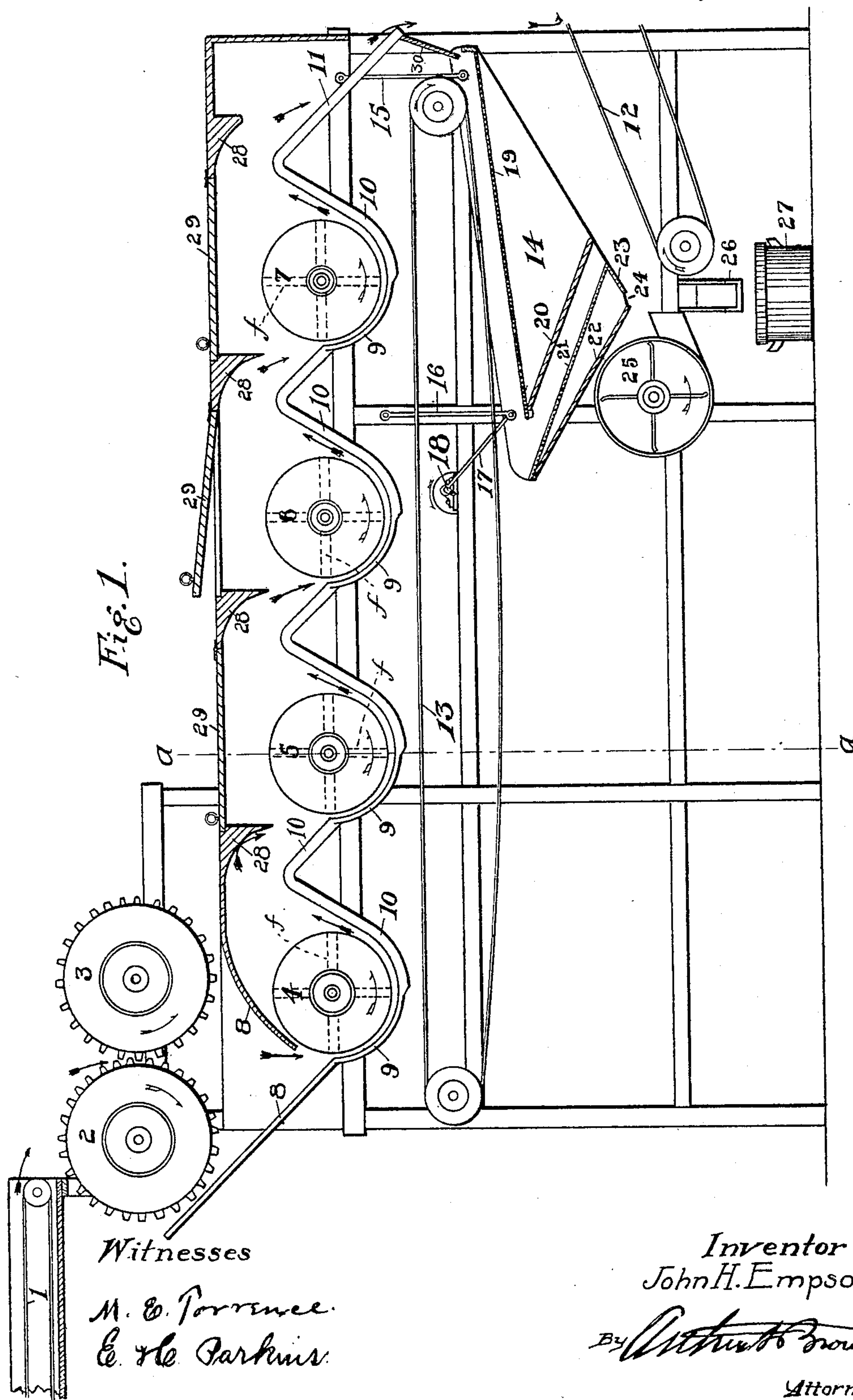


No. 795,498.

PATENTED JULY 25, 1905.

J. H. EMPSON.  
PEA SHELLING MACHINE.  
APPLICATION FILED DEC. 16, 1901.

3 SHEETS—SHEET 1.



Witnesses

M. E. Torrance.  
E. H. Perkins.

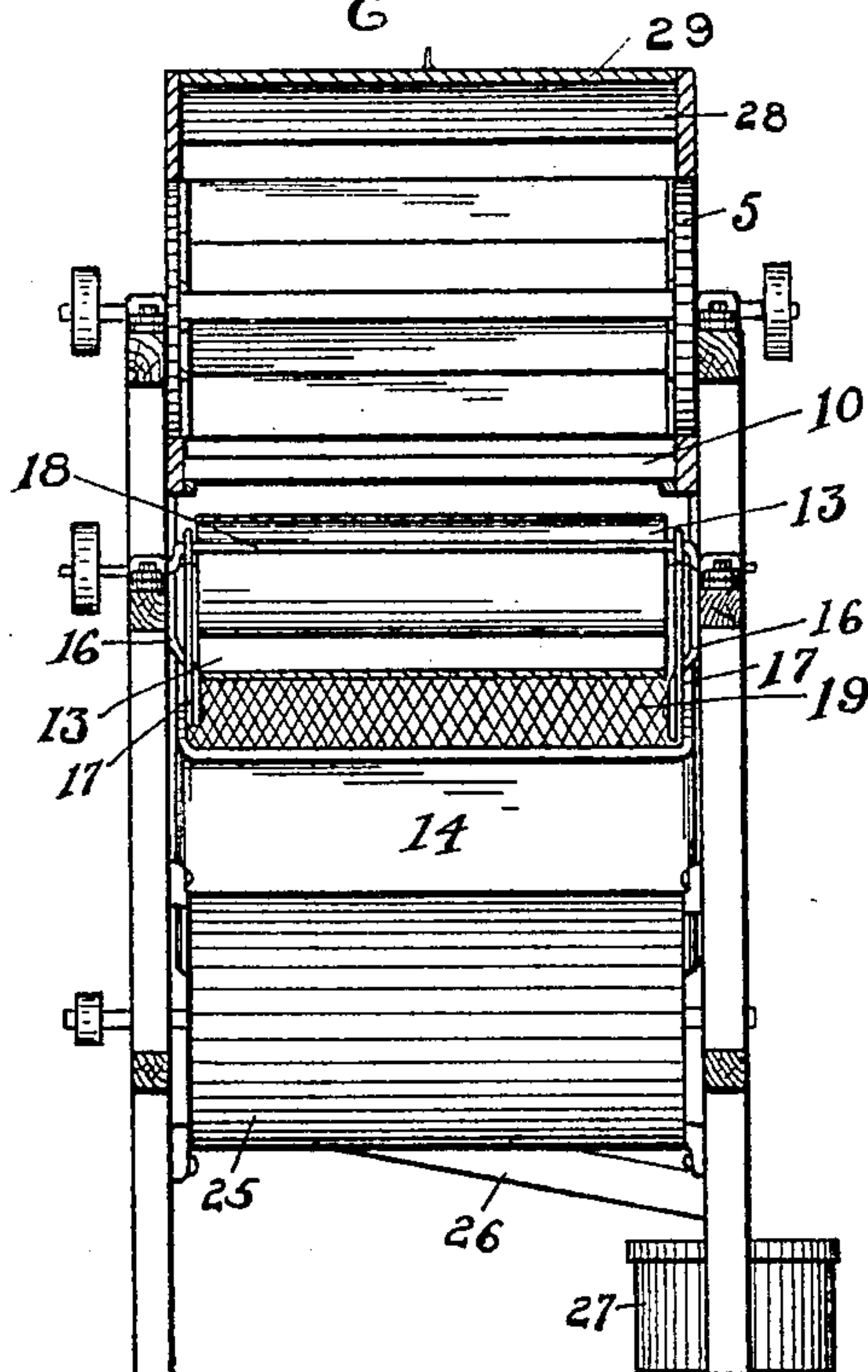
Inventor  
John H. Empson

By *Arthur H. Brown*  
Attorney

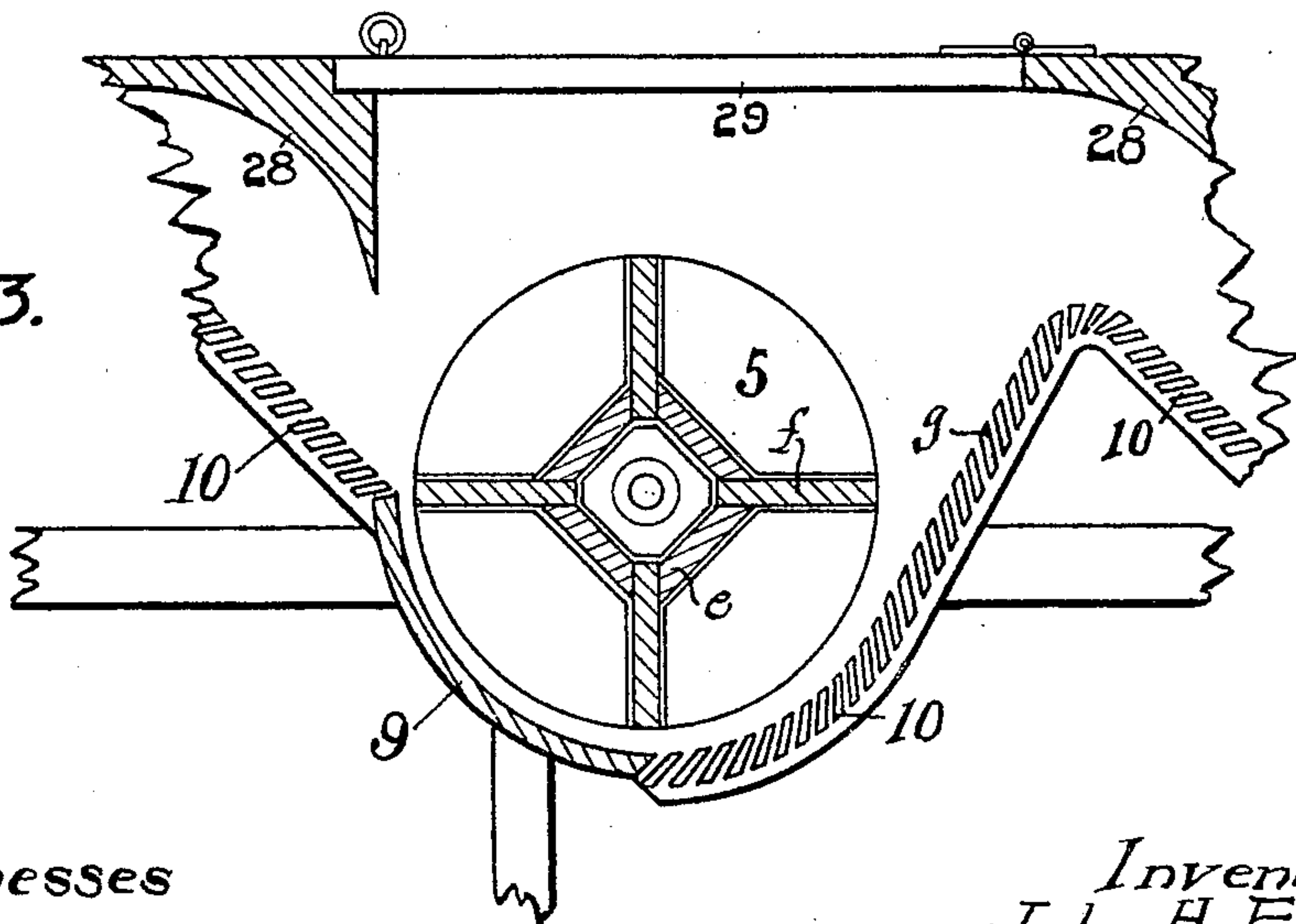
J. H. EMPSON.  
PEA SHELLING MACHINE.  
APPLICATION FILED DEC. 18, 1901.

3 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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*E. H. Parkins*

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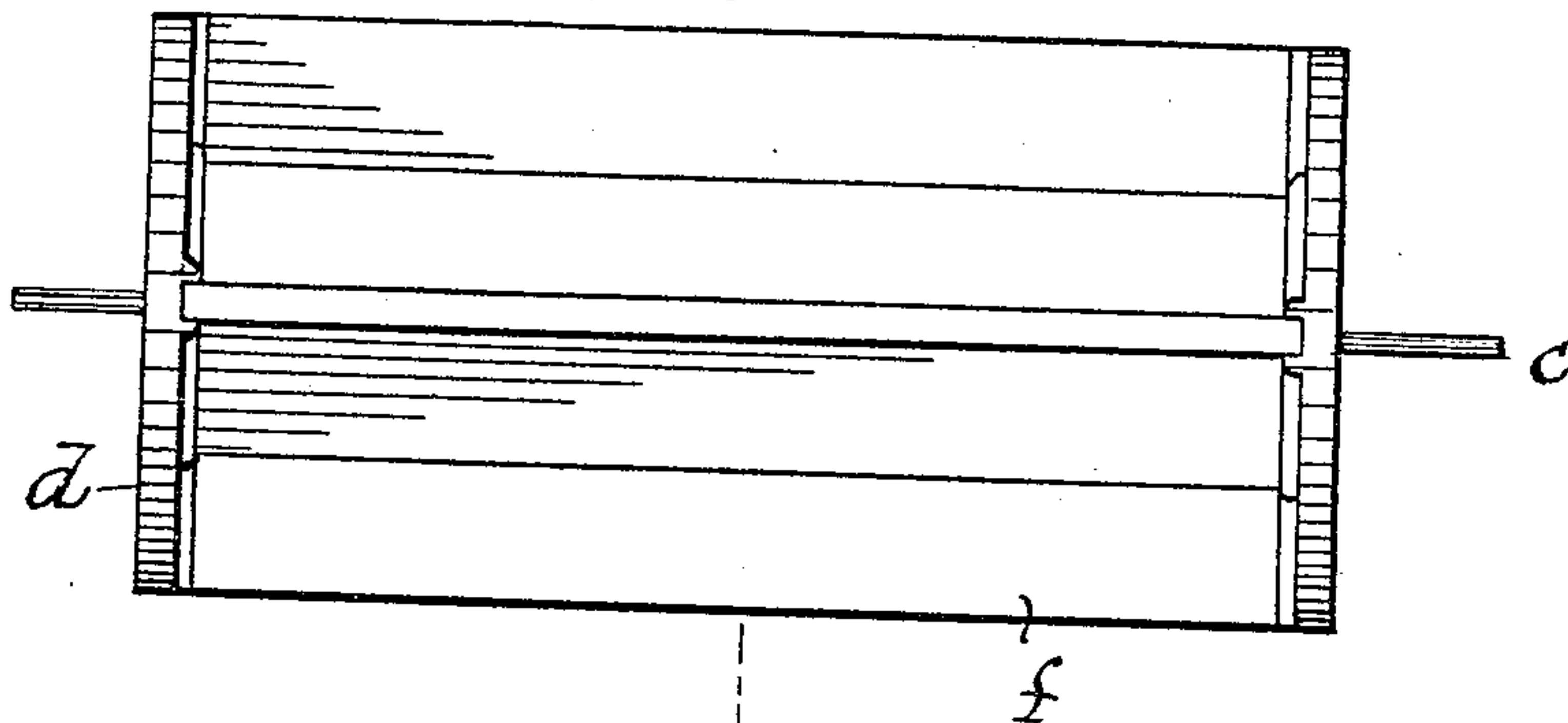
No. 795,498.

PATENTED JULY 25, 1995.

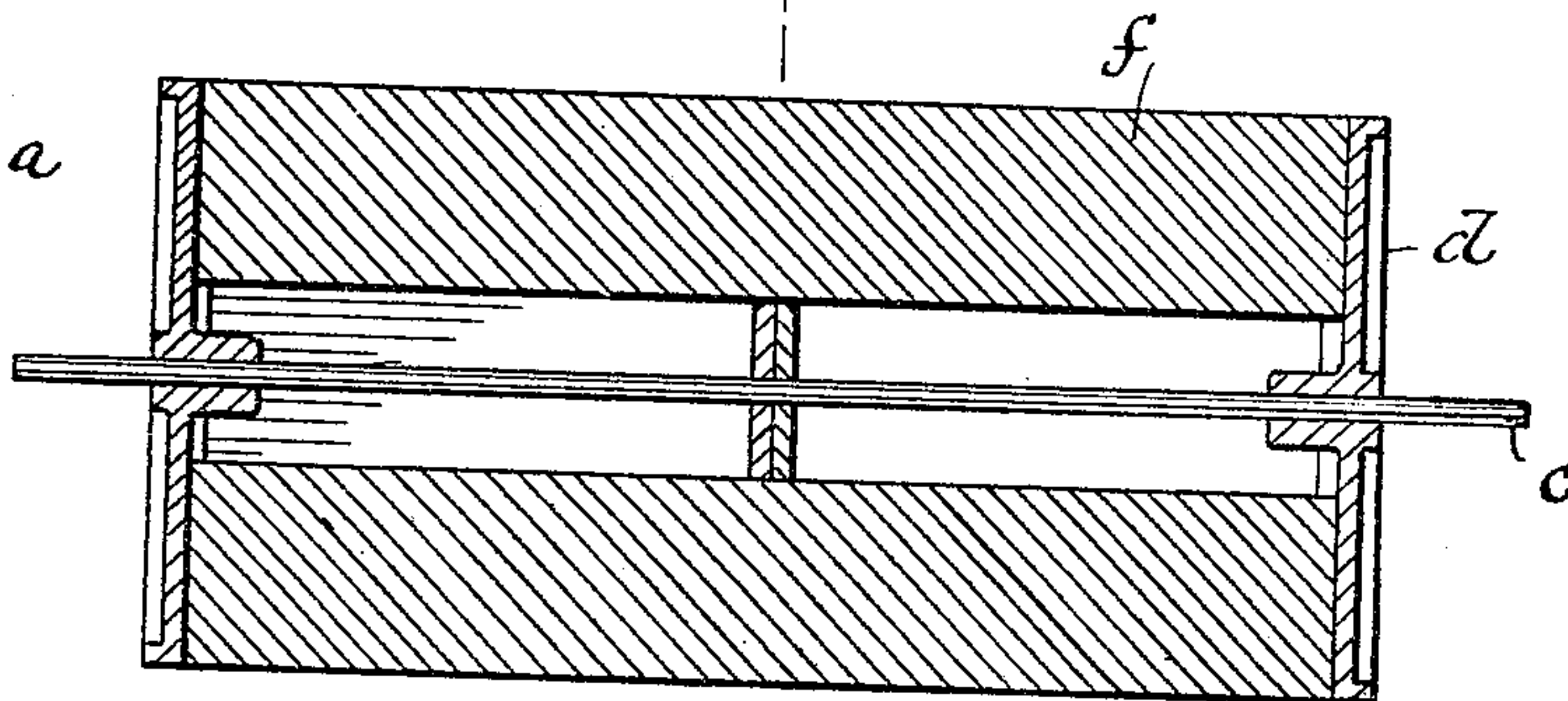
J. H. EMPSON.  
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APPLICATION FILED DEC. 16, 1901.

3 SHEETS—SHEET 3.

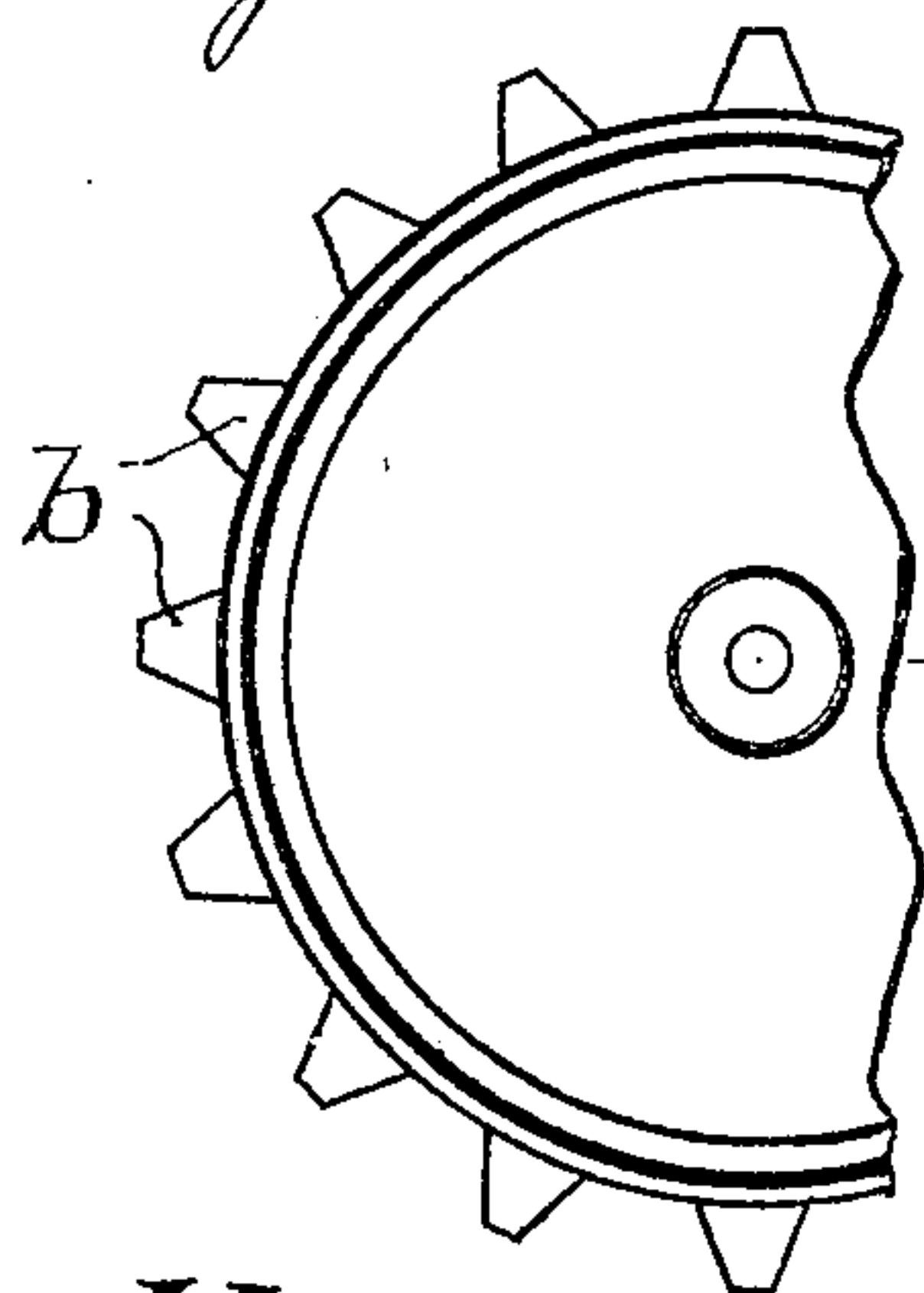
*Fig. 4.*



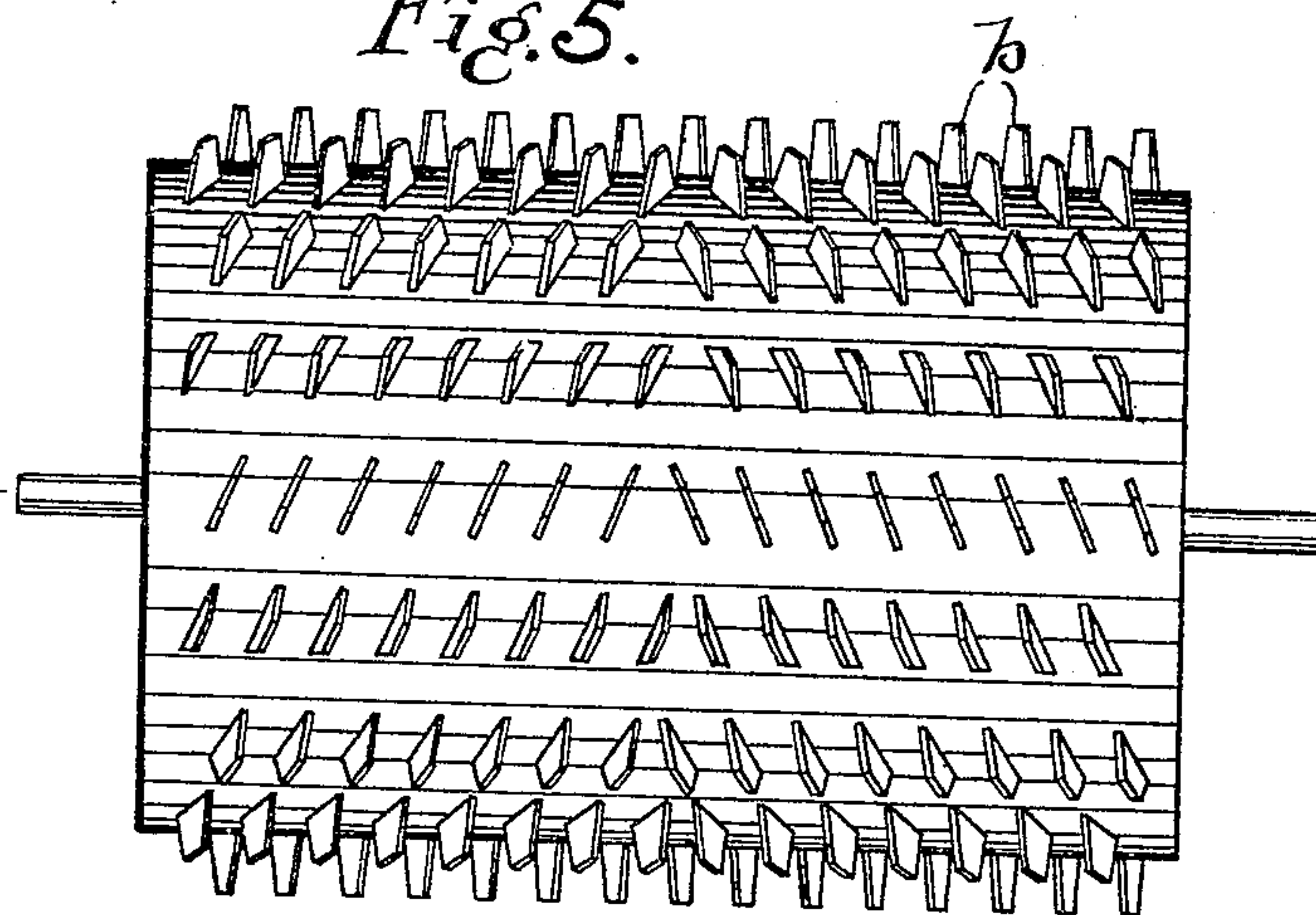
*Fig. 4a*



*Fig. 5a*



*Fig. 5.*



Witnesses  
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E. H. Perkins.

Inventor  
John H. Empson.

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# UNITED STATES PATENT OFFICE.

JOHN H. EMPSON, OF LONGMONT, COLORADO.

## PEA-SHELLING MACHINE.

No. 795,498

Specification of Letters Patent.

Patented July 25, 1905.

Application filed December 16, 1901. Serial No. 86,098.

*To all whom it may concern:*

Be it known that I, JOHN H. EMPSON, a citizen of the United States, residing at Longmont, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Pea-Shelling Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of the machine. Fig. 2 is a vertical cross-section in the plane indicated by the line *a a* in Fig. 1. Fig. 3 is a detail longitudinal vertical section, on an enlarged scale, showing one of the throwing-drums and the parts of the machine coöperating immediately therewith. Fig. 4 is an elevation of one of the throwing-drums. Fig. 4<sup>a</sup> is a longitudinal section of one of the throwing-drums. Fig. 5 is an elevation of one of the automatic feed-spreading drums. Fig. 5<sup>a</sup> is a partial end view of one of the feeding-drums.

The machine which is illustrated in the accompanying drawings and which exhibits one embodiment of the present invention is designed particularly for shelling green peas while the pods containing the same are still on the vines, which have been removed from the field and conveyed to the machine in any suitable or convenient way.

The vines with the pods attached are preferably fed to the machine by being thrown or otherwise deposited upon the upper section of an endless traveling belt 1, said upper section traveling in the direction of the arrow in Fig. 1. Fig. 1 also illustrates by arrows the direction of the rotation of the several drums and belts therein illustrated and also the course of the vines in passing therethrough, and consequently it will be unnecessary in the further description of the machine to specifically refer to the direction of rotation of the drums or the way in which the several belts run.

The vines conveyed by the conveyer feeding-belt 1 are deposited upon the upper surface of the automatic feeding and separating drums 2 and 3. These drums are shown in detail in Figs. 5 and 5<sup>a</sup>. As there shown, each drum has upon its periphery a large number of radially-projecting teeth, pegs, or vanes *b*, each preferably being a thin blade with straight sides and these teeth being placed at an angle right and left from the center, so as to spread the vines evenly the full width of the drums, whereby the vines enter

the machine in a thin stream. The vines thus spread into a thin stream as they pass between the contiguous faces of said feeding and spreading drums are directed by stationary feed-chutes 8 8 to the first of a series of throwing-drums. The vines are subjected successively to the action of a number of these throwing-drums, which may be as many as is necessary for the performance of the work. Four such drums (indicated, respectively, by the numerals 4, 5, 6, and 7) are illustrated in the drawings, and such number has been found by practical experience to be sufficient.

The several drums 4, 5, 6, and 7 are constructed in the same way, some of the details of construction being shown in Figs. 3, 4, and 4<sup>a</sup>. Each drum comprises a central shaft *c*, by means of which it is suitably journaled and rotated, cylindrical heads *d* at each end, a casing *e*, inclosing the shaft and preventing the vines becoming entangled thereon, and radial paddles *f*. The vines fed by the feeding and spreading drums pass between the first of the drums and a solid stationary concave 9, substantially concentric with the drum and sufficiently far removed therefrom to permit the passage of the pea-pods without being ground or broken by the action of the paddle-arms of the drum. This solid imperforate concave extends downwardly to about directly below the axis of the drum and there merges into or communicates with an upwardly-extending slatted or latticed chute 10, which extends upwardly to about the level of the top of the drum and thence downwardly to the concave 9 of the next succeeding drum. As clearly shown in Fig. 3, this latticed chute gradually recedes from the drum as it rises, thus affording a diverging upwardly-opening space between it and the drum for the projection of the vines. This also prevents the vines from getting wedged between the drum and the latticed chute. This latticed chute is composed of fixed slats *g*, spaced sufficiently far apart to permit the ready passage of shelled peas and pod and leaf fragments, but sufficiently narrow to prevent the passage of the vines themselves. These slats extend across the machine parallel with the axis of the throwing-drum and are arranged at an angle to the path which the vines follow, so that the vines will not catch therein. The latticed chute between successively-operating throwing-drums, it will be noted, first rises upwardly



and thence extends downwardly to the next drum, constituting substantially a feed-chute for the next drum. The space over the drums is covered, as indicated, sufficient passage being left over the tops of the drums and over the highest points of the slatted chutes to enable the vines to pass with freedom.

Referring to the first of the drums 4, the vines pass between said drum and the imperforate concave 9 and thence upwardly along the latticed chute 10 and are thrown violently by the action of the throwing-drum against the top cover of the machine. This top cover is provided with concussion-surfaces 28, one for each of the throwing-drums. Each concussion-surface 28 is located substantially over the downwardly-inclined surface of the latticed chute 10, and it is suitably curved, so as to direct the vines thrown against it down upon said chute, thus aiding in the forwarding of the vines through the machine. The vines are thrown violently against the first concussion-surface 28 by the action of the first drum 4, and as the result the pea-pods are opened, and the peas dropping out fall down upon the latticed chutes and drop through the openings through the slats thereof. The vines pass in succession to the action of the several throwing-drums, which in turn throw the vines against their respective coacting concussion-surfaces until at length the peas are all hulled and the depleted vines are eventually discharged over the final discharge-chute 11.

The work of hulling the peas is due to the vines with the pods attached being thrown by the throwing-drums against the concussion-surfaces. The initial feeding and spreading drums are rotated so slowly that the teeth thereon do not have any shelling action. It has been found in practice that when these feeding-drums are twenty-four inches in diameter a speed of one hundred and eighty revolutions per minute is a proper speed. The throwing-drums require a substantial surface speed in order to secure the proper shelling or hulling of the green peas. In case the diameter of these drums is twenty-six inches it has been found in practice that they should be rotated at a speed of three hundred revolutions per minute or at a greater speed for some kinds of peas. Preferably, also, the several drums rotate successively faster, the last rotating as high as four hundred and fifty revolutions per minute. These dimensions and speeds are given so as to indicate how the machine should be operated to secure practical results; but it is not intended to thereby limit the scope of the invention.

As shown in Fig. 1, the top of the casing which incloses the throwing-drums is provided with hinged doors 29 between the concussion-surfaces, thus enabling access to the drums

and latticed chutes to be had at any time for the purpose of cleaning the machine and attending to repairs. Preferably, also, the concussion-surfaces 28 are arranged so as to be adjusted at various angles, which is desirable on account of the varying conditions of the peas and vines.

In case of some varieties of peas which are difficult to shell and those having very long vines a second pair of feeding and spreading drums, like the drums 2 and 3, could be inserted between the throwing-drums, as between the drums 5 and 6, or the product from a machine such as illustrated could be carried directly through a second machine of the same kind.

The casing in which the throwing-drums are mounted is closed at its sides.

The hulled peas and small bits of leaves, the pods, and other refuse which pass through the latticed chutes fall upon an endless traveling conveyer-belt 13, which conveys the same to a shaker 14, having a fine screen 19, upon which the product falls. A stationary chute 30 properly directs the aforesaid product onto said screen 19. The shaker 14, which carries this screen, is pivotally suspended by links 15 and 16 and is rapidly vibrated by a link 17, connected with a crank 18 on a driving-shaft. The screen 19 inclines downwardly. The fine refuse passes through this screen and either falls directly upon the upwardly-traveling section of a conveyer 12 or falls upon an inclined chute 20, carried by the shaker, which directs the same upon the same belt 12. The partially-screened product which passes over the fine screen 19 falls upon a second coarse inclined screen 21, also carried by the shaker. The peas and some of the refuse pass through this screen, while other refuse passes down over this screen and onto the refuse-belt 12. The peas and such refuse as may have passed through the screen 21 are directed by inclined chutes 22 and 23 (with which the shaker is provided) to an opening 24, through which said peas and refuse drop in front of a blast of air created by a rotary blower 25. This air-blast blows the refuse still with the peas onto the surface of the refuse-conveyer 12. The peas fall down into a pea-receiver consisting of a chute 26, and thence into a removable receptacle 27.

The depleted vines pass over the final chute 11 and are deposited upon the refuse-conveyer 12. This refuse-conveyer is of sufficient length to carry all the refuse to an appropriate dump.

It will be obvious that the various screens, belts, drums, and other rotating parts can be moved by suitable power-operated gearing which is or may be of such obvious character as to require no detailed description.

Experience shows that it is desirable that the concave 9 should be imperforate and not



slatted, since if slatted a great many of the pods are thereby torn from the vines and the vines unduly torn.

It is obvious that various changes may be made in details of construction without departing from the spirit and characteristics of the invention.

I claim as my invention—

1. A machine for hulling green peas on the vines having, in combination, a plurality of successively-acting rotating throwing-drums; means coöperating with each of said drums to present the vines with the attached pods to the action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, said means comprising an imperforate concave below each drum on its descending side, and a perforated upwardly-extending chute on the rising side of said drum, said perforated chute as it rises extending gradually farther and farther away from said drum, said perforated chute permitting the downward passage of the hulled peas; a fixed concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface; and a downwardly-inclined chute for directing the vines from one of said perforated chutes to the concave of the next drum.

2. A machine for hulling green peas on the vines having, in combination, a plurality of successively-acting rotating throwing-drums; means coöperating with each of said drums to present the vines with the attached pods to the action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, said means comprising an imperforate concave below each drum on its descending side, and a perforated upwardly-extending chute on the rising side of said drum, said perforated chute as it rises extending gradually farther and farther away from said drum, said perforated chute permitting the downward passage of the hulled peas; a fixed concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface; and means for directing the vines from one of said perforated chutes to the concave of the next drum.

3. A machine for hulling green peas on the vines, having in combination, a plurality of successively-acting rotating throwing-drums; means coöperating with each of said drums to present the vines with the attached pods to the action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, said means comprising an imperforate concave below each drum on its descending side, and a perforated upwardly-extending chute on the rising side of said drum, said

perforated chute as it rises extending gradually farther and farther away from said drum, said perforated chute permitting the downward passage of the hulled peas; a concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface; and a downwardly-inclined chute for directing the vines from one of said perforated chutes to the concave of the next drum.

4. A machine for hulling green peas on the vines having, in combination, a rotating throwing-drum; means coöperating with said drum to present the vines with the attached pods to the action of said drum while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drum, said means comprising an imperforate concave below the drum on its descending side, and a perforated upwardly-extending chute on the rising side of said drum, said perforated chute as it rises extending gradually farther and farther away from said drum, said perforated chute permitting the downward passage of the hulled peas; and a fixed concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface.

5. A machine for hulling green peas on the vines having, in combination, a rotating throwing-drum; means coöperating with said drum to present the vines with the attached pods to the action of said drum while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drum, said means comprising an imperforate concave below the drum on its descending side, and a perforated upwardly-extending chute on the rising side of said drum, said perforated chute as it rises extending gradually farther and farther away from said drum, said perforated chute permitting the downward passage of the hulled peas; and a concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface.

6. A machine for hulling green peas on the vine having, in combination, a plurality of successively-acting throwing-drums which rotate at progressively higher speeds, means coöperating with each of said drums to present the vines with the attached pods to the throwing action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, a fixed concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface, and means for directing the vines from one drum to the next drum.

7. A machine for hulling green peas on the vine having, in combination, a plurality of successively-acting throwing-drums which



rotate at progressively higher speeds, means coöperating with each of said drums to present the vines with the attached pods to the throwing action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, a concussion-surface in advance of each drum, the pods being split open by the blow which they receive on striking said surface, and means for directing the vines from one drum to the next drum.

8. A machine for hulling green peas on the vine having, in combination, a plurality of successively-acting rotating throwing-drums, means coöperating with each of said drums to present the vines with the attached pods to the throwing action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, a fixed concussion-surface in advance of and above each drum, the pods being split open by the blow which they receive on striking said surface, and means for directing the vines from one drum to the next drum.

9. A machine for hulling green peas on the vine having, in combination, a plurality of successively-acting rotating throwing-drums, means coöperating with each of said drums to present the vines with the pods to the throwing action of said drums while permitting the free passage of the pods, thus avoiding the breaking or crushing of said pods by said drums, a concussion-surface in advance of each drum, the pods being split open by the blow which they receive on striking said surface, and means for directing the vines from one drum to the next drum.

10. A machine for hulling green peas on the vine having, in combination, a rotating throwing-drum, means coöperating with said drum to present the vines with the attached pods to its throwing action while permitting the free passage of the vines and pods, thus avoiding the breaking or crushing of said pods by said drum or any tearing of the vines as the result of the conjoint operation of said presenting means and drum, and a fixed concussion-surface in advance of and above said drum, the pods being split open by the blow which they receive on striking said surface.

11. A machine for hulling green peas on the vine having, in combination, a rotating throwing-drum, means coöperating with said drum to present the vines with the attached pods to its throwing action while permitting the free passage of the vines and pods, thus avoiding the breaking or crushing of said pods by said drum or any tearing of the vines as the result of the conjoint operation of said presenting means and drum, and a concussion-surface in advance of said drum, the pods being split open by the blow which they receive on striking said surface.

12. A machine for hulling green peas on

the vines having, in combination, a rotating throwing-drum, a concussion-surface against which the pods are thrown by the said drum, means for presenting the vines with the attached pods to the throwing action of said drum while permitting the free passage of the pods, and feeding mechanism for conveying the vines with pods attached to the said drum and its coöperating presenting means, said feeding mechanism comprising two slowly-rotating drums rotating in opposite directions and into the bight between which the vines are presented, said drums having projecting inclined teeth on their faces, some of said teeth being inclined in opposite directions from the middles of said drums, whereby the vines are spread out into a thin sheet before being presented to the action of said throwing-drum.

13. A machine for hulling green peas on the vine and separating the hulled peas from the refuse having, in combination, a plurality of successively-acting hulling instrumentalities; a refuse-conveyer at the tail end of the machine for receiving the depleted vines and refuse which emerge from the last of the hulling instrumentalities; a discharge-chute at the tail end of the machine to direct the said vines and refuse to said conveyer; a single traveling belt extending beneath all of the hulling instrumentalities and receiving therefrom the hulled peas and fine chaff, the receiving layer of said belt carrying the peas and chaff to the tail end of the machine above the conveyer; a vibrating shaker between the discharge end of said belt and said conveyer comprising a plurality of successively coarser screens which receive in succession the peas and chaff, and chutes below said screens, the chute below the last of said screens directing the peas to a suitable receiver, while the remainder of the chutes and the last of the screens direct the chaff to said conveyer; said pea-receiver; means for vibrating said shaker; and means for creating a current of air toward said conveyer and through the peas passing from said shaker to said receiver whereby the chaff intermingled with said peas is deposited on said conveyer.

14. A machine for hulling green peas on the vine and separating the hulled peas from the refuse having, in combination, hulling instrumentalities; a refuse-conveyer at the tail end of the machine for receiving the depleted vines and refuse which emerge from the hulling instrumentalities; a discharge-chute at the tail end of the machine to direct the said vines and refuse to said conveyer; a traveling belt extending beneath the hulling instrumentalities and receiving therefrom the hulled peas and fine chaff; the receiving layer of said belt carrying the peas and chaff to the tail end of the machine above the conveyer; a vibrating shaker between the discharge end of said belt and said conveyer



comprising a plurality of successively coarser screens which receive in succession the peas and chaff, and chutes below said screens, the chute below the last of said screens directing the peas to a suitable receiver, while the remainder of the chutes and the last of said screens direct the chaff to said conveyer; said pea-receiver; means for vibrating said shaker; and means for creating a current of air toward said conveyer and through the peas passing from said shaker to said receiver whereby the chaff intermingled with said peas is deposited on said conveyer.

15. A machine for hulling green peas on the vine and separating the hulled peas from the refuse having, in combination, hulling instrumentalities; means beneath the hulling instrumentalities receiving therefrom the hulled peas and fine chaff; a vibrating shaker comprising a plurality of successively coarser screens which receive in succession the peas and chaff, and chutes below said screens, the chute below the last of said screens directing the peas to a suitable receiver separated from the chaff, while the remainder of said chutes and the last of said screens direct the chaff away from the pea-receiver; said pea-receiver; means for vibrating said shaker; and means for creating a current of air through the peas passing from said shaker to said re-

ceiver, whereby the chaff intermingled with said peas is carried away.

16. A machine for hulling green peas on the vine and separating the hulled peas from the refuse having, in combination, hulling instrumentalities, a vibrating shaker, and means for vibrating said shaker, said shaker comprising an inclined fine screen which receives the hulled peas and the chaff, an inclined chute beneath said fine screen which keeps separate the fine chaff falling through said fine screen from the peas and coarse chaff which pass off from the receiving-surface of said screen, a subsequently-acting inclined coarse screen which receives the peas and the coarse chaff from said fine screen, said coarse screen extending beneath and inclining in the same direction as said chute, and a second chute which receives the peas falling through said coarse screen and discharges them separately from the coarse chaff discharged from the receiving-surface of said coarse screen.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN H. EMPSON.

Witnesses:

DOY GRAY,

NEIL W. TURRELL.