdown machine. One which can be transported in small compass and reassembled without difficulty or delay and require 50 no adjustment on re-assembling. To provide for this convenience, without sacrifice of efficiency in any other respect, is another object of the present invention.

Owing to the nature of the process of grad-

ing and the material to be operated upon, one of the elements of the problem is that while the ungraded material must be handled in bulk, the separate pieces should be 60 dealt with individually. It therefore becomes necessary that provision be made as a preliminary to grading, that while the material is fed to the machine indiscriminately, some device must be provided or some provision made, which will effect the rapid separation of the individual pieces from the mass 65 fed to the machine. This separating device too, must be of a nature which, while handling the material rapidly, will not bruise, 70 mar or disfigure the individual pieces during the process of feeding and separating.

These diverse functions are accomplished by means of very simple devices. They are illustrated in the accompanying drawings. 75

Described generally the machine consists in a series of inter-changeable units, by the addition or subtraction of which or parts thereof, the length, character and adaptability to various characters of materials and 80 grading is provided for. Each of these sections, the details of construction of which will be more fully described hereinafter, consists in a pair of removable oppositely rotating cylinders adjacent to each other and provided with variously formed surfaces, suitable to the varying requirements of the 85 different materials. These cylinders are preferably parallel to each other with their axes horizontal and are supported loosely upon cradles consisting of rotatable bearing disks or rollers. Usually a series of pairs of these rotating cylinders are placed end 90 to end, the lateral distance between the members of each succeeding pair being progressively wider. Each section with its cylinders and driving mechanism is a complete and separable unit in itself, but which when placed in position unites itself by the mere act of placing it, not only in proper 100 operative position but also in driving association with the unit to which it is joined. Thus, not only is the device divisible into operative units or sections but the cylinders of each section being merely laid loosely upon 105 their bearing cradles, are themselves removable and inter-changeable.

A more detailed description of this invention will now be given, reference being had to the accompanying drawings, which illustrate the form of machine adapted to grade 110 fruit and vegetable products.

Figure 1 is a perspective view of an assembled section unit, the sizing and conveying cylinders being shown dotted. Fig. 2 shows a plan view of four sections of a machine. Fig. 3 is a side elevation of Fig. 2. Fig. 4 shows a plan of a fifteen section machine, with feeder sections or units at two points. Fig. 5 is a detail of the bearing and driving disks, with cylinders in position. Fig. 6 is a plan section of the bearing and driving disks, showing their coupling and interlocking devices. Fig. 7 is an end view of Fig. 6. Fig. 8 is a plan view of a section showing conical forms of feeder cylinders. Fig. 9 is a plan view of a detail of adjacent cylinders on a large scale showing a form of surface provided with helical ridges of progressively increasing pitch with a portion of an adjacent section having a surface provided with helical ridges of finer and uniform pitch. Fig. 10 is a detail of a portion of the roll showing a surface of flexible yielding ridges illustrating their engagement with an article in the process of grading. Fig. 11 is a plan view of a detail showing the feeding and spacing cylinder with thread of increasing pitch.

In view of the sectional character of the device, a description of one section will serve for the complete machine, each being substantially like every other with the exception of the variations in the interchangeable cylinders. These are provided with a circumferential surface varying in accordance with the function intended to be performed or the material it is to operate upon. Referring therefore to Fig. 1, a suitable frame is provided, consisting preferably of two members 1 and 2 respectively placed a suitable distance apart and spaced and held rigidly in relation to each other by tie bolts 3 passing through sections of pipe 4 or other suitable spacing devices. Upon the upper surface of this frame are located bearings 5 preferably formed with open top or U shape journal boxes. Journaled in these boxes and extending from one frame member to the other are shafts 6, parallel to each other and provided on each of their ends with bearing rollers or disks 7. These disks are provided with interlocking devices in order to engage with similar rollers or disks upon an adjacent section. These interlocking devices or clutches may be of any suitable form. They are here shown as consisting of a projecting member 8 and a socket or recess 9 located on opposite sides of the disk center. A loose circular plate 10 is also provided of somewhat larger diameter than the disks adjacent to which it is placed. Supported loosely upon the bearing rollers 7 are cylinders 11 extending across the frame as shown in Fig. 1. Two cylinders 11 occupy each frame section but a surplus of cylinders is provided to be interchanged with those oc-

cupying each of the sections. The pairs of cylinders are preferably parallel to each other and are separated to leave a space between their adjacent surfaces. The section is provided with a suitable discharge chute 12 beneath the cylinders 11 to receive and discharge the material which drops between.

The initial section may be supplied with any suitable form of hopper or feed chute 13 as shown in Figs. 3, 4 and 8. The power mechanism for this section may consist, as shown, of a belt 14 from a suitable source of power to drive the wheels 15 and 16 secured upon the ends of the shafts 17 and 18 which correspond to and couple with the shafts 6 as heretofore described.

The sections are securely locked to each other by hook-clamps or any other suitable connection. I have shown for this purpose, flat pieces 19 with slotted bolt holes which fit over and are secured by the hand operated bolts 20 as shown in Fig. 3 and particularly in Fig. 1.

The number of sections is determined by the character of material operated upon. A greater number of course being provided in cases where a large number of variations of grade is desired, or when material, owing to its peculiar or irregular form, requires a long distance for its proper grading.

As this device in addition to being a grader is inherently a conveyor, sections may be interposed between grading sections to act purely as conveyers and thus the discharge points of the various grades may be separated widely. This facilitates the handling of the grades in connection with other processes, such as canning, boxing, etc.

With regard now to the cylinders. These are provided with different characters of surface depending upon the nature of the material to be graded in accordance with the principles referred to hereinbefore. Certain broad lines can be laid down which will enable those skilled in the art to make particular application and to provide cylinders of a character adapted to any particular form of fruit, vegetable or other material. The appropriate motion to present the material properly to the successively increasing grading spaces between the cylinders, is secured by the opposite rotational motion of the cylinders of and the action of the helically ridged surface. Purely progressive travel or purely rotational movement can be impressed upon the pieces to be graded. Progressive travel with rotational movement at any desired speed can also be given. To give forward travel to the pieces without rotational movement, one of each pair of cylinders is supplied with a right hand thread, its adjacent cylinder being provided with a left hand thread, both threads or helices being of like pitch. To add rotation to the movement of advance, one of the cylinders may be pro-

vided with a thread of different pitch. The pitch and rotational speed, control the character and amount of the travel of the pieces. In some instances, the ridges may be non-helical or absent on one of the pairs of cylinders. The first necessity in grading and especially with this particular form of device, is, that from the promiscuous supply discharged upon the first cylinders, a continuous and uniform series of separated pieces should be fed to the grading cylinders. The first pair of cylinders, which may be termed feeding or spacing cylinders are preferably provided with a right and left hand helically ridged surface of progressively increasing pitch. In Fig. 9, I have shown such cylinders provided with helical ridges consisting at the beginning of the cylinder of a single thread helix, changing into a double and progressively into a multiple thread of greater pitch. This separating of the pieces on the first section is usually advantageous without regard to the form or character of the material to be operated upon, so that it will seldom be necessary to make any great variation in the initial cylinders from that described, except that it is advisable when handling soft or bruisable fruit to make the helical corrugations of yielding or resilient material, such for example, as rubber, felt, or the like.

In Fig. 8 I have shown a modification of the spacer or separator, consisting of smooth surface truncated cones. These may be set at a slight downward angle from the feed chute to the first cylinders. This form may be used on material which would be deleteriously affected by the helical ridges.

In operation, the material to be graded having been supplied to the hopper or chute and the cylinders put in oppositely rotational movement by the power connection, the fruit or other material rolls down upon the feed cylinders. Owing to the increasing pitch of the threads thereon, the pieces of fruit are advanced with greater speed as they travel along the cylinders and consequently they are separated from each other by a continually increasing distance until they reach the first grading cylinder upon which they are fed. They then progressively advance and drop through the widening spaces as they reach them. The pieces are caused to rotate or not as required, depending upon the character of cylinders, as heretofore described.

Any change in the motion of the fruit may be brought about by changing the character of the cylinders and this is accomplished by merely lifting out one or more of the cylinders. This may be done without stopping the machine if desired. Substitution of an appropriate cylinder can then be made.

When it is necessary or desirable to shorten the machine, the bolts 20 are loosened on the

section to be removed and that section taken away. This change in no wise affects the remaining sections except in the obvious manner of reducing the number of grades. The lengthening of the machine is simply the converse of that just described.

What I claim, is:—

1. A grading machine comprising a suitable frame and rotatable parallel sizing cylinders supported in said frame provided with threads of different pitch and of substantially uniform depth throughout.

2. A grading machine comprising a suitable frame and rotatable parallel sizing cylinders supported in said frame provided with threads of different and opposite pitch and of substantially uniform depth throughout.

3. A grading machine comprising a suitable frame and oppositely rotatable parallel sizing cylinders supported in said frame provided with threads of different pitch and of substantially uniform depth throughout.

4. A grading machine comprising a suitable frame and rotatable parallel sizing cylinders supported in said frame provided with threads of different and increasing pitch and of substantially uniform depth throughout.

5. A grading machine comprising a frame and rotatable parallel sizing cylinders supported in said frame provided with threads of different, opposite and increasing pitch and of substantially uniform depth throughout.

6. A grading machine comprising a frame and oppositely rotatable sizing cylinders horizontally supported in said frame provided with threads of different and increasing pitch and of substantially uniform depth throughout.

7. A grading machine comprising a suitable frame and oppositely rotatable parallel sizing cylinders supported in said frame provided with threads of opposite and increasing pitch and of substantially uniform depth throughout.

8. A grading machine comprising a frame and oppositely rotatable sizing cylinders horizontally supported in said frame provided with threads of opposite, different and increasing pitch and of substantially uniform depth throughout.

9. A grading machine comprising a series of units, each unit consisting of a frame and a pair of parallel cylinders loosely supported upon rotatable bearing rolls secured upon suitable shafts journaled thereon and means for connecting the shafts supporting adjacent cylinders in driving association with each other, the members of succeeding pairs being differently spaced to form a succession of varying grading spaces, for the fed material traveling the successive pairs of rolls from the feed end.

10. A grading machine comprising a series of units, each unit consisting of a frame and a

pair of parallel cylinders loosely supported upon rotatable bearing rolls journaled thereon, the units forming independently removable sections, means for driving the bearing rolls and suitable connecting means between the rolls whereby the driving of one section affects the driving of the rolls of adjacent sections.

11. A grading machine comprising a series of units, each unit consisting of a frame and a pair of parallel cylinders loosely supported upon rotatable bearing rolls journaled thereon, the units forming independently removable sections, means for driving the cylinders of one section and means connecting each section whereby the driving mechanism of one section effects the driving of the cylinders of adjacent sections.

12. A grading machine comprising a suitable frame, a series of pairs of rotatable sizing cylinders supported in said frame, the members of each pair being parallel and being provided with a thread of different pitch, the distance between the members of each succeeding pair being progressively wider.

13. A grading machine comprising a series of units, each unit consisting of a suitable frame and a pair of parallel rotatable cylinders supported thereon, the units forming independently removable and interchangeable sections, the distance between the members of each succeeding pair being progressively wider, means for driving the cylinders of each section and suitable connecting means between the driving mechanism of each section whereby the driving of one section effects the driving of the cylinders of adjacent sections.

14. In a grading machine, a feeder thereto comprising a pair of laterally adjacent cylinders provided with a multiple thread of increasing pitch.

15. In a grading machine, a feeder thereto comprising a pair of laterally adjacent rotatable cylinders provided with a yielding or resilient multiple thread of increasing pitch.

16. A grading machine comprising a series of independently detachable sections, one of said sections, being provided with a pair of laterally adjacent rotatable cylinders provided with a thread of increasing pitch, the ends of each pair of cylinders being operatively adjacent to permit material discharged from one pair of cylinders to be received directly on the succeeding pair, the distance between the members of each succeeding pair being progressively wider.

17. A grading machine comprising a series of independently detachable sections, one of said sections being provided with a pair of laterally adjacent rotatable cylinders provided with a thread of increasing pitch, the ends of each pair of cylinders being operatively adjacent, to permit material discharged from one pair of cylinders to be received directly on the succeeding pair, the distance between the members of each succeeding pair being progressively wider and means for connecting said sections in operative driving association with each other.

18. A grading machine comprising a series of units, each unit consisting of an independent frame and a pair of parallel cylinders loosely supported upon rotatable bearing rolls secured upon suitable shafts journaled on the frame, the units forming independently removable sections, the distance between the members of each succeeding pair being progressively wider, a driving shaft to each section axially offset to the driving shaft of the adjacent section and a suitable coupling or connection between the offset adjacent ends of the driving shafts whereby the driving of the shaft of one section effects the driving of the shaft of the adjacent section; for the fed material traveling the successive pairs of rolls from the feed end.

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