

(No Model.)

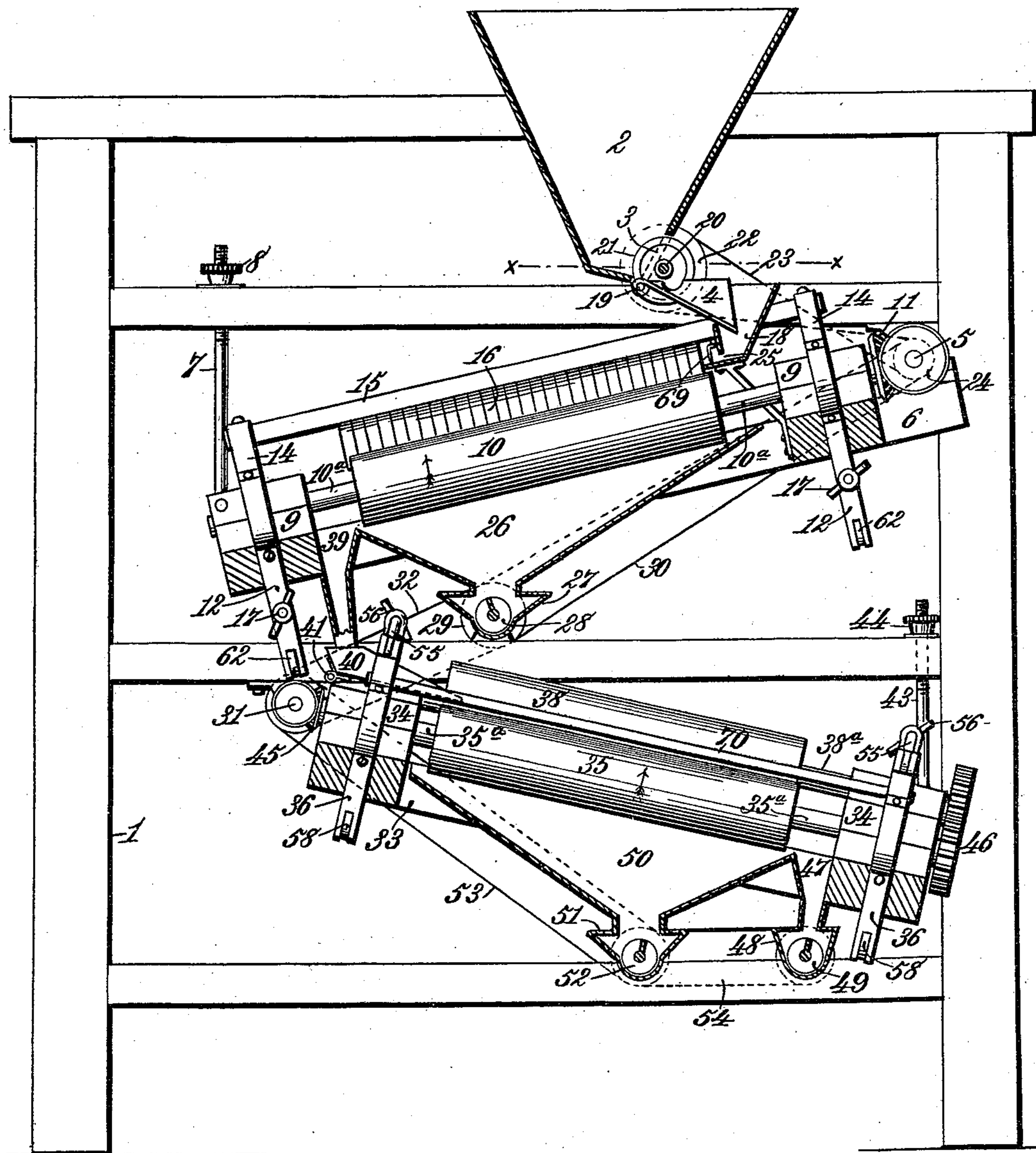
3 Sheets—Sheet 1.

DE WITT C. BREED.  
BEAN SEPARATING MACHINE.

No. 532,944.

Patented Jan. 22, 1895.

*Fig. 1.*



Witnesses.

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By

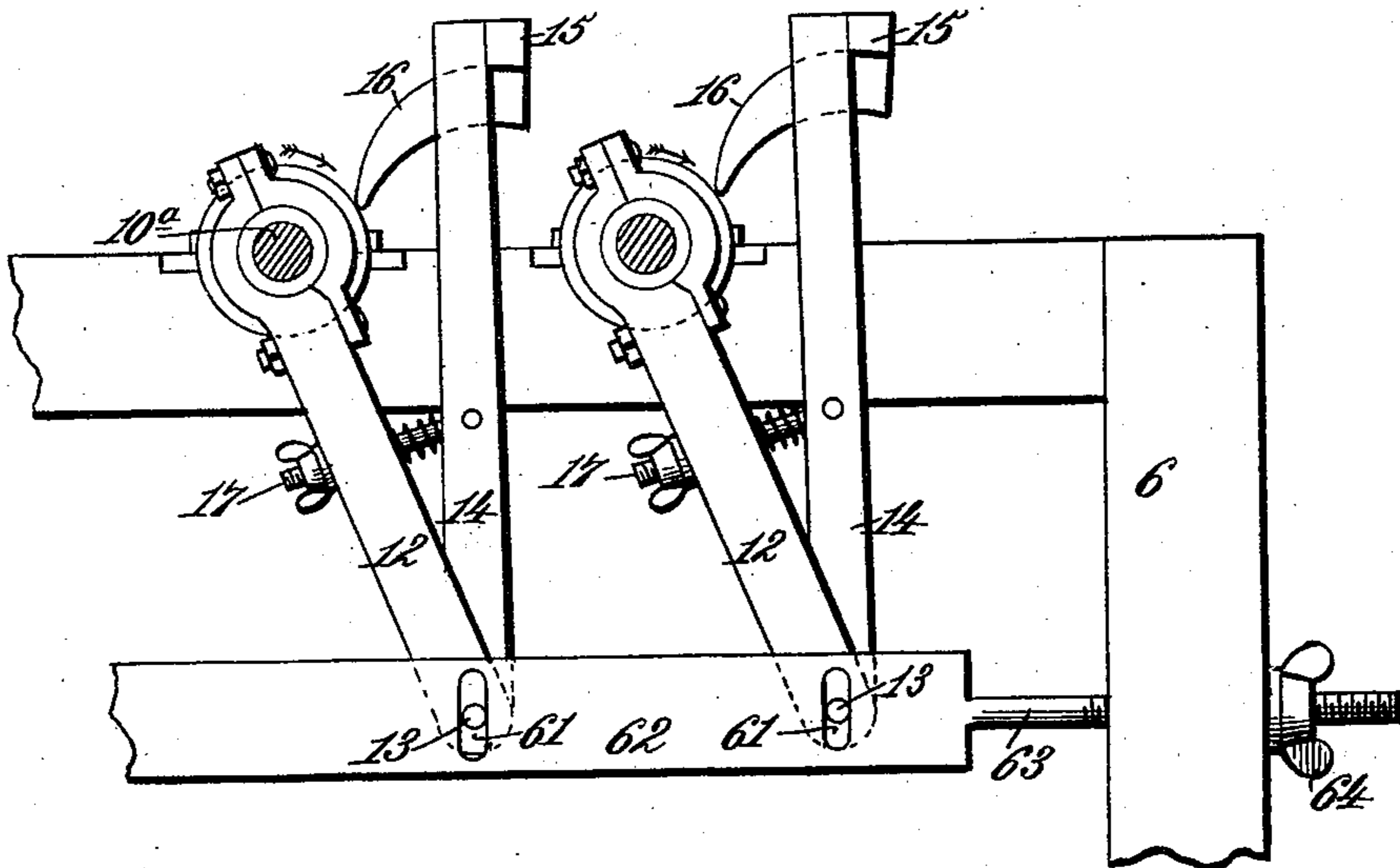
*James L. Norris*  
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DE WITT C. BREED.  
BEAN SEPARATING MACHINE.

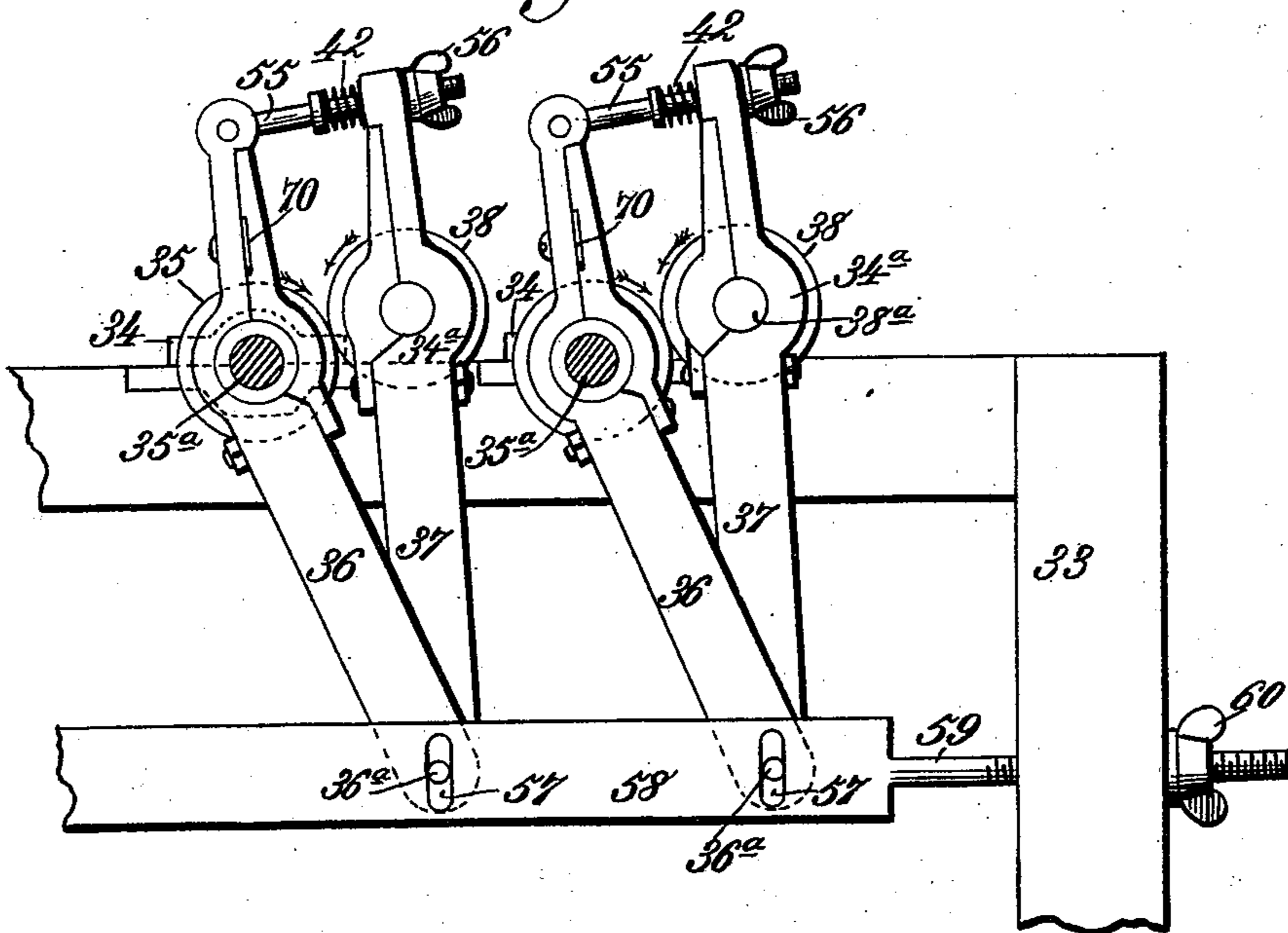
No. 532,944.

Patented Jan. 22, 1895.

*Fig. 2.*



*Fig. 3.*



Witnesses.

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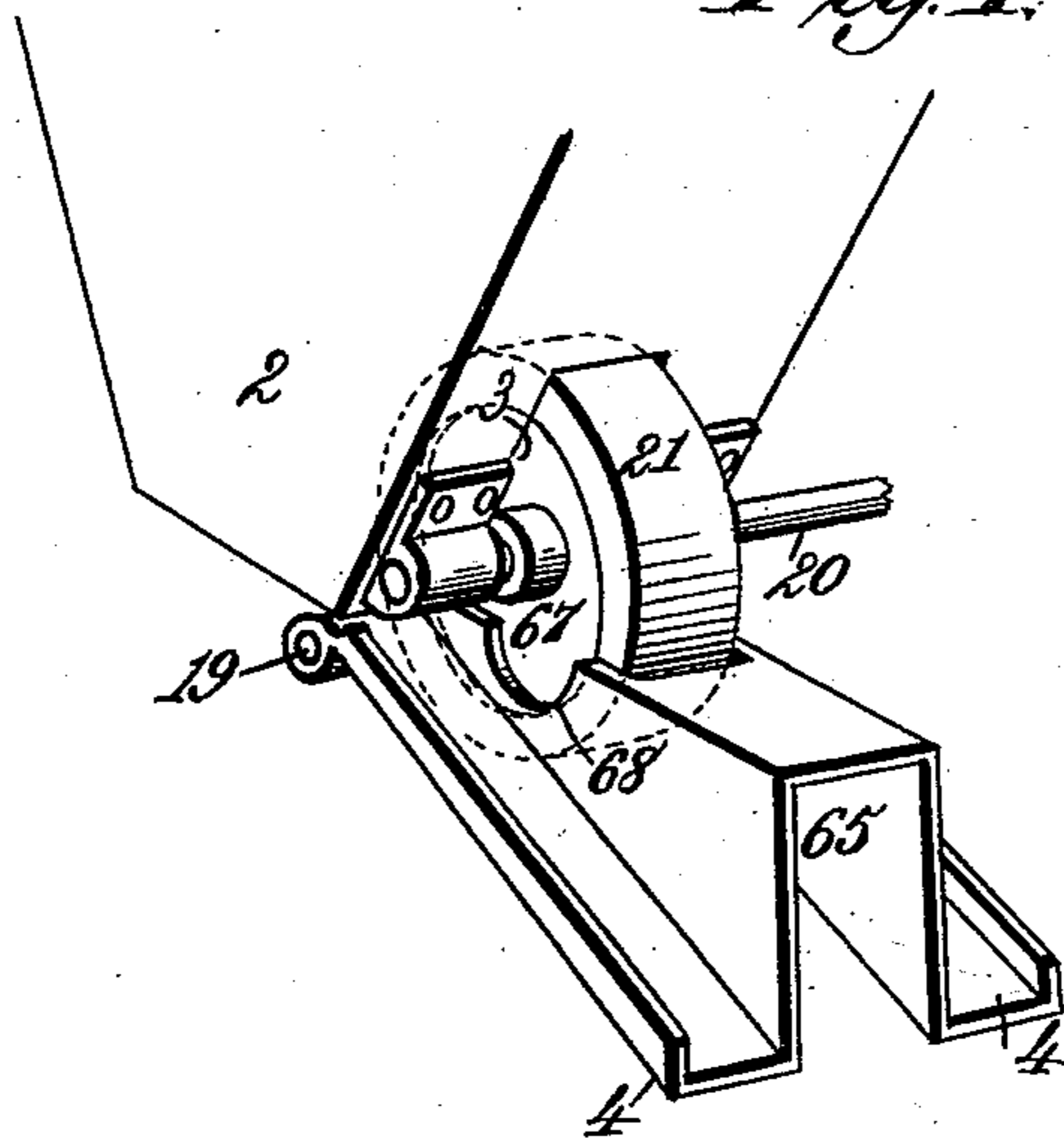
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DE WITT C. BREED.  
BEAN SEPARATING MACHINE.

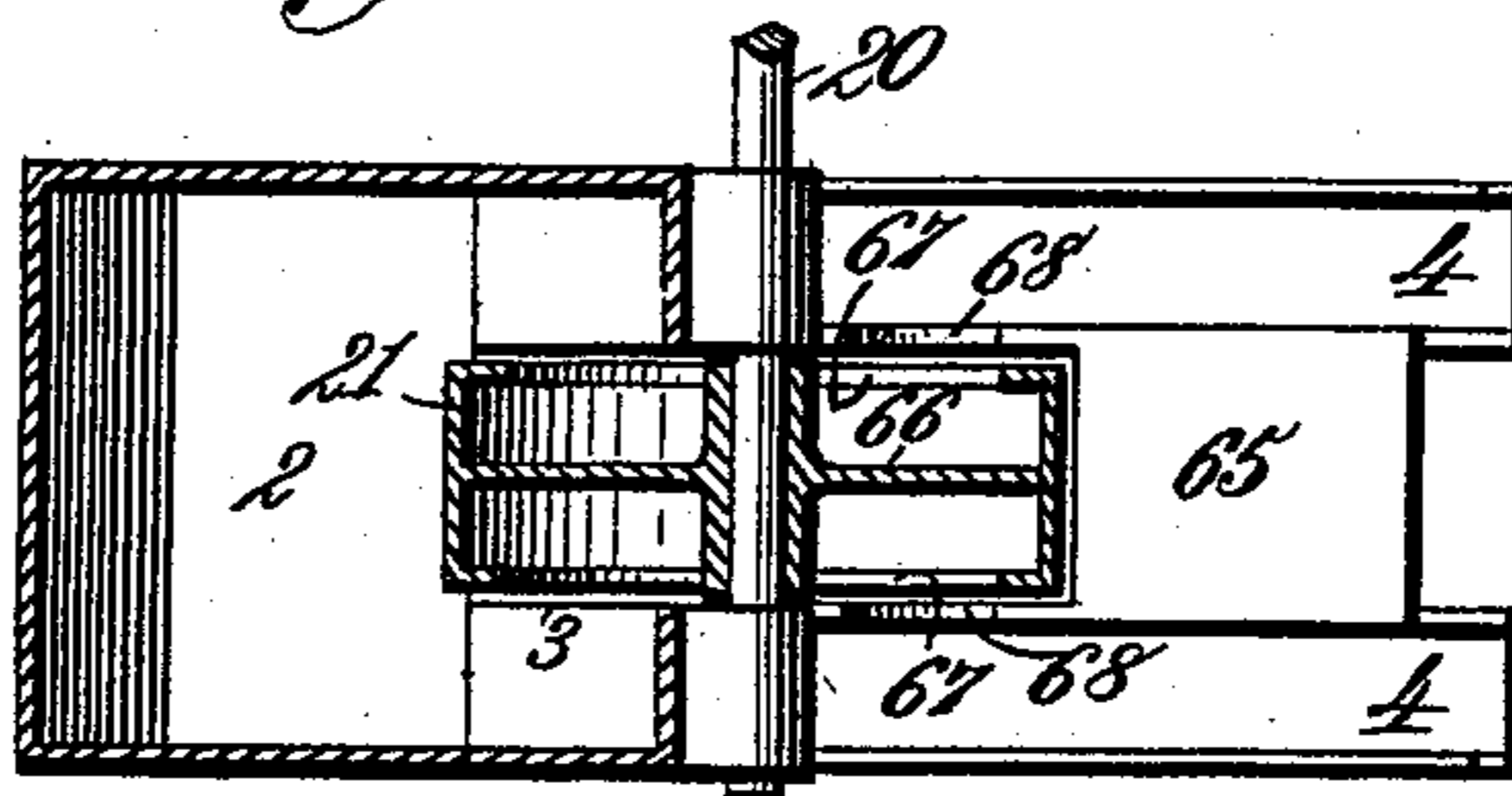
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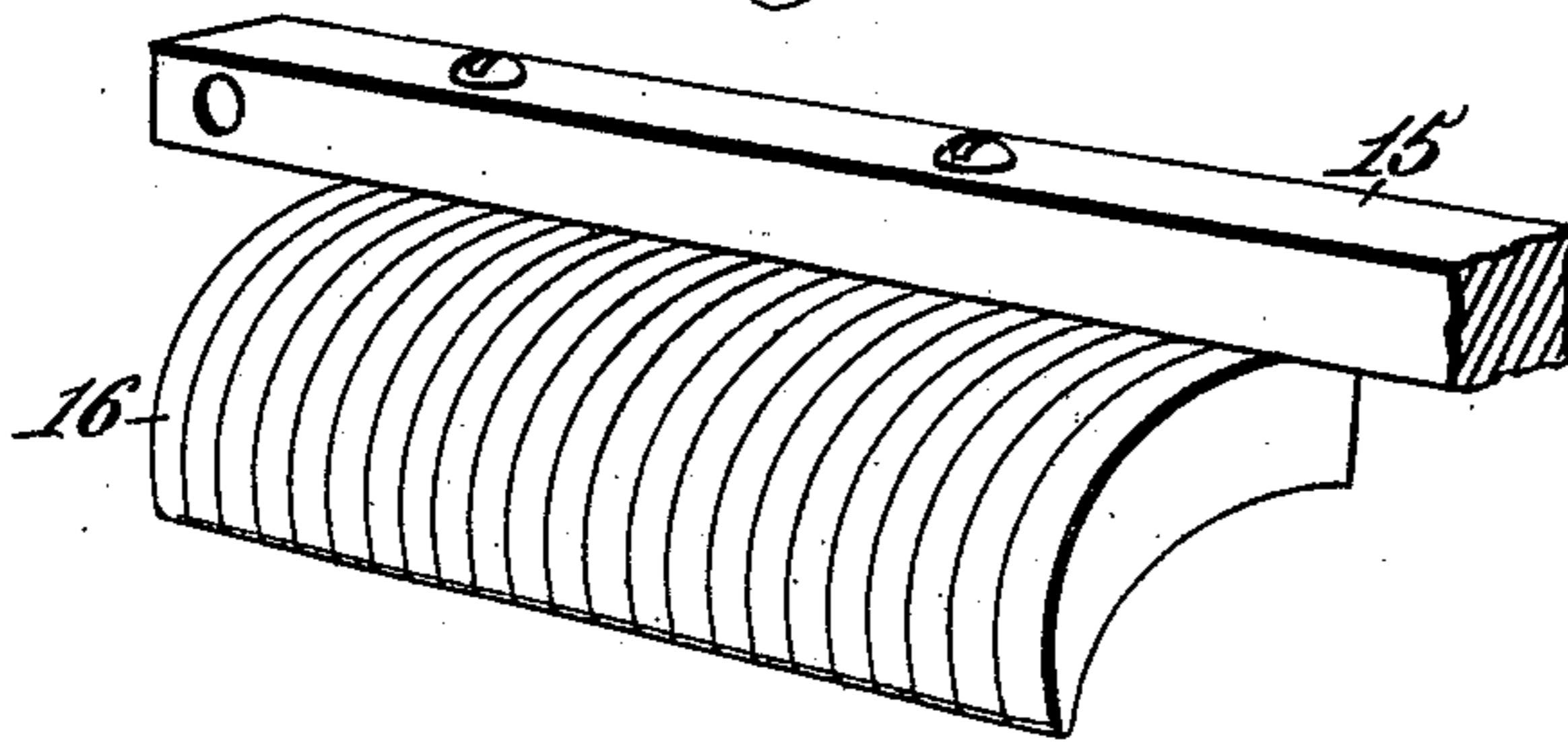
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



*Witnesses.*

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# UNITED STATES PATENT OFFICE.

DE WITT C. BREED, OF MEDINA, NEW YORK.

## BEAN-SEPARATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 532,944, dated January 22, 1895.

Application filed April 13, 1892. Renewed June 14, 1894. Serial No. 514,611. (No model.)

*To all whom it may concern:*

Be it known that I, DE WITT CLINTON BREED, a citizen of the United States, residing at Medina, in the county of Orleans and State of New York, have invented new and useful Improvements in Bean-Separating Machines, of which the following is a specification.

This invention relates to a machine for rapidly and thoroughly separating perfect and merchantable beans, or similar agricultural products, from dirt, refuse and defective, imperfect or unsalable material at small expense.

The invention consists in certain features of construction and novel combinations of devices in a separating machine as will be hereinafter described and claimed.

In the annexed drawings illustrating the invention—Figure 1 is a partly sectional side elevation of a machine embodying my improvements and adapted to the separation of beans and similar products. Fig. 2 is an end elevation of the upper separating devices. Fig. 3 is an end elevation of the lower separating devices. Fig. 4 is a perspective of a portion of the feed devices. Fig. 5 is sectional plan of the same on the line  $x-x$  of Fig. 1. Fig. 6 is a perspective of an elastic separating comb or card.

Referring to the drawings, the numeral 1, Fig. 1, designates a suitable frame for supporting the operative parts of the machine. In or upon the upper part of this frame is a supply hopper 2 in which are placed the beans to be separated. The lower part of the hopper 2 is provided on one side with an exit opening 3 communicating with a spout 4 through which the beans are conducted in passing to the separating devices.

In one side of the main frame of the machine is journaled a main driving shaft 5 from which the separating rollers and auxiliary screw conveyers, hereinafter described, are primarily actuated. On this main driving shaft 5 is hinged or pivotally supported one end of an adjustable inclined frame 6 which, as shown, is suspended at its other end from a vertically adjustable rod or hanger 7 depending from the upper part of the machine frame and provided with a screw threaded portion on which is mounted a nut or hand-wheel 8 for adjusting the frame 6 to a more

or less inclined position, as required. The adjustably inclined frame 6 is provided at its opposite ends with boxes 9 to receive the journals of a roller 10 that forms a part of the separating mechanism. This roller 10 is driven by bevel gearing 11 from the main driving shaft 5, as shown. On the roller journals 10<sup>a</sup> are pivotally supported the upper ends of swinging arms 12 to the lower ends of which are hinged or pivoted, at 13, Fig. 2 the lower ends of adjustable arms 14 to the upper ends of which is rigidly secured a bar 15 that is arranged parallel with but above and to one side of the roller. To this bar 15 is securely attached a comb or card 16 Fig. 6 consisting of a series of closely set teeth composed of rubber or other suitable yielding and elastic material.

The yielding teeth of the comb or card are preferably curved outward and downward from the rigid bar 15, as shown in Figs. 2 and 6, and have their lower ends in more or less proximity to the roller 10 according to the character of the material to be graded or separated by the action of said roller and card. Near their lower ends the pivotally connected bracket arms 12 and 14 are further connected by screw-bolts 17 on which are placed thumb nuts and springs for adjusting said arms toward and from each other so as to vary the proximity of the roller 10 and comb 16 with relation to each other, as may be required in order to effect a separation of the smooth and perfect beans from those that are rough, rusty or damaged.

The upper portion of the adjustably inclined frame 6 carries a supplemental hopper or chute 18 Fig. 1, which is so constructed as to receive on one side the discharge end of the spout 4 through which the beans are conducted from the main supply hopper 2, before described. The spout 4 is connected at one end by a hinge 19 to the lower end of the hopper 2 and at the other end is supported by the hopper or chute 18 so that communication between said spout 4 and hopper 18 will not be affected by adjustments in the inclination of the frame 6 by which the roller 10, comb 16 and hopper 18 are supported. Across the upper end of the spout 4 is mounted a shaft 20 carrying a hollow feed wheel 21 that works

partly in the exit opening 3 of the supply hopper 2 for the purpose of conveying beans from said hopper into the spout 4 and thence to the chute 18 by which they are delivered to the separating devices. The shaft 20 of the feed wheel 21 is provided with a pulley or band wheel 22 driven by belting 23 from a pulley 24 on the main driving shaft.

In the lower portion of the hopper or chute 18 is a feed opening 25 through which the beans are discharged into the angle or trough formed by the converging curved surfaces of the roller 10 and adjacent comb 16, and as it will be understood that the said roller is geared and actuated in such manner as to rotate toward the said comb it will be seen that the beans will be retained in this angle or trough as they pass along down the inclined roller from its upper to its lower end. During this rolling movement of the beans in the trough or angle between the inclined roller 10 and elastic comb 16 the rough and irregular surfaces of the rusty or imperfect beans will come in frictional contact with the rotating roller 10 and by this means the defective or refuse beans will be carried or forced through the narrow space between the roller and comb and be discharged beneath the same. To assist the inclined roller 10 in its work of arresting the free passage of rough imperfect beans, dirt and extraneous substances, the said roller may have a facing of rubber or other elastic or frictional material, or, if preferred, it may be wholly composed of such material.

It will be observed that while the comb 16 assists in forming with the roller an inclined trough or way for the beans and a guard to retain the perfect and smooth faced beans in said trough its individual teeth are capable of separately and independently yielding to permit the passage and separation of rough imperfect beans and extraneous substances without exposing either the roller or the comb to the injurious and wearing effects of friction.

The imperfect beans and refuse material separated by the joint action of the roller 10 and comb 16 drop into a hopper 26 that may be suspended beneath and carried by the adjustable frame 6 or be otherwise supported in any suitable manner. Through this hopper 26 the refuse beans and dirt are received in a trough 27 containing a screw-conveyer 28 on the shaft of which is a pulley 29 through which the conveyer is actuated by belting 30 from the main driving shaft.

The perfect and smooth surfaced beans, which are of marketable quality, meet with no obstruction in their passage along the inclined trough or angle formed by the converging surfaces of the roller 10 and comb 16 and may be received in any suitable receptacle at the lower end of these inclined separating devices. It is obvious that by a suitable adjustment of the rod or hanger 7 any desired inclination can be given to the roller 10 and comb 16 for the purpose of accelerating or re-

tarding the feed of the beans along the separating surfaces. It will also be seen that by means of the thumb nuts on the screw bolts 17 the roller 10 and comb 16 can be adjusted to a more or less close relation with reference to the character and bulk of the refuse material to be separated.

To provide for a more complete separation of the perfect and imperfect beans and obtain a marketable commodity entirely free from dirt, refuse and undesirable material a supplemental or auxiliary arrangement of separating devices may be supported in the lower part of the machine frame. The auxiliary separating mechanism comprises a rotary shaft 31 mounted in suitable bearings below the lower end of the adjustable frame 6 and driven by belting 32 from the shaft of the screw-conveyer 28. On the shaft 31 is hinged or pivoted the uppermost end of an adjustable inclined frame 33 which occupies a reversely inclined position to the frame 6 in which the roller 10 and comb 16 are mounted.

The adjustable inclined frame 33 is provided at its opposite ends with boxes 34 for the journals of a roller 35, and on the journals 35<sup>a</sup> of this roller are pivotally mounted a pair of depending swinging arms 36 the lower ends of which are connected by pivots 36<sup>a</sup>, Fig. 3, to the lower ends of adjustable arms 37 having near their upper ends suitable boxes 34<sup>a</sup> to receive the journals 38<sup>a</sup> of a roller 38 arranged to co-act with the roller 35 for the purpose of effecting a thorough separation of the perfect and imperfect beans. The rollers 35 and 38 may be faced with rubber or other elastic or frictional material or be wholly composed of such a substance. The beans and other material passing from the lower end of the trough formed by the upper roller 10 and comb 16 may be conducted by a spout 39 into a hinged chute 40 which has one end pivoted at 41 to the frame of the machine. The discharge end of this chute 40 is supported in any suitable manner above the inlet end of the angle or trough formed by the converging surfaces of the rollers 35 and 38 which are geared and actuated to rotate toward each other.

While the upper end of the adjustable inclined frame 33 is hinged or pivoted on the shaft 31, as above described, the lower end of said frame is suspended by means of a vertical rod or hanger 43 depending from the framework of the machine and having a screw threaded portion on which is mounted a nut or hand wheel 44 for adjusting or varying the inclination of the frame 33 and rollers 35 and 38 to retard or accelerate the passage of the material under treatment in an inclined direction downward along the trough or angle formed by said rollers. The hinged support of the chute 40 permits this adjustment of the frame 33 without affecting a proper operative relation of the said chute with the spout 39 on one hand or the rollers 35 and 38 on the other. The roller 35 is driven by bevel gear-

ing 45 from the shaft 31 and transmits motion through spur gears 46 to the roller 38 so that both rollers will rotate uniformly and in opposite directions, toward each other. In  
 5 rolling downward along and in the trough or angle of the rollers 35 and 38 the smooth surfaced and perfect or merchantable beans meet with no obstruction and pass off at the lower end through a spout 47 that empties into a  
 10 trough 48 containing a screw conveyer 49 by which the cleansed and sound or perfect beans are taken to a point where they can be collected and packed for market. Any rough, rusty or imperfect beans, together with dirt  
 15 or other refuse, that may pass onto the separating rollers 35 and 38, and which will not be capable of rolling smoothly along in the inclined trough formed by said rollers, will be caught by the frictional surfaces of the  
 20 rotating rollers and carried down into hopper 50 which discharges into a trough 51 provided with a screw-conveyer 52 by which the refuse material is removed to a suitable place of deposit. The screw-conveyer 52 may be driven  
 25 by belting 53 from the shaft 31, and the conveyer 49 by belting 54 from the shaft of the conveyer 52, as shown.

The upper ends of the swinging or adjustable arms 36 and 37 are connected by links or  
 30 screw bolts 55 provided with springs 42 and having threaded portions to engage thumb-nuts 56 by which the arms 36 and 37 can be adjusted on the pivots 36<sup>a</sup> to bring the rollers 35 and 38 closer together or carry them farther apart according to the size or quality of  
 35 the material to be acted upon by said rollers.

The roller 38 is preferably arranged at a somewhat higher level than the roller 35 for the purpose of causing the beans to gravitate  
 40 toward the lowermost roller. By this means the friction on the rough or rusty beans is exerted mostly by the lower roller 35 while the uppermost roller 38 acts chiefly as a guard to retain the body of beans in the inclined  
 45 trough formed by the two rollers. It will be seen that the arrangement of one of these rollers at a higher level than the other throws the exit space between said rollers to one side of the vertical line in which the beans would  
 50 otherwise naturally gravitate; and thus any wedging of the beans in the narrow exit space or angle between the rollers is prevented and the frictional surfaces of the rollers are preserved from undue wear or cutting in proportion to the relief from pressure thereon which  
 55 is thus afforded.

In order to provide for adjusting or varying the relative elevation of the rollers 35 and 38, according to the requirements of the material acted upon, and at the same time protect the roller surfaces from wear, the pivots 36<sup>a</sup> that connect the lower ends of the arms 36  
 60 and 37 are engaged in vertical slots 57 in horizontally and longitudinally movable shifter-bars 58 supported by the adjustable inclined frame 33 and each provided at one end with a threaded stem 59 on which is a thumb-nut

60 for adjusting and securing the rollers 35 and 38 in the desired position with relation to each other.

It will be seen that by moving the shifter-bars 58 longitudinally and thereby oscillating the arms 36 on the journals of the roller 35 the arms 37 will be raised or lowered and thus the relative elevation of the rollers 35 and 38  
 75 can be changed as desired with the effect of causing them to exert more or less friction on the material under treatment. It is obvious that the adjustment of one of these rollers at a higher elevation than its fellow, 80 thereby lessening the friction and pressure, not only tends to preserve the frictional surfaces from wear but also requires the expenditure of less power for operating the machine.

The means thus described for adjusting or 85 varying the relative elevation of the rollers 35 and 38 may also be applied to the roller 10 and comb 16 of the upper separating devices. As shown in Fig. 2 the pivots 13 that connect the lower ends of the adjustable arms 12 and 14 may engage vertical slots 61 in shifter-bars 62 having threaded stems 63 provided with thumb-nuts 64 by which said shifter-bars can be adjusted longitudinally to swing the arms 12 on the journals of the roller 10 and thereby 95 raise or lower the arms 14 to vary the elevation of the comb 16 with relation to the roller 10 and thus increase or diminish the friction exerted by the roller 10 on the material under treatment.

To assist in retaining or guiding the beans in the trough formed by rollers 35 and 38 and prevent them from flying off over the lowermost roller 35 the arms 36 may support a guard plate or strip 70 that can be arranged 105 with its lower edge in suitable proximity to the upper surface of the roller 35 and toward its outer side.

The machine can be constructed with a single roller 10 and its accompanying comb 16 110 and a single pair of auxiliary separating rollers 35 and 38 though I prefer to provide each machine with at least two sets of these upper and lower separating devices, which will be sufficient for handling a small crop. For the purpose of adapting the machine to the handling of large crops in a short time and with small expense the number of separating devices can be increased to any desired extent and may be conveniently arranged in a gang 115 for simultaneous operation from a single prime motor. The main supply hopper 2 and the several screw conveyers can be extended the entire length of a gang machine for use in common with the several sets of separating devices and the shifter bars 58 and 62 can be extended to connect with and simultaneously operate the supports of all the adjustable separating devices.

In Figs. 4 and 5 I have shown a preferred 130 form of feed wheel 21 and double spout 4 arranged in connection with a supply hopper 2 and adapted for feeding to a duplicate set of separating devices placed side by side as

shown in Fig. 2. The double spout 4 is hinged at 19 to the hopper 2 as already described. One side of this spout will be arranged to discharge into a hopper 18, Fig. 1, communicating with a roller 10 and comb 16 and the other side of the double spout will convey the beans or other material through the same hopper, or a different one, to an adjacent roller and comb. The opposite sides of the double spout may be connected by an intermediate hood shaped portion 65 which will enable said spout to straddle the adjacent sides of two hoppers 18 or a partition that may separate such hopper. This central hood shaped portion of the double spout 4 is slotted adjacent to the supply hopper 2 for reception of the feed wheel 21, which is made hollow and divided by a central disk shaped partition 66, as shown. The hollow centrally divided feed wheel 21 works partly in the opening 3 of the hopper 2 and is provided in each side with a circular opening 67 through which the beans pass from the hopper 2 into said hollow wheel 21 and thence outward into the double spout 4 as the wheel revolves. To facilitate passage of the beans from the hollow wheel 21 into the spouts 4 the sides of the hood shaped portion 65 may be provided with semi-circular notches or passages 68 opposite the circular opening 67 in the sides of the feed wheel. Although the construction described is well adapted to the feeding of the beans in regulated quantities I would have it understood that I do not limit myself to any particular form of feed wheel.

If desired the exit passage 25 of the spout 18 may be provided with a flap valve 69, Fig. 1, to restrain a too rapid feed of material to the separating devices.

What I claim as my invention is—

1. In a separating machine, the combination of an inclined frame, oscillatory or adjustable arms having their lower ends pivotally connected and their upper ends adjustable to and from each other, a pair of inclined rollers journaled in boxes carried by said frame and arms and forming an inclined trough for reception of material to be separated, and shifter-bars connected with the lower ends of said adjustable or oscillatory arms to vary the relative elevation of said rollers, substantially as described.

2. In a separating machine, the combination with a pair of inclined separating devices forming an inclined trough for reception of the material to be separated, one of said devices being supported at a higher elevation than the other, of means for varying the relative elevation of said devices, substantially as described.

3. In a separating machine, the combination of an inclined frame, adjustable pivotally connected arms, a pair of separating devices supported in said frame and arms and forming an inclined trough for reception of material to be separated, one of said devices being at a higher elevation than the

other, and shifter-bars connected with and adapted to oscillate said adjustable arms to vary the relative elevation of said separating devices, substantially as described.

4. In a separating machine, the combination of an inclined frame, adjustable oscillatory arms having their lower ends pivotally connected and their upper ends adjustable to and from each other, a pair of inclined separating devices supported in said frame and arms and forming an inclined trough for reception of material to be separated, one of said devices being at a higher elevation than the other, shifter-bars connected with and adapted to oscillate said adjustable arms to vary the relative elevation of the separating devices, and means for adjusting the oscillatory arms to and from each other, substantially as described.

5. In a separating machine, the combination with an inclined roller and a card or comb supported parallel with and above one side of said roller and forming an inclined trough therewith, of feed devices for delivering to the upper end of said trough the material to be separated, a conveyer arranged beneath said roller to carry away the refuse material while the cleansed or marketable product is discharged at the lower end of the inclined trough formed by said roller and comb, a pair of inclined rollers forming an inclined trough to receive the cleansed product from the above named roller and comb, a conveyer located beneath said pair of rollers to carry away the refuse, and a conveyer located at the lower end of the inclined trough formed by said pair of rollers to receive and carry away the marketable product, substantially as described.

6. In a separating machine, the combination of a pair of adjustable inclined separating devices one of which is supported at a higher elevation than the other, means for adjusting or varying the relative elevation of said devices, and a guard supported above and in proximity to the lower separating device, substantially as described.

7. In a separating machine, the combination with an inclined roller, and a card or comb supported in an inclined position at one side of said roller and having elastic teeth adapted to form with the roller surface an inclined trough for reception and passage of the material to be separated of feed devices for delivering material to the upper end of the inclined trough formed by said roller and comb, and a conveyer located beneath said roller and comb to receive and conduct away the refuse material separated by the roller and comb, substantially as described.

8. In a separating machine, the combination with an inclined roller, of a stationary card or comb supported parallel with said roller to form therewith an inclined trough for reception of the material to be separated said comb adapted to serve as a guard to retain the material upon said roller and enable

the smooth marketable product to roll down the inclined trough while the rough, imperfect and refuse material is frictionally engaged by the roller and discharged vertically downward through a space between the roller and comb, substantially as described.

9. In a separating machine, the combination with an inclined roller and a card or comb supported in an inclined position parallel with said roller and forming an inclined trough therewith, of a pair of inclined rollers

arranged to form a trough for receiving the partly cleansed and separated material from said roller and comb and complete the separation, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

DE WITT C. BREED. [L. S.]

Witnesses:

ALBERT H. NORRIS,  
JAMES A. RUTHERFORD.