No. 612,940. Patented Oct. 25, 1898.

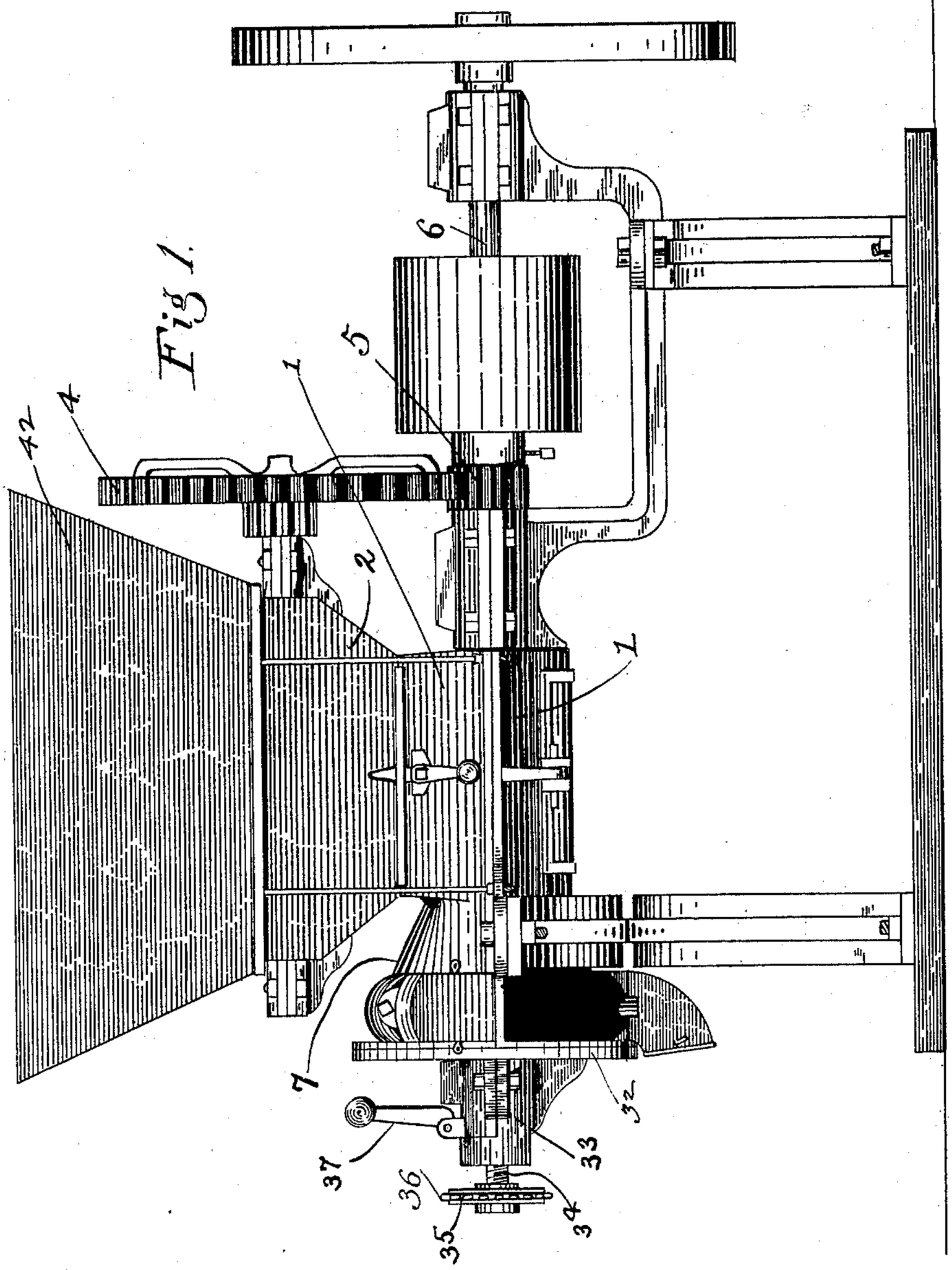
J. S. WOODCOCK.

FEED MILL.

(Application filed Jan. 29, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig 1.



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4 Sheets—Sheet 2.

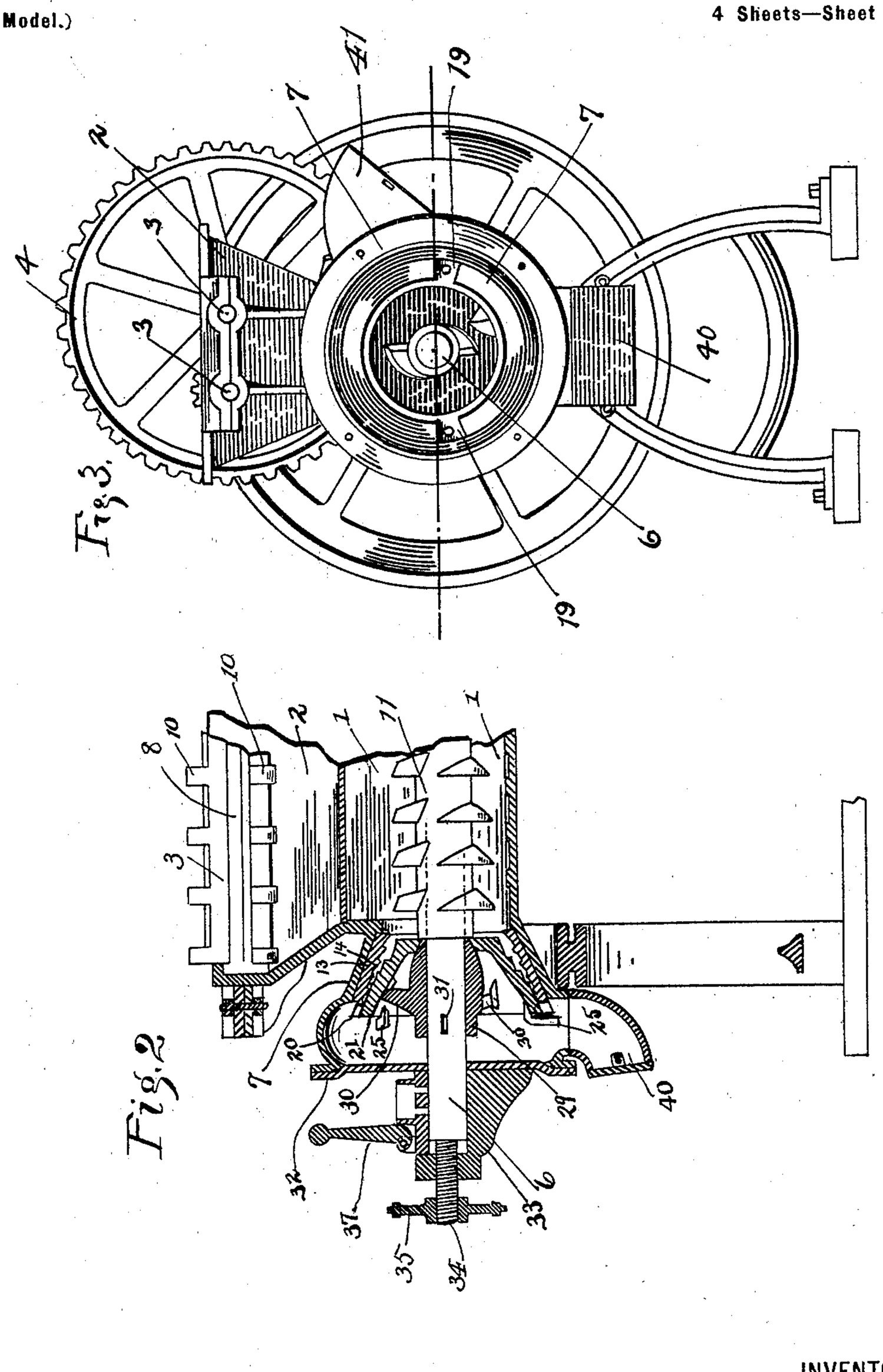

Fig. 3.

Fig. 2

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(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

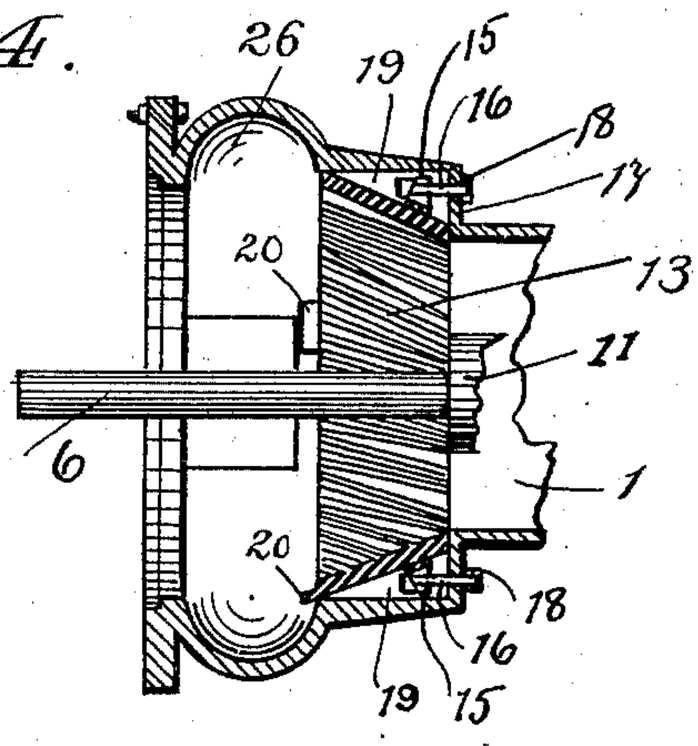


Fig. 7.

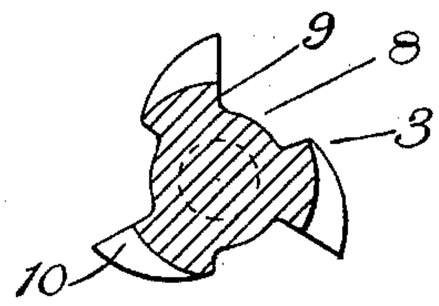


Fig. 5.

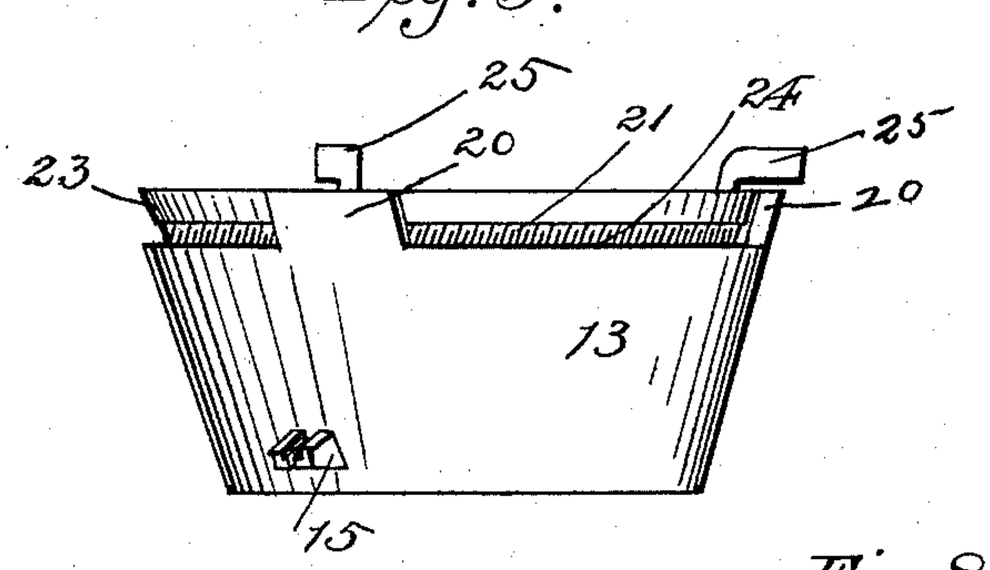


Fig. 6.

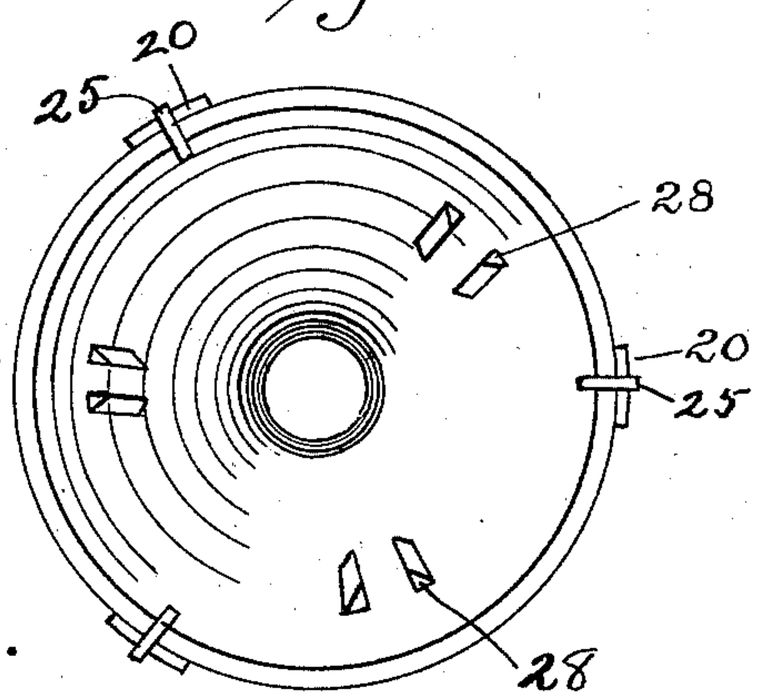
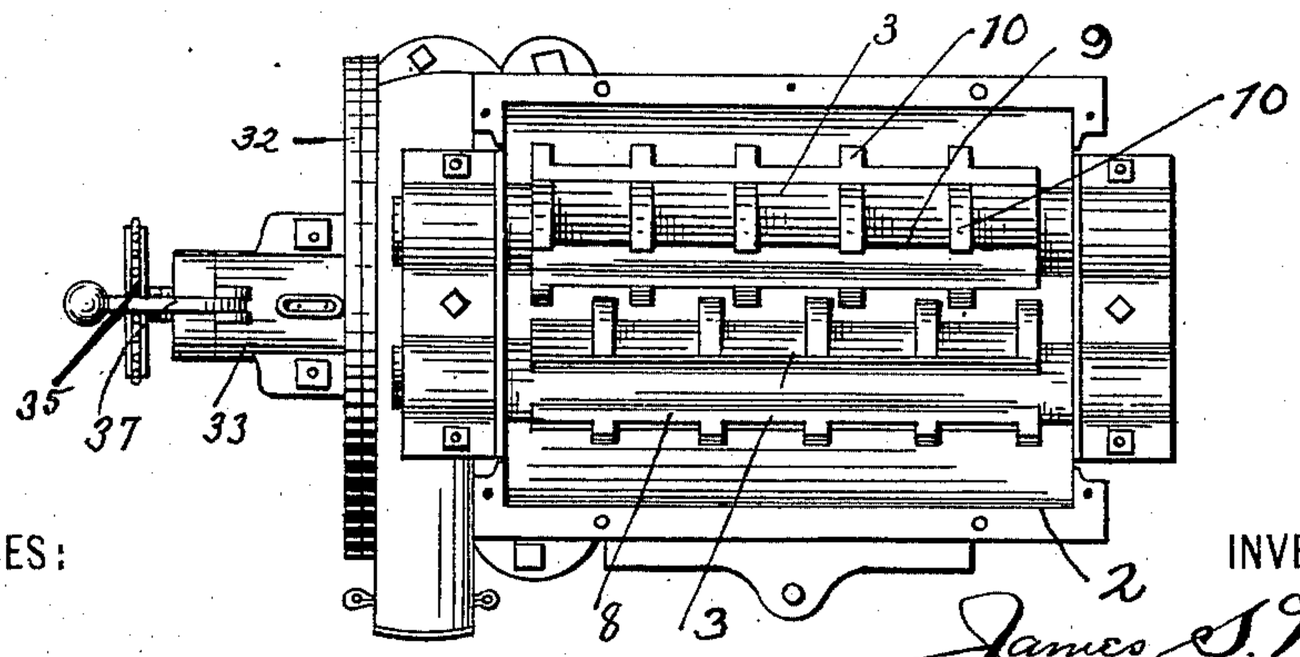


Fig. 8.



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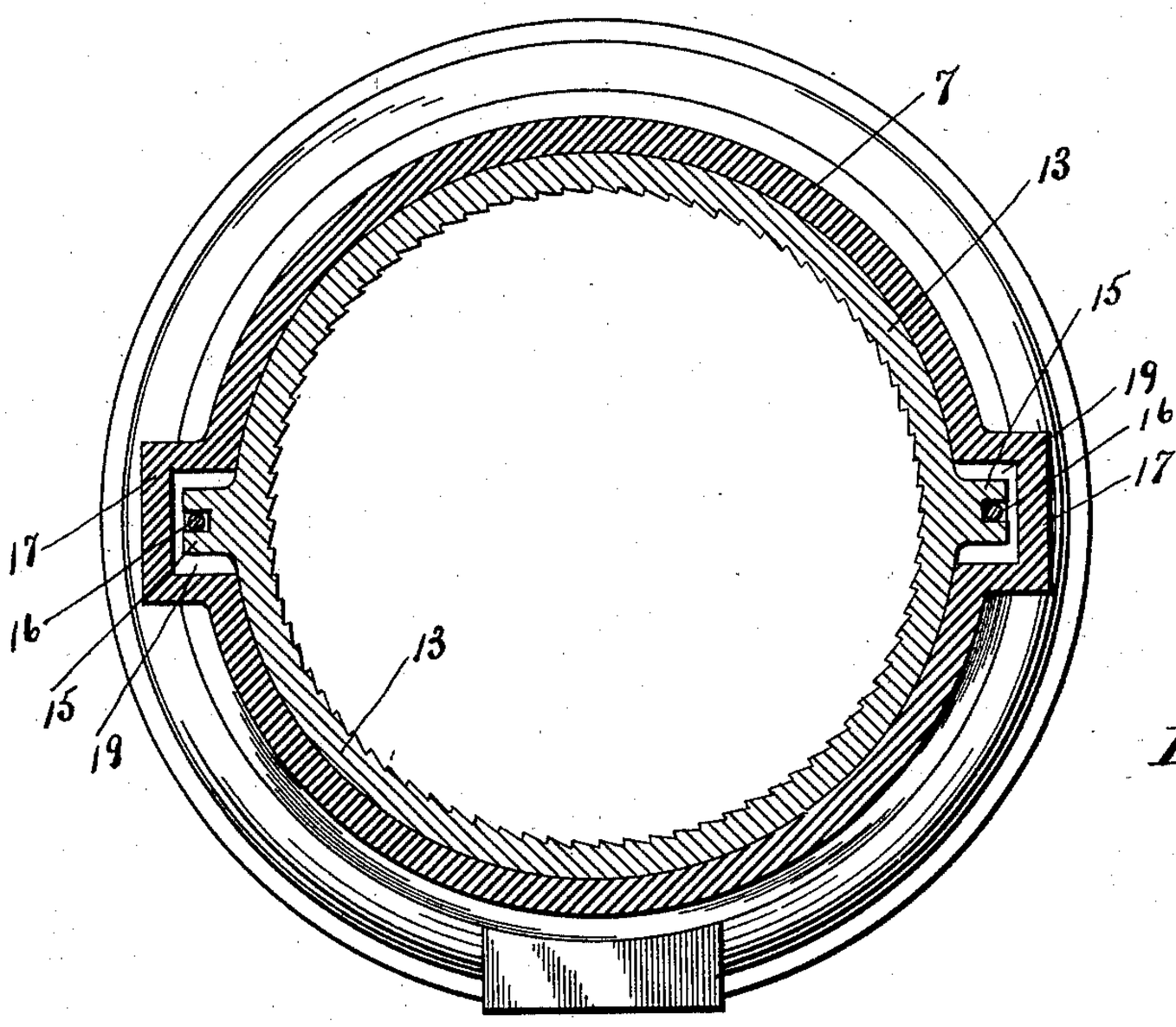

Fig. 9.

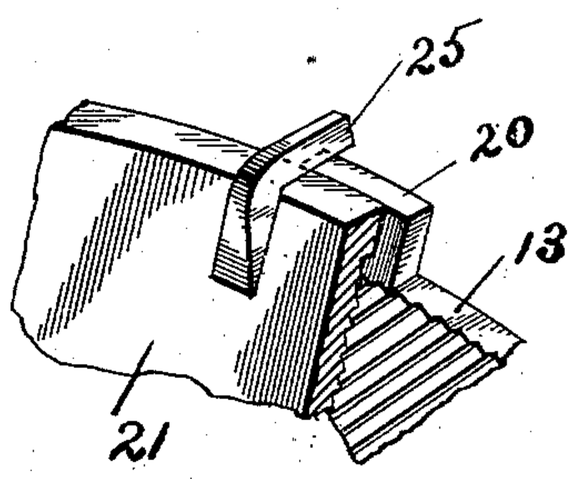

Fig. 10.

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UNITED STATES PATENT OFFICE.

JAMES S. WOODCOCK, OF NEW LEXINGTON, OHIO.

FEED-MILL.

SPECIFICATION forming part of Letters Patent No. 612,940, dated October 25, 1898.

Application filed January 29, 1897. Serial No. 621,231. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. WOODCOCK, a citizen of the United States, residing at New Lexington, in the county of Perry and State of Ohio, have invented a certain new and useful Improvement in Feed-Mills, of which the following is a specification.

My invention relates to the improvement of feed-mills of that class which are adapted for the purpose of grinding feed for stock.

The present invention aims at improvements in the details of construction hereinafter more particularly described, and then pointed out in the claims.

These objects I accomplish in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is a central vertical section of the forward end portion of said machine. Fig. 3 is an end view with the end cap and grinding-cones removed. Fig. 4 is a detail sectional view of the forward or delivery end portion of the grinding-machine, taken at right angles with that shown in Fig. 2 and showing the inner grinding-cone removed. Fig. 5 is a detail view, in side elevation, of the outer or stationary grinding-cone, showing the inner grinder connected therewith. Fig. 6 is a plan view of the inner grinding-rings. Fig. 7 is a detail view showing a transverse section of one of the upper breakers, and Fig. 8 is a plan view of the body of the machine with the hopper removed therefrom. Fig. 9 is an enlarged sectional view through Fig. 4 transversely of the shaft. Fig. 10 is an enlarged perspective detail showing one of the lugs and conveyers of the grinding-ring.

Similar numerals refer to similar parts throughout the several views.

As indicated in the drawings, the feed-mill to which my improvements relate is of that character wherein the corn or other substance to be ground is first subjected to the action of horizontally-arranged breakers and afterward conveyed to and passed between cone-grinders and delivered at one end of the machine.

1 represents the horizontally-arranged body of my improved feed-mill, which may be of the usual or general construction, and 2 represents the stationary hopper or breaker-casing, which rises from said body. Within this hopper are journaled in the usual manner two or more horizontally-arranged breakers or breaker-shafts 3, these breakers having their rearwardly-extending journals geared together in the usual manner and operated by a gear-wheel 4, which is on the end of one of said shafts and which receives its motion from a pinion 5, which is mounted on the main or driving shaft 6. This driving-shaft extends horizontally through the lower portion of the body or casing 1 and through the central portion of the flaring end extension or outlet 7 of said body.

As indicated more clearly in Figs. 7 and 8 of the drawings, each of the breakers 3 is provided throughout its length at desirable intervals with peripheral depressions 8, resulting in the formation of longitudinally-arranged shoulders 9. From the raised or outer portions of each of the breaker-shafts project at desirable intervals suitable breaking-teeth 10, the teeth of one breaker being so located as to pass between two of the teeth of the adjoining breaker when said breakers are rotated.

Upon that portion of the shaft 6 which is contained within the body or main casing 1 is mounted a conveying-sleeve 11, the teeth of which are so inclined as to result when said shaft 6 is rotated in the material contained in the casing 1 being fed outward into the extension 7. As indicated in the drawings, the inner portion of said extension 7 is flaring or of a truncated-cone form, and within this cone-shaped portion is adapted to fit a correspondingly-shaped grinding-ring 13. This ring, as indicated more clearly in Figs. 2 and 4 of the drawings, is provided on its inner surface with the usual grinding teeth or ribs 14. As indicated, I provide the exterior surface of the cone grinding-ring 13 with oppositely-located lugs 15, through which are adapted to pass, as shown in Fig. 4 of the drawings, bolts 16, the heads of said bolts engaging with said lugs and the outer end portions of said bolts extending through openings formed in lateral extensions 17 of the body 1. These bolts are adapted to be held in position by means of nuts 18, which are on the outwardly-projecting ends thereof. In order to further secure

the grinding-ring 13 in its position and prevent any tendency toward rotation, I provide the extension 7 at opposite points with recesses 19, which are adapted to receive the lugs 15. 20 represent lugs which project at equidistant points from the outer edge or rim of said grinding-ring 13.

21 represents an inner-cone grinding-ring which is adapted to be supported and rotate within the external grinding-ring 13. This inner grinding-ring is, as shown more clearly in Fig. 5 of the drawings, provided about its outer end portion with a shallow flange or raised band or skirt 23. The remaining exterior surface of said inner cone is provided with grinding-teeth, as indicated at 24. The outer edge portion of the inner grinding-ring is provided at intervals with forwardly and thence outwardly projecting wings or conveyers 25, which when said ring is rotated are adapted to move within the expanded mouth portion 26 of the extension 7.

As shown in Fig. 5 of the drawings, the flanged surface or skirt 23 of the inner grinding-ring is adapted when said ring is in its place within the outer ring to bear against the inner faces of the lugs 20, thereby preventing an actual contact of the external grinding-teeth of the inner cone and the corresponding internal teeth of the outer cone.

As shown in Figs. 2 and 6, I provide the inner and conical surface of the inner grinding-ring with radially-arranged lugs 28, the latter being in pairs, as shown.

In order to insure the inner grinding-cone in its position within the outer grinding-ring, I mount upon the shaft 6 a sleeve or stop-collar 29, which is provided with radially-arranged arms 30, said arms being adapted to fit, respectively, between the lugs of the pairs 28. The inner end of this sleeve or collar 29 passes through the inner end of the internal grinding-ring and bears against the outer end of the conveyer-sleeve 11. The stop-collar 29 is prevented from rotation on the shaft 6 by means of a key 31, which is adapted to pass through said collar and also through said shaft.

Bolted or otherwise detachably connected with the outer end of the extension 7 is an end plate or cap 32, which has projecting centrally therefrom a boxing 33, which receives and forms a bearing for the outer end of the shaft 6.

34 represents a set-screw which passes through and which has a threaded engagement with the outer end of the boxing 33. This set-screw has fixed to its outer end portion a suitable hand-wheel 35, the latter being provided with peripheral notches 36.

37 represents a pawl-lever which is fulcrumed at one end to the upper side of the boxing 33 and which is adapted to be dropped downward into engagement with the desired notch 36.

The inner end of the set-screw 34, as indicated in the drawings, is adapted to bear against the outer end of the shaft 6.

The mouth portion 26 of the extension 7 is provided in its lower side with an outlet-spout 40, while a similar outlet is provided in its side, as indicated at 41.

Upon the stationary hopper-casing 2 I secure a detachable and flaring hopper 42.

The operation of my improved feed-mill is substantially as follows: Rotary motion being communicated to the shaft 6 and the breakers 3 and consequently to the conveyer-sleeve 11 and inner grinding-ring 21 the corn or other material to be ground is introduced into the hopper 42, where it is subjected to the action of the breakers 3. Passing these breakers the partially-broken material is dropped downward into the main case 1, from whence it is driven outward by the conveyer 11 between the grinding-rings 13 and 21. Subjected to the grinding and crushing action of the teeth of the grinding-rings, the comparatively finely-ground material is discharged into the mouth portion 26 and is thence conveyed outward by the action of the wings 25 through the outlet 40 or 41.

Although the space between the teeth of the two grinding-rings gradually decreases in width toward the outer portions of said rings it is obvious that the bearing of the skirt or flange portion 23 of the inner ring against the lugs 20 of the outer ring must serve to prevent actual frictional contact between said teeth, thereby insuring the life and durability of said parts by preventing undue wear thereof.

The rigid connection of the collar 29 with the shaft 6 and the engagement with the arms 30 of said collar with the lugs 28 of the inner grinding-ring provide effective means for connecting the inner grinding-ring with the shaft and insuring the rotation of said ring.

Owing to the engagement of the lugs 15 of the stationary or outer grinding-ring with the recesses 19 and the fact that said lugs have a bolt connection with the body of the machine, it is obvious that said ring will be firmly retained in connection with the said machine-body and prevent it from any tendency toward rotation or working outward through the action of the moving parts.

By the formation of the longitudinal grooves in the breakers 3 it will be seen that recesses are formed in the said breakers, which prevent the contact of the teeth of one breaker with the body of the adjoining breaker. These grooves also result in the formation of the longitudinal shoulders 9, which serve to engage the corn or other material and form breaking-surfaces in addition to the teeth 10.

It will be observed that the construction of my improved feed-mill and its parts is simple and that the same may be produced in a durable and reliable form at a reasonable cost of manufacture.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a feed-mill the combination with the body thereof, a rotating shaft and a conical grinding-ring 21 carried thereby, said grinding-ring having a raised flange or skirt portion 23, having the same incline as the wall of the grinding-ring, of a fixed grinding-ring surrounding said ring 21 and lugs projecting from said fixed ring against which the flange or skirt portion 23 of said ring 21 is adapted to bear and prevent contact of the teeth of said rings and means for feeding material between said rings and conveyers on the outer edge portion of the inner ring projecting forwardly and outwardly, substantially as and for the purpose specified.

2. The combination with the casing-body 1 having the extension 7, the latter being provided with an outlet, of a rotating driving-shaft 6 extending through said casing and extension, a stationary grinding-ring within said extension and a grinding-ring mounted on said shaft 6 within said stationary ring, lugs 20 on the stationary ring with their inner faces inclined to conform to the incline of the outer wall of the skirt portion and a raised skirt portion 23 formed on the inner ring and having its outer face on substantially the same incline as the wall of the ring and adapted to bear against the inner inclined walls of said lugs and prevent contact of the grinding-teeth on said rings, substantially as and for the purpose specified.

3. The combination with the outer conical grinding-ring having lugs 20 at its larger end extending in the direction of the incline of its outer wall, of the inner conical grinding-ring having at its larger end a surrounding skirt extended beyond its grinding portion and having the same inclination as the wall of the grinding-ring, and lugs projecting beyond said skirt and having lateral portions forming conveyers, all substantially as shown and described.

JAMES S. WOODCOCK.

In presence of—
B. D. YAW,
H. F. ACKER.