

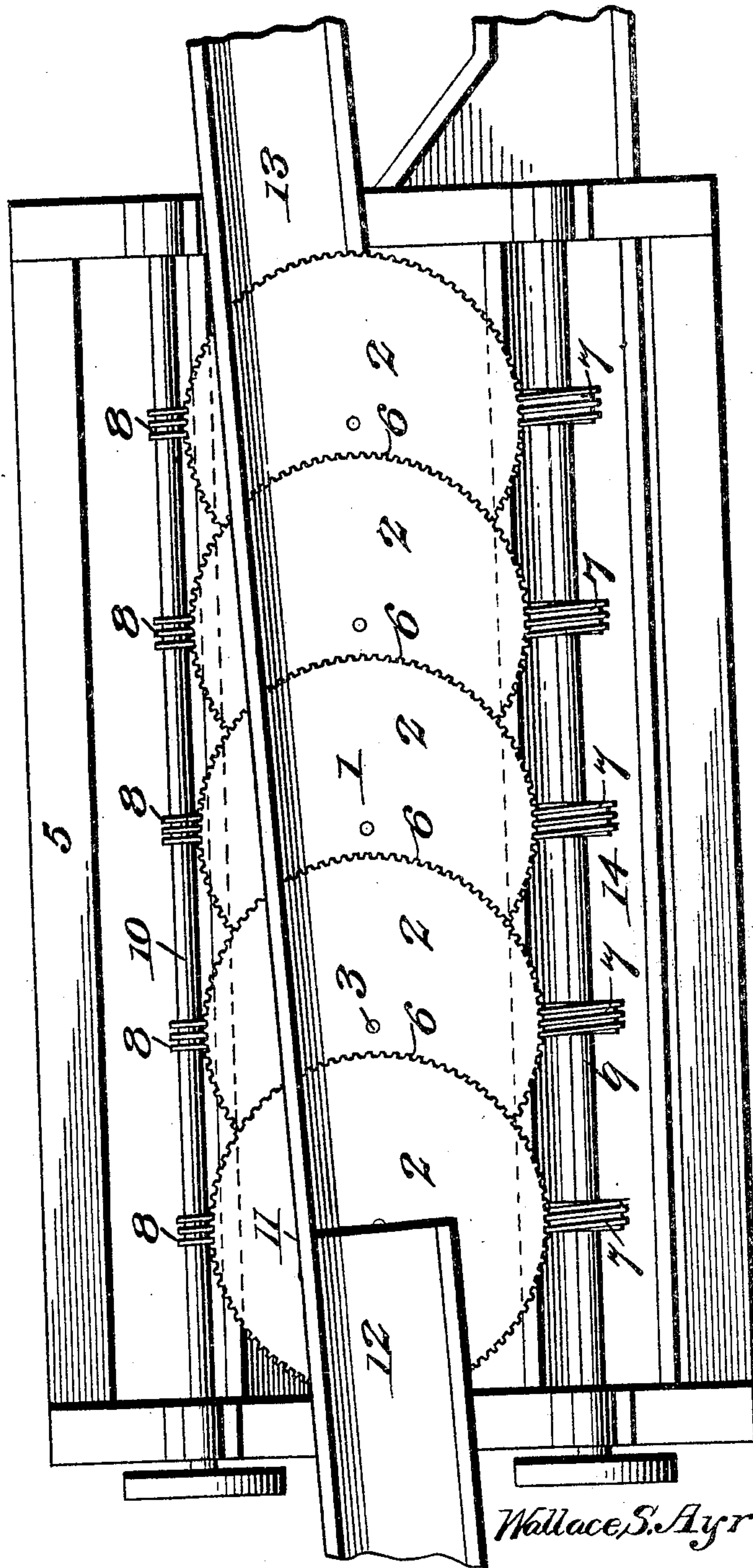
No. 798,315.

PATENTED AUG. 29, 1905.

W. S. AYRES.  
SEPARATING MACHINE.  
APPLICATION FILED DEC. 15, 1900.

3 SHEETS—SHEET 1.

Fig. 1.



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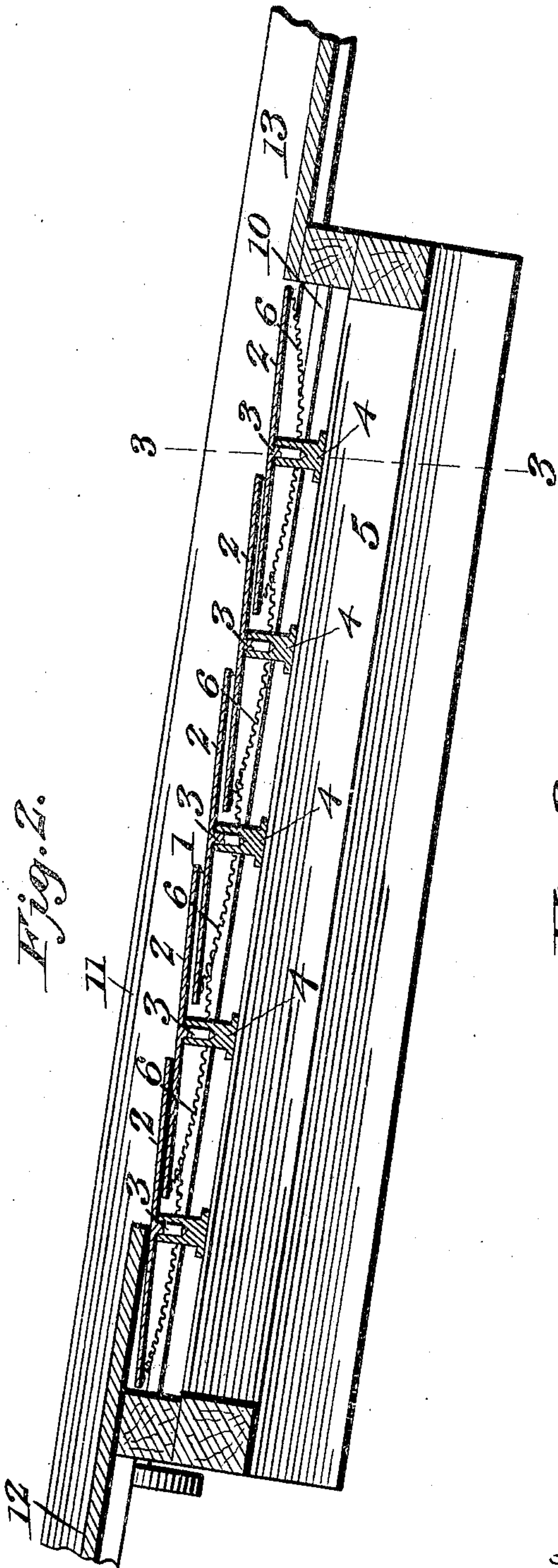
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*D. J. Holman*

No. 798,315.

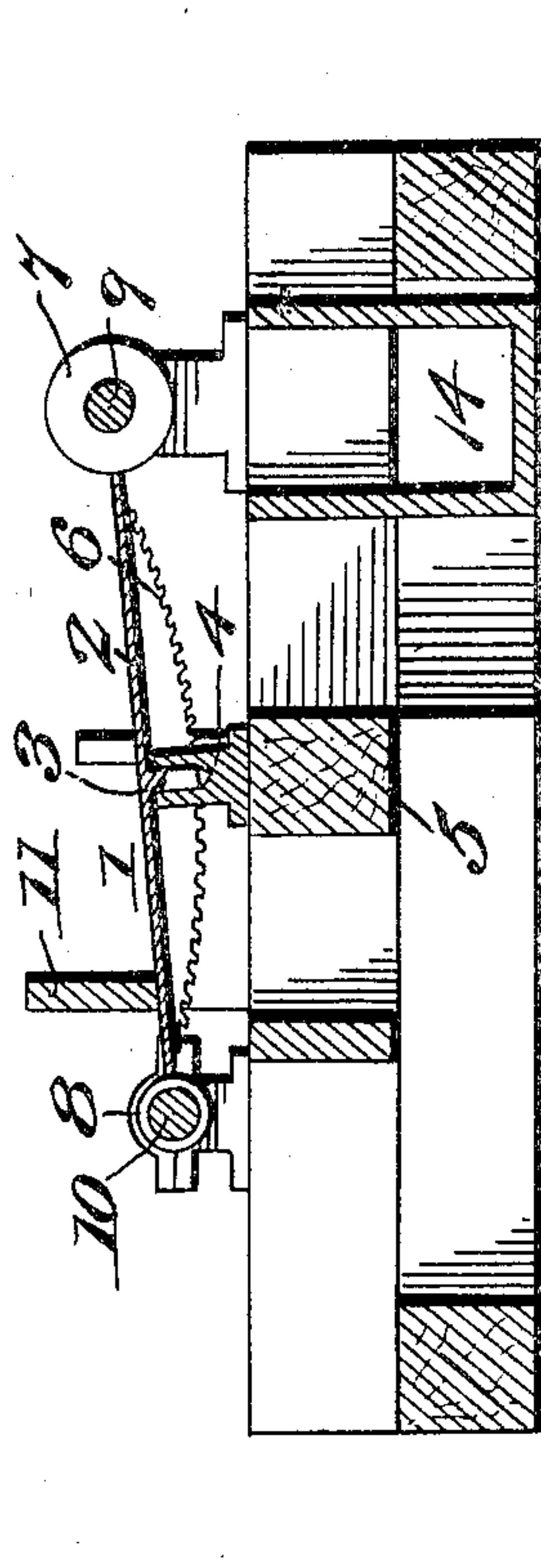
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3 SHEETS—SHEET 2.



*Fig. 3.*



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3 SHEETS—SHEET 3.

Fig. 4.

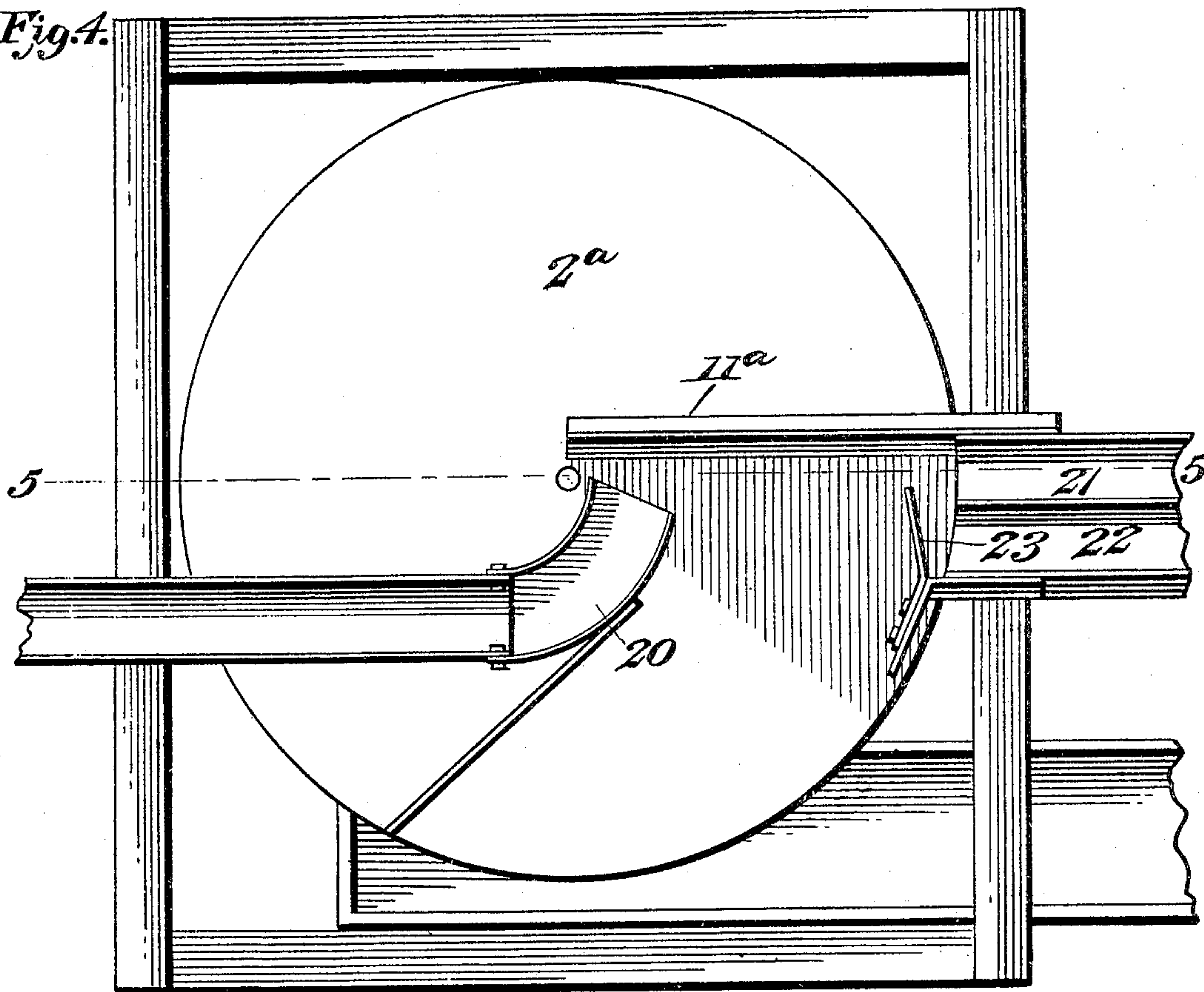
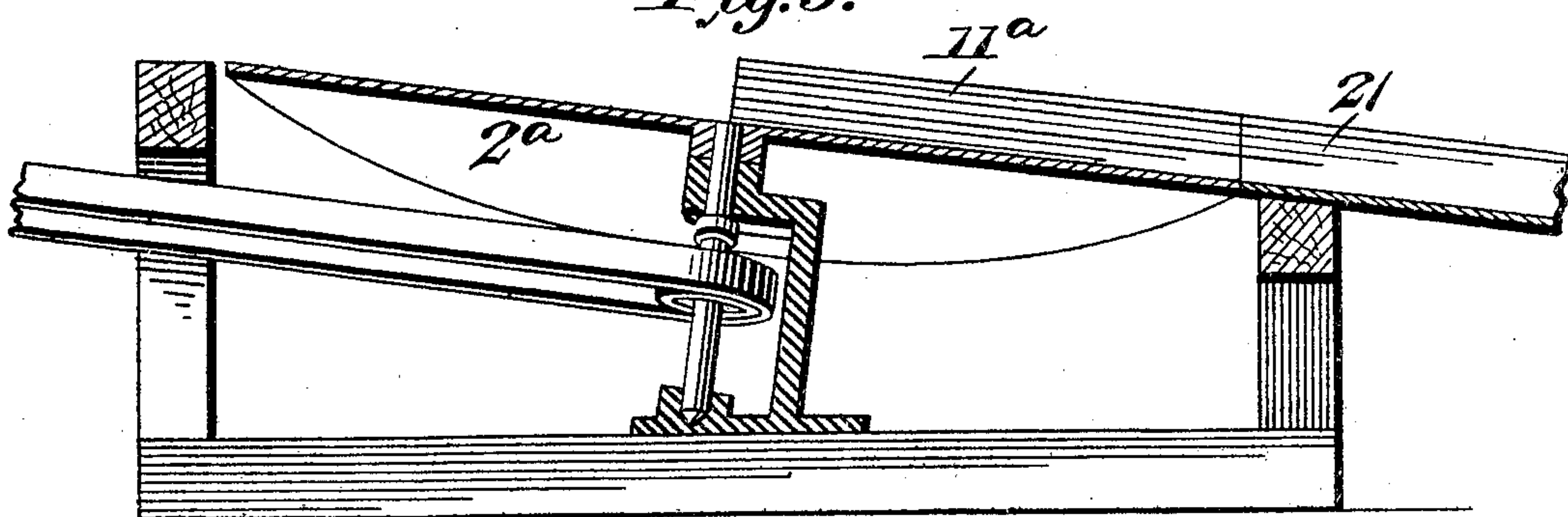


Fig. 5.



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# UNITED STATES PATENT OFFICE.

WALLACE S. AYRES, OF HAZLETON, PENNSYLVANIA.

## SEPARATING-MACHINE.

No. 798,315.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed December 15, 1900. Serial No. 39,999.

*To all whom it may concern:*

Be it known that I, WALLACE S. AYRES, a citizen of the United States, residing at Hazleton, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Separating-Machine, (Case B,) of which the following is a specification.

This invention relates to machines for separating coal and other minerals or substances, and has special reference to that type of separators embodying means for effecting a separation by gravity or friction or by a combination of either or both with specific gravity.

The invention has for its object to provide for a maximum thoroughness of separation, besides accomplishing it in a more economical manner than heretofore, as well as permitting of the construction of a separator-machine which will occupy much less height and floor-space than those now in use. These results are accomplished by providing for carrying out the operation of separating the materials through the influence of two forces, maintaining two principal motions, one of which causes the material under treatment to move forward, while the other acts upon it transversely at any desired angle. In other words, the separation is to be effected by those pieces or particles having but little frictional resistance following one force or motion, while those having a greater frictional resistance follow the other.

More directly, the present application involves another embodiment of the invention broadly set forth and claimed in a companion application, Serial No. 47,308, filed February 14, 1901. In this companion application are embodied the features generic to all forms of the invention, while the present case presents a simple and efficient type of machine which effects a separation by utilizing the broad idea of the invention in an economical and practical manner.

With these and other objects in view, which will be readily apparent as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The specific type of machine forming the subject-matter of the present application is also necessarily susceptible to a variety of modifications without departing from the

spirit or scope of the invention; but the preferred form of the machine is shown in the accompanying drawings, in which—

Figure 1 is a plan view of a separating-machine constructed in accordance with the present invention. Fig. 2 is a longitudinal sectional view thereof, showing the forward inclination of the separating-floor to provide for maintaining the forward motion of the stream of material by gravity. Fig. 3 is a transverse sectional view on the line 3 3 of Fig. 2, showing more plainly the transverse inclination of the floor with reference to the guide to maintain the line of movement of the main stream of material against or along with said guide. Fig. 4 is a plan view of another form of machine in which a single revoluble disk constitutes the separating-floor. Fig. 5 is a transverse sectional view on the line 5 5 of Fig. 4.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

As set forth in the other application aforesaid, the present invention involves as fundamental thereto a separating-floor which is inclined transversely to the line of movement of the stream of material and, in a more restricted aspect, a separating-floor which is inclined in two directions to insure a complete carrying forward of all particles or substances having a less angle of repose than the transverse inclination of the floor.

In embodying the above-recited features in the form of machine shown in Figs. 1 to 3 the separating-floor (designated in its entirety by the numeral 1) is made up of a series of overlapping revoluble disks 2, preferably provided with flat or conical surfaces, which may be smooth, roughened, or otherwise formed to permit of certain particles or substances freely passing thereover, while others are frictionally engaged by the surfaces of the disks and are moved out laterally from the main stream of material, which traverses the entire floor in a forward or longitudinal direction. It is unimportant to the successful carrying out of the invention precisely how the revoluble disks 2 are constructed or mounted; but for illustrative purposes each of the disks 2 is shown as provided with a central journal 3, mounted in a suitable fixed bearing 4, fitted to a supporting-frame 5, which supporting-frame may be horizontal or in-



clined, so long as provision is made whereby when the forward motion of the stream of material is to be produced by gravity the complete separating-floor, made up of the series of disks 2, may be inclined in a forward direction. For that reason the frame 5 is shown in Fig. 2 of the drawings as longitudinally inclined to exemplify the feature of producing the forward motion of the stream of material by gravity. Any suitable means may be utilized to impart a synchronous movement to the individual separating or conveying disks 2; but a simple means for accomplishing this result is shown in the drawings and resides in providing the peripheral edges of the disks with worm-teeth 6, engaged by the worms 7 and 8, carried, respectively, by the shafts 9 and 10, disposed longitudinally of the supporting-frame and arranged at opposite sides of the longitudinal plane of the separating-floor 1. The oppositely-located worms insure a steady and even movement of the individual disks 2, although it will be understood that any gearing or turning mechanism may be employed in connection with said disks to insure the necessary synchronous and steady movement thereof.

The bearings or supports for the individual disks 2 are preferably longitudinally aligned, so that there will be a succession of these disks, one in advance of the other, and in overlapping relation, so as to provide a substantially continuous floor over which the main stream of material may freely travel, while slate and other foreign substances will frictionally engage with the surfaces of the individual disks and be moved laterally thereby out of the path of the main stream of material.

In connection with the form of machine illustrated there is associated with the separating-floor 1 a guide 11, extending longitudinally of the floor and preferably arranged obliquely across the same to provide a guideway in which the main stream of material is positively held and guided from its entrance through the feed-spout 12 at the upper end of the floor to its delivery into the discharge chute or trough 13 at the lower end of the floor to receive the coal, which has maintained its travel across the entire floor. The slate and other substances which are worked out laterally from the main stream of material by the rotatable individual disks 2 are dropped over the edge thereof into the longitudinally-arranged discharge-trough 14, which extends longitudinally of the supporting-frame and serves to receive and carry off the separations from the grades of coal following the line of movement of the main stream along the guide 11.

It is to be observed that in the form of machine shown in Figs. 1 to 3 of the drawings the complete separating-floor 1, made up of the overlapping revoluble disks 2, is not only

inclined in a forward direction, but also transversely toward the guide 11, thus involving the same combination, in a broad sense, as disclosed in the companion application aforesaid. It should also be noted, however, in the present invention that the angle of inclination in the trough formed by the guide 11 and the surfaces of the disks 2 is a trifle less than the angle of repose of the pieces or particles having the greater frictional resistance, but at the same time a little greater than the angle of repose of those having the least frictional resistance, thus insuring a positive feed of the coal and other good material against and along the guide and the lateral movement or separation of the slate and other foreign substances therefrom. The general transverse inclination of the individual disks toward the guide 11 is designed to be adjusted in any suitable manner and is necessarily sufficiently less than the angle of repose of the pieces or particles having the greater frictional resistance so that such pieces or particles will adhere to the surfaces of the revolving disks and be carried sidewise out of the stream of moving material. This inclination of the disks, however, must at the same time be slightly greater than the angle of repose of the pieces or particles having the least frictional resistance, so that such pieces or particles will always travel along the guide. With reference to this guide it may be stated, as in the other case aforesaid, that the same may be straight, curved, or broken and set at any angle of obliquity with reference to the longitudinal plane of the separating-table over which it is placed.

While in the form of machine described the separating-floor is illustrated as being made up of a series of overlapping revoluble disks, it will be obvious that the invention could be carried out by the employment of a single revoluble disk 2<sup>a</sup>, as shown in Figs. 4 and 5 of the drawings. This disk is, of course, to be of a sufficient size to permit of the separating action being accomplished and is not only inclined in a forward direction, but also laterally or transversely with reference to the guide 11<sup>a</sup>. In connection with the form of machine involving the single disk 2<sup>a</sup> there is preferably associated a feed-spout 20, arranged to direct the material against the upper end portion of the guide 11<sup>a</sup>, while contiguous to the lower end of this guide are arranged the discharge-chutes 21 and 22. These discharge-chutes are disposed side by side, and in front of the mouth or entrance to one of the chutes—namely, the chute 22 for impure coal—there is preferably located a regulating-shutter 23, this combination and arrangement of parts being substantially the same as disclosed in my companion application aforesaid.

Various modifications of the motions herein



described may be resorted to without departing from the spirit or scope of the invention, and it will be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a separator of the character described, a separating-floor comprehending a rotary disk, and a guide disposed to direct a stream of material over the disk, said disk being downwardly inclined toward the guide to compel a portion of the material to remain adjacent to the guide during its movement across the disk, while another portion of the material is carried away from the guide by the movement of the disk.

2. In a separator of the character described, a separating-floor comprehending a rotary disk, and a guide arranged thereover to direct a stream of material over the floor, said disk being downwardly inclined in the direction of movement of the stream to facilitate the gravitation thereof, and said disk being also inclined transversely of the guide, substantially as and for the purpose specified.

3. In a separator of the character described, a separating-floor comprehending a rotary disk, a straight guide located thereover for the purpose specified, said disk being inclined both longitudinally and transversely of the guide, as described, means for rotating the disk, a feed-spout and a discharge-chute adjacent to the opposite ends of the guide, and a receptacle disposed adjacent to the highest portion of the disk to receive the material separated from the stream.

4. In a separator of the character described, a separating-floor comprising a plurality of flat disks.

5. In a separator of the character described, a separating-floor comprising a plurality of flat rotary disks arranged successively one in advance of the other.

6. In a separator of the character described, a separating-floor comprising a plurality of flat rotary disks arranged in closely-contiguous relation one in advance of the other, and means for effecting the synchronous rotation of the disks.

7. In a separator of the character described, a separating-floor comprising a series of flat rotary disks arranged successively one in advance of the other, the contiguous edges of said disks being in lapping relation.

8. In a separator of the character described, a separating-floor transversely inclined downwardly toward a stream of material passed thereover, and comprising a series of flat rotary disks arranged successively one in advance of another.

9. In a separator, a separating-floor downwardly inclined with respect to the advance of a stream of material passed thereover, and also transversely inclined downwardly toward said stream, said floor comprising a series of disks arranged successively one in advance of the other.

10. In a separator of the character described, a separating-floor downwardly inclined in the direction of the advance thereover of a stream of material and also downwardly inclined toward the stream in a direction transverse thereto, said floor being composed of a series of flat rotary disks having their contiguous edges in lapping relation.

11. In a separator of the character described, a separating-floor downwardly inclined in the direction of the advance thereover of a stream of material and also downwardly inclined toward the stream in a direction transverse thereto, said floor being composed of a series of flat rotary disks having their contiguous edges in lapping relation, and means for effecting the synchronous rotation of the disks.

12. In a separator of the character described, a separating-floor comprising a plurality of flat rotary disks arranged successively one in advance of another, and a guide disposed over the floor to direct a stream of material supported by said floor.

13. In a separator of the character described, a separating-floor comprising a series of flat rotary disks arranged successively one in advance of another, and a straight guide extending longitudinally over the floor, said floor being transversely inclined downwardly toward the guide.

14. In a separator of the character described, a separating-floor inclined longitudinally and comprising a series of flat rotary disks arranged successively one in advance of another, and a straight guide disposed longitudinally of the floor to direct a stream of material supported by said floor.

15. In a separator, a separating-floor comprising a series of disks arranged successively one in advance of the other and inclined longitudinally, and a straight guide extending continuously over the series of disks, said floor being also transversely inclined downwardly toward the guide.

16. In a separator, a separating-floor comprising a series of disks arranged successively one in advance of the other and inclined longitudinally, a straight guide extending continuously over the series of disks, said floor being also transversely inclined downwardly toward the guide, and means for rotating the disks to cause their advanced portions to move laterally away from the guide for the purpose of effecting the separation.

17. In a separator, a forwardly and transversely inclined separating-floor comprising a plurality of synchronously-rotatory indi-

vidual disks arranged successively one in advance of the other in overlapping relation, a guide extending obliquely across the floor and following the forward inclination thereof, and  
5 separate chutes arranged respectively at the lower end of the floor and at one side of the series of disks.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WALLACE S. AYRES.

Witnesses:

JAMES H. LAUGHRAN,

WM. J. SCHMIDT.