

UNITED STATES PATENT OFFICE.

ELIAS GUNNELL, OF CHICAGO, ILLINOIS.

PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 751,072, dated February 2, 1904.

Application filed August 5, 1901. Serial No. 70,973. (No model.)

To all whom it may concern:

Be it known that I, ELIAS GUNNELL, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Pneumatic Hammers, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention has reference to the provision of a pneumatic hammer in which a constant pressure is employed in driving the hammer in a direction to strike its blow, while pressure is intermittently admitted and exhausted from the cylinder in advance of the hammer to procure the reciprocation thereof.

One of the objects of this invention is the provision of an arrangement of valve mechanism, and port openings controlled thereby, whereby the passage of fluid into and out of the forward end of the cylinder will take place with the greatest possible facility, and procure a maximum efficiency of operation of the hammer on the impact stroke thereof as well as upon the return stroke. The above as well as such other objects as may hereinafter appear, I attain by means of a construction which I have illustrated in preferred form in the accompanying drawing.

The reference figure "1" represents a hammer cylinder or barrel; 2, a reciprocating piston operating therein; 3, a valve located in the chamber, and 4, a throttle valve mounted in a chamber 5, formed within the hub of a handle 6.

An inlet 7 is provided for the admission of the fluid pressure, which passing through the chamber 5 and past the valve 4, enters the piston cylinder through the radial ports 8 at the back of the piston 2, when the valve 4 is pushed open against the pressure of a spring 9, in the manner which will be clear from an examination of the drawings.

At the extreme left hand end of the piston cylinder or barrel 1, is mounted a rivet set, or other operating tool 10, which is provided with a retaining ring 11, carried in a screw threaded bushing 12, the said ring 11 being constructed to latch or catch upon the rivet

set 10 and prevent the same from being inadvertently driven out of the cylinder.

The piston 2 has one end, or head 13, larger than the other, the smaller head 14 having a bushing 15 within which it operates, and having between its extreme ends at 14^a an intermediate head, which, together with the head 14, is a snug fit in the bushing 15, while the other portions are of smaller diameter.

The valve 3 is of hollow or shell-like construction, and has also one portion 16 which is of larger diameter than the part 17, the chamber 16^a between the parts 16 and 17 being supplied with live fluid pressure through a passage 18, shown in dotted lines. The valve 3 is open at both its ends, thus forming a tubular shell, and controls a number of port openings, one of which, 19, leads to the external atmosphere from both the passage 20 and the passage 21, and another of which, 22, leads from the interior of the cylinder to the interior of the valve, when the valve is in its extreme left hand position, being closed when the valve is in the position shown in the drawings.

At the right side of the enlargement 16 of the valve there is a chamber 23, which has communication through a passage 24, with two port openings 25 and 26, that open into the interior of the piston cylinder. Supplemental exhaust ports to the atmosphere are provided at 27 and 28, the purpose of these being to facilitate the operation of the device as will appear from the description which I will now give.

Air being admitted past the throttle valve 4, enters through the radial ports 8, and drives the piston 2 to the left, which is its impact stroke, during which it cuts off the exhaust port 27 to the atmosphere, and then the opening leading to the passage 20, and, continuing its travel, until the head 14 uncovers the port 25, when live pressure enters the passage 24, and acting in the chamber 23 upon an area of the valve larger than the area exposed in the chamber 16^a, shifts it to the left, cutting off the exhaust port 19, from both the passages 20 and 21, and opening the passage 22 where-

No. 751,073.

PATENTED FEB. 2, 1904.

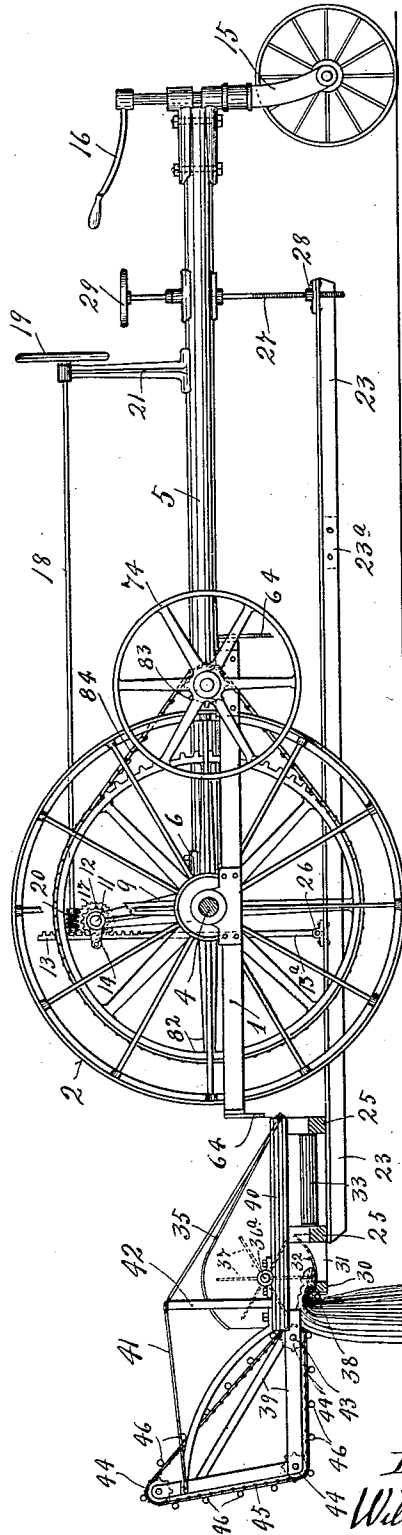
T. O. HELGERSON.
TRAVELING THRESHER.

APPLICATION FILED NOV. 12, 1902.

NO MODEL.

7 SHEETS—SHEET 2.

Fig. 2.



Witnesses.
A. H. Opsahl.
H. H. Helgeson.

Inventor.
T. O. Helgeson.
By his Attorneys.
William Merchant

No. 751,073.

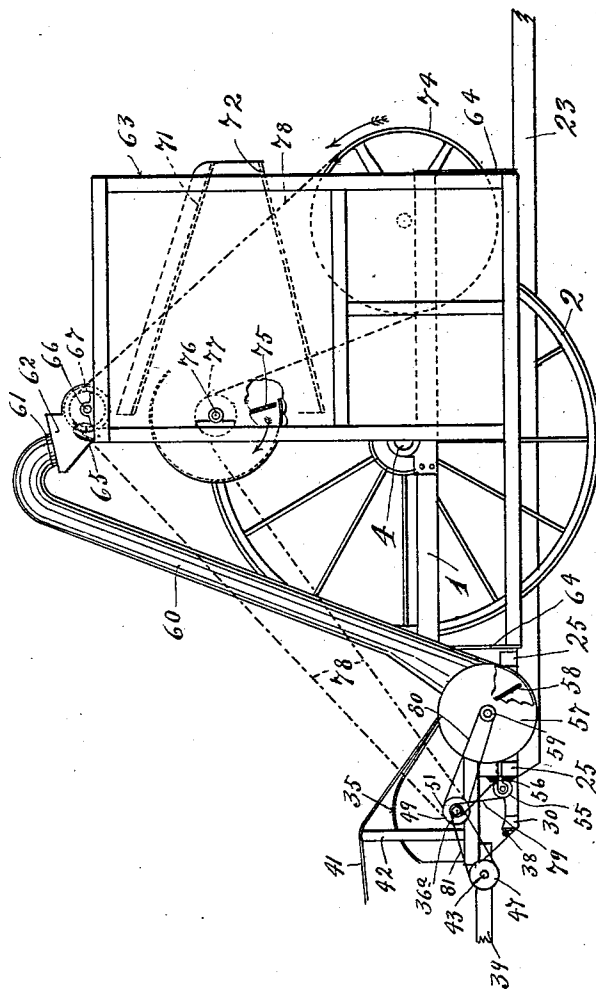
PATENTED FEB. 2, 1904.

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NO MODEL.

7 SHEETS—SHEET 3.

Fig. 3.



Witnesses
A. H. Opsahl
H. D. Hilgerson

Inventor.
T. O. Helgerson.
By his Attorneys
Williamson & Merchant

No. 751,073.

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T. O. HELGERSON.
TRAVELING THRESHER.
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NO MODEL.

7 SHEETS—SHEET 4.

Fig. 4.

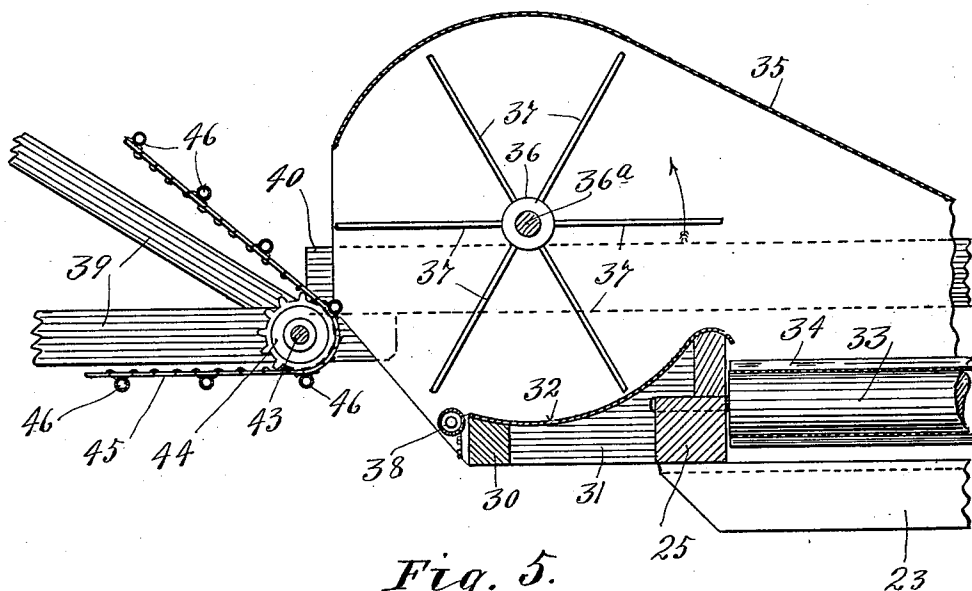
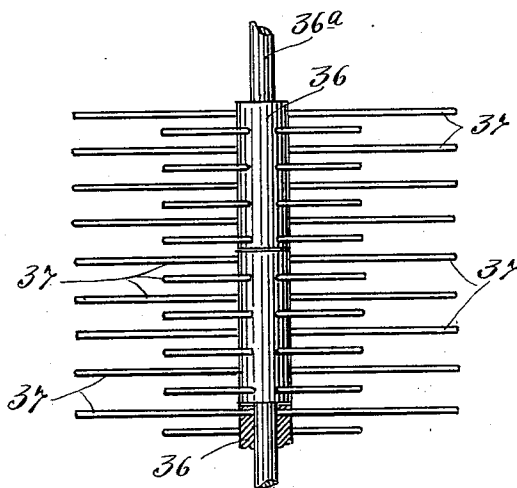


Fig. 5.



Witnesses.
A. H. Opsahl.
H. D. Helgerson

Inventor.
T. O. Helgerson
By his Attorneys
Williamson & Merchant

No. 751,073.

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T. O. HELGERSON.
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APPLICATION FILED NOV. 12, 1902.

NO MODEL.

7 SHEETS—SHEET 5.

Fig. 6.

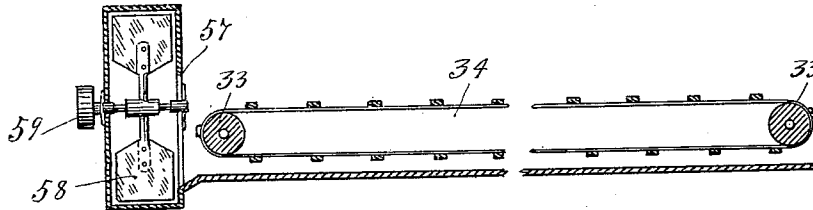
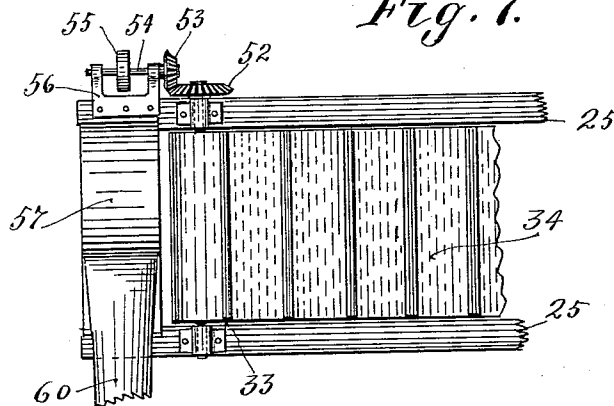


Fig. 7.



Witnesses.
a. H. Opsahl.
H. D. Helgerson

Inventor.
T. O. Helgerson.
By his Attorneys.
William M. Merchant

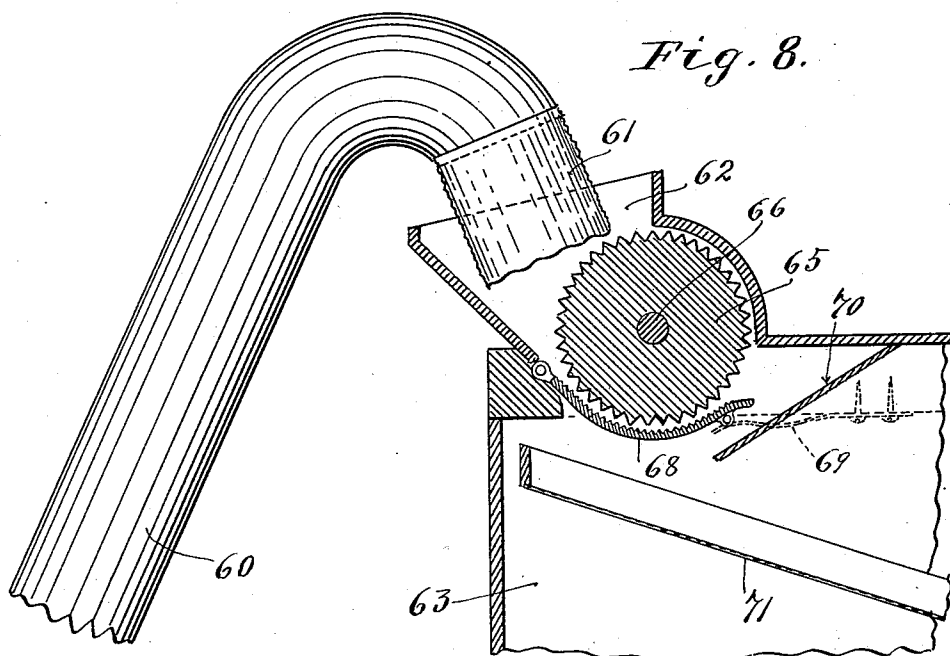
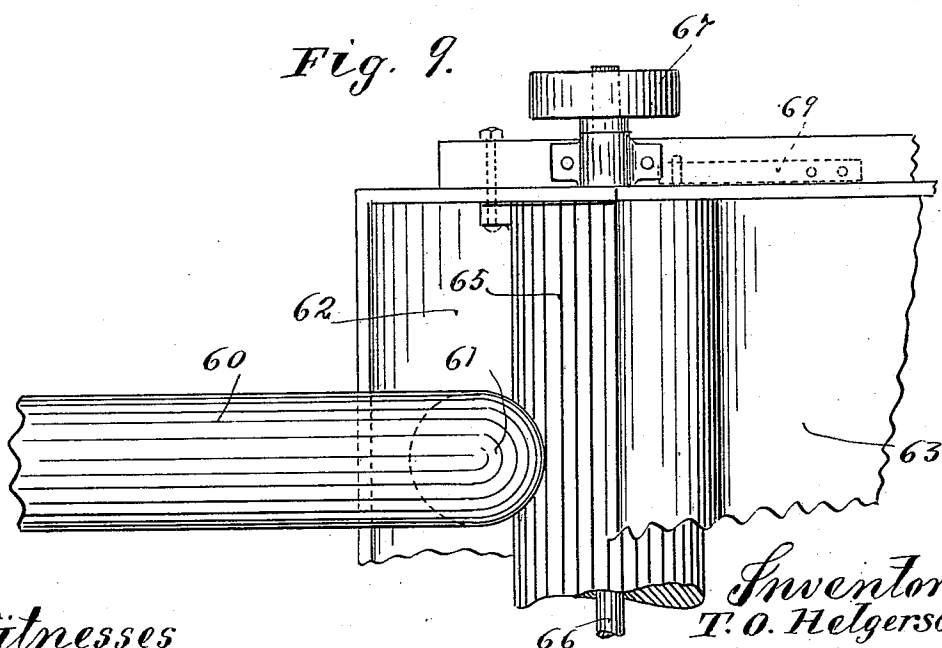
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T. O. HELGERSON.
TRAVELING THRESHER.
APPLICATION FILED NOV. 12, 1902.

NO MODEL.

7 SHEETS—SHEET 6.



Witnesses
A. H. Opsahl.
H. D. Kilgus.

Inventor.
T. O. Helgerson
By his Attorneys.
Williamson & Merdion

No. 751,073.

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T. O. HELGERSON.
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APPLICATION FILED NOV. 12, 1902.

NO MODEL.

7 SHEETS—SHEET 7.

Fig. 11.

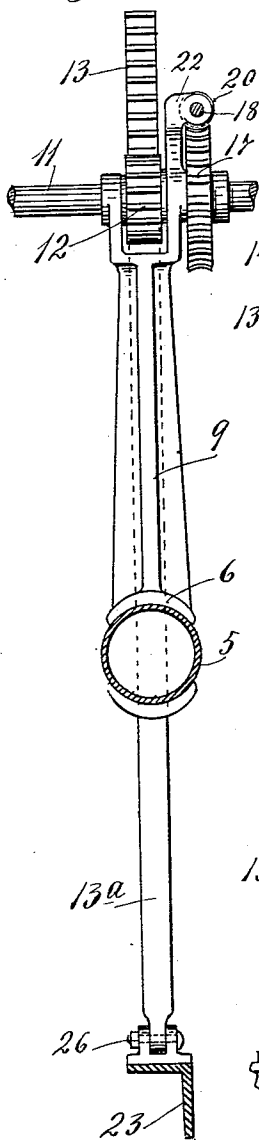
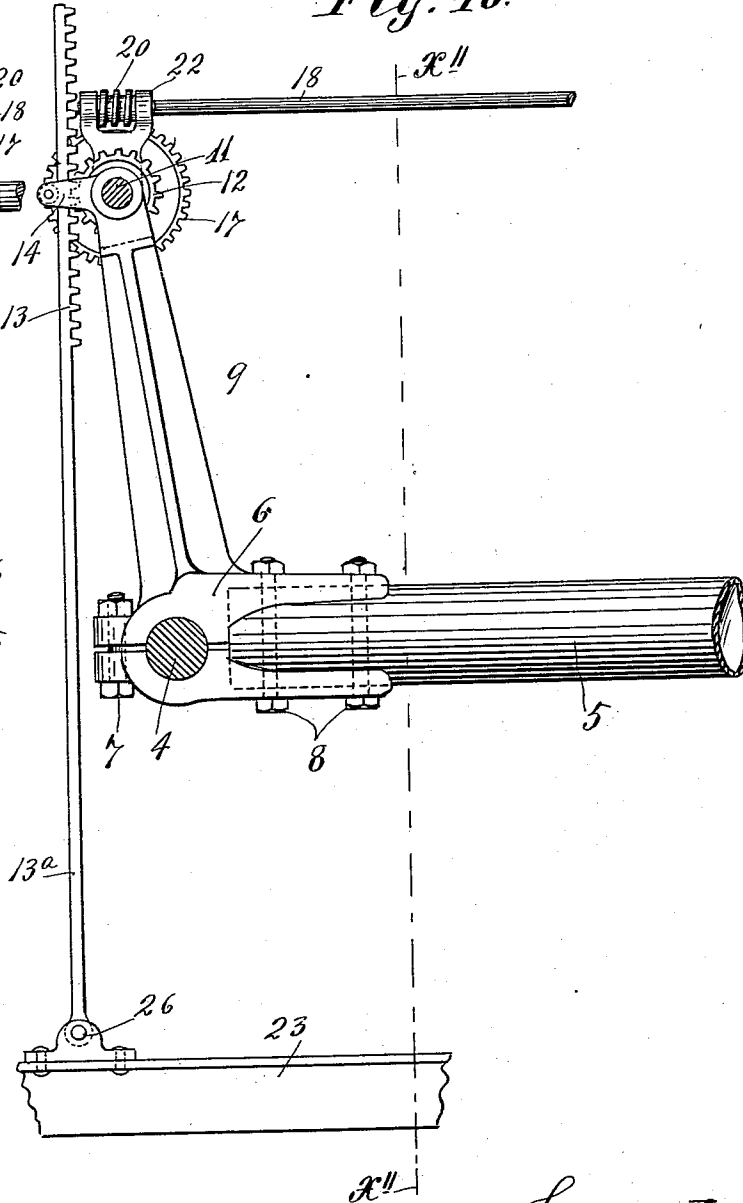


Fig. 10.



Witnesses.
A. H. Opsahl.
H. D. Kilgore

Inventor.
T. O. Helgerson.
By his Attorneys.
Williamson Merchant

UNITED STATES PATENT OFFICE.

THOMAS O. HELGERSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF TWO-THIRDS TO JULIUS ROSHOLT AND C. A. PAULSON, OF MINNEAPOLIS, MINNESOTA.

TRAVELING THRESHER.

SPECIFICATION forming part of Letters Patent No. 751,073, dated February 2, 1904.

Application filed November 12, 1902. Serial No. 130,987. (No model.)

To all whom it may concern:

Be it known that I, THOMAS O. HELGERSON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Traveling Threshers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide an improved traveling thresher adapted to thresh standing grain or seeds while traveling the field and without cutting down the straw or stalks.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

A machine designed in accordance with my invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a plan view of the complete machine with some parts broken away and with others removed. Fig. 2 is a vertical section of the machine, taken on the line $x^2 x^2$ of Fig. 1. Fig. 3 is a view in left side elevation, showing principally those portions of the machine which are cut away in Fig. 2. Fig. 4 is an enlarged view, in vertical section, on the line $x^4 x^4$ of Fig. 1, some parts being broken away. Fig. 5 is a plan view of a portion of the so-called "beating-brush." Fig. 6 is a transverse vertical section on the line $x^6 x^6$ of Fig. 1. Fig. 7 is a plan view of the parts shown in Fig. 6, some parts being broken away. Fig. 8 is a vertical section on the line $x^8 x^8$ of Fig. 1, some parts being broken away. Fig. 9 is a plan view of the parts shown in Fig. 8, portions thereof being broken away. Fig. 10 is a detail of a raising and lowering device, taken in section on the line $x^{10} x^{10}$ of Fig. 1; and Fig. 11 is a transverse vertical section on the line $x^{11} x^{11}$ of Fig. 10.

It may be here premised that the machine hereinafter described in detail is arranged to

be pushed ahead by horses or other draft-animals or other motive power, for that matter, attached in the rear thereof. The machine does not cut the straw, but threshes the grain or seed from the standing straw or stalks as it is driven forward.

The rectangular main frame 1 of the machine is supported by a pair of large and broad-faced wheels 2 and 3, which are loosely mounted on a heavy axle 4, rigidly secured to said frame 1 and projecting at the right-hand side thereof. The wheel 2 is embraced by the frame 1 and is, in fact, the traction-wheel or driver of the threshing mechanism. A long pole 5 is rigidly connected to the shaft 4 quite close to the drive-wheel 2 by means of a divided clamp or socket 6 and nutted bolts 7 and 8, passed through the said parts, as best shown in Fig. 10. The upper section of the socket 6 is provided with a vertical standard 9, and rigidly secured to the outer end of the non-rotary axle 4 is a similar arm 10.

In Fig. 1, 1^a indicates a brace which extends from the base of the standard 10 to one corner of the main frame 1. A shaft 11 is journaled in the upper end of the standards 9 and 10, and between prongs of the said standards said shaft 11 is provided with small spur-gears 12. The gears 12 mesh with racks 13, which are loosely held for vertical and limited oscillatory movements by keepers 14, projecting forward from the upper ends of the standards 9 and 10. (See particularly Fig. 10.) The racks 13 have long depending bars 13^a, to which, as will be hereinafter noted, a vertically-adjustable supplemental frame is attached.

At the rear end of the pole 5 is a caster-wheel 15, the pintle-rod of which is provided with a hand-lever 16, by means of which the said caster-wheel may be oscillated in a horizontal plane, and thereby made to serve as a rudder to steer the machine.

The racks 13 are raised and lowered as follows: The shaft 11 is provided close to the bracket 9 with a worm-wheel 17. (See Figs. 10 and 11.) The numeral 18 indicates a long rod provided at its rear end with a hand-wheel

19 and at its forward end with a worm or screw 20, which latter meshes with said gear 17. Said shaft 18 is journaled in the standard 21 on the pole 5 and in a pronged extension 22 of the bracket 9, which extension 22 also holds the worm 20 and shaft 18 against endwise movements.

The supplemental frame, heretofore incidentally referred to, is made up preferably of a straight angle-bar 23, a bent angle-bar 24, and a pair of parallel transversely-extended beams 25. The bars 23 and 24 are riveted or otherwise rigidly secured at 23^a, and the beams 25 are rigidly secured to the parallel forwardly-projecting ends of the said bars 23 and 24. The depending ends of the rack-bars 13^a are pivotally connected to brackets 26, one on the bar 23 and the other on the bar 24. (See Figs. 10 and 11.) A long vertical screw-rod 27 is passed through and swiveled in the rear portion of the pole 5 and is screwed through a nut-block 28 on the rear end of the supplemental frame-bar 23. At its upper end the screw-rod 27 is provided with a hand-piece 29, by means of which it may be readily turned. As is evident, by turning the rod 18 and the screw-rod 27 the supplemental frame may be raised vertically and lowered to any desired altitude within, of course, certain limits.

Extending transversely of the machine, in front of the forward beam 25, is a bar 30, supported by brackets 31 from the said beam 25. A smooth and toothless concave 32 is supported by the bar 30, brackets 31, and adjacent beam 25, as best shown in Figs. 2 and 4.

Journaled in the beams 25, near the ends thereof, is a pair of rollers 33, over which runs an endless slat-and-belt conveyer 34. The concave 32 at its rear edge terminates over the forward edge of the conveyer-belt 34, so as to deliver onto the same, and the said belt 34 closely fills the space between the beams 25. A housing or case 35 incloses or covers the concave 33 and the conveyer 34. The said housing forward of and above the forward edge of the concave 32 is open for the introduction or entry of the heads of the standing grain. Working within the housing 35 and cooperating with the concave 32 is a so-called "beating-brush," preferably formed by hub-sections 36 and radial teeth 37, which hub-sections are mounted on and carried by a shaft 36^a, suitably journaled in the sides of the housing 35. The teeth 37 of this so-called "beating-brush" are formed by straight sections of quite stiff spring-steel rods, and their outer ends are simply cut straight across and left without heads, forks, or other enlargement. The said spring teeth or rods 37 are preferably round in cross-section. This beating-brush is run at a very high rate of speed, and the ends of its teeth run very close to the concave 32.

Extending transversely of the machine, close to and just in front of the receiving edge of

the concave 32 and forming practically an extension and rounded forward edge thereof, is a roller 38, which is loosely mounted in the sides of the case 35.

The reel which delivers the heads of the standing grain to the concave and beating-brush is of novel construction and is preferably constructed as follows: 39 indicates the reel-supporting frame, which frame in vertical section longitudinally of the machine is triangular and is located with its lower side extending approximately in a horizontal plane and with one angle close to the front opening of the case 25. This frame 39 is supported at its rear end or angle by a pair of bars 40, secured on top of the transverse beams 25 just outward of the housing 35. The forward portion of said frame 39 is shown as supported by truss-rods 41, attached thereto and the rear ends of the bars 40, and passed over intermediate posts 42 on the said bars 40, as best shown in Figs. 1 and 2. In each of the three corners or angles of the frame 39 is journaled a transverse shaft 43, provided with a pair of sprockets 44, located one just inward of each side of the frame. Sprocket-chains 45 run over the three sprockets at each side of the frame, and these parallel sprocket-chains are connected by transversely-extended reel bars or rods 46.

The shaft 43 at the rear angle of the frame 39 projects at its left-hand end, as shown in Fig. 1, and is provided with a pulley 47. Also by reference to Fig. 1 it will be noted that the shaft 36^a of the beating-brush projects at its left-hand end and is provided with pulleys 48, 49, 50, and 51. It will be further noted by reference to Figs. 1 and 7 that the shaft of the left-hand roller 33 is provided at its forward end with a beveled gear 52, which meshes with a beveled pinion 53, carried by a short counter-shaft 54, provided with a pulley 55 and suitably journaled in a bracket 56, secured on the forward beam 25. The purposes of these pulleys and gears will be more fully set forth in tracing the driving-belts which transmit motion to the various parts under the advance movement of the machine. The endless conveying-belt 34 moves the grain or seeds from the right toward the left and delivers the same into the open side of a fan-case 57, suitably supported at the ends of the beams 25 and having mounted therein an ordinary fan 58, the shaft of which projects toward the left and is provided with a pulley 59.

The fan-case 57 has a nearly vertical discharge spout or tube 60, the upper end of which is turned downward and preferably provided with a flexible discharging-section 61, which opens directly into the open upper end of a hopper 62, supported on top of a rectangular case 63, which case in turn is rigidly supported by projecting bars 64, secured to the left-hand side of the primary or main frame 1.

Extending transversely of and mounted within the hopper 62 is a large feed-roller 65,

provided on its periphery with longitudinally-extended V-shaped corrugations. The shaft 66 of said roller projects at its right-hand end and is provided with a pulley 67. The bottom 5 of the hopper 62 is afforded by a pivoted concave 68, the upper surface of which is provided with corrugations of approximately the same form, but much smaller or finer than the corrugations of the roller 65. The free rear- 10 wardly-projecting end of the concave 68 is yieldingly pressed upward by springs 69, supported by the case 63.

The grain or seeds delivered from the rear end of the concave 68 are directed by a deflecting-board 70 onto a coarse screen 71. 15 The clean grain or seed will pass through the screen 71 and will be directed by an inclosed deck 72 into a suitable receptacle preferably formed at the bottom of the case 63. The 20 hulls or other coarse material which cannot pass through the screen 71 will be discharged off from the rear end thereof.

Journalled in suitable bearings on the rear portion of the main frame 1 is a short transverse counter-shaft 73, which carries a large 25 pulley 74, located in line with the heretofore-noted pulleys 67 and 49. Working within the case 63 between the screens 71 and the deck 72 is a fan 75, the shaft 76 of which projects 30 at the right and is provided with a pulley 77, (shown only by dotted lines in Fig. 3,) which is located in line with the said pulleys 49, 67, and 74. A driving-belt 78, (indicated by dotted lines in Fig. 3,) runs over the said pulleys 35 49, 67, 74, and 77. A short crossed belt 79 runs over the pulleys 55 and 50 and another short belt 80 runs over the pulleys 51 and 59. Still another short belt 81 runs over the pulleys 47 and 48.

40 A large sprocket-wheel 82 is rigidly secured to the hub of the large traction wheel or driver 2. On the counter-shaft 73 is a loose sprocket-pinion 83, over which and the said sprocket 82 runs a sprocket-chain 84. 45 The sprocket 83 is adapted to be connected to and disconnected from the counter-shaft 73 in the usual way by an ordinary sliding half-clutch 85, which is subject to a shipper-lever 86. (Shown as pivoted to the rear bar of the 50 frame 1.)

Operation: The manner in which the supplemental frame and the parts carried thereby are raised and lowered has already been described. From the description already given 55 it will also be understood that when the machine is driven forward motion will be transmitted from the traction-wheel 2 to all of the running parts of the machine. Under the action of the triangular reel the tops or 60 headed ends of the standing stock or straw are directed against the roller 38 and the heads are delivered directly in the path of movement of the spring fingers or rods 37 of said beating-brush. This brush, it will be remem- 65 bered, runs at a very high rate of speed in the

direction of the arrow marked thereon in Fig. 4. By the said spring-fingers the heads of the grain or other seed pods are struck in rapid succession and are bent rearward over the roller 38 and toward or onto the receiv- 70 ing end of the concave 32. Under this rapid and severe pounding action of the spring-fingers nearly all of the grain or seed will be threshed or separated from the hull. The reel-bars 46, it will be noted, after passing to 75 their extreme rear position, at which point they deliver the heads of the grain to the beater, move rapidly forward, but are elevated far enough to clear the heads of all of the standing grain. With this triangular form of 80 reel the reel-blades may be moved almost into contact with the fingers of the beater-brush. The commingled grain or seed and the loosened hulls which are thrown rearward from the concave 32 are delivered onto the endless 85 feed-belt 34, and thereby delivered into the fan-case 57, from whence they are blown by the fan 58 through the tube 60 and into the hopper 62. They are then fed by the corrugated feed-roller 65 over the corrugated sur- 90 face of the spring-pressed concave 68, under which action they are rubbed or scoured. This rubbing or scouring action serves to remove the husks and such of the seeds or grain as have not been properly threshed by the 95 beating-brush, and it further serves to remove from such seeds or grain "white caps" or other portions of the husk, which in many instances adhere thereto even after having 100 passed the beating-brush.

As already stated, the cleaned grain or seed which falls upon the sieve 71 after passing from the concave 68 passes through said sieve and is delivered to a suitable receptacle by 105 the deck 72, while the husks are under the action of the fan 75 blown off from the said sieve or delivered from the lower end thereof.

A peculiar scouring or rubbing action which I have found to be just what is required to 110 remove white caps and other portions of the husk or even the complete husk from grain and seeds is obtained by the roller having the relatively large corrugations and the concave having the relatively small or fine corruga- 115 tions. Furthermore, by far the best results are obtained by making the said corrugations in both instances V-shaped instead of curved. The concave should of course be spring-pressed or adapted to yield to different 120 thicknesses of grain or seed which at different times will be forced between the said roller and concave.

A machine of the above character I have in actual field tests found extremely efficient for 125 threshing flax as well as for threshing wheat and oats from the standing stalks.

In threshing flax it is of course desirable not to break or mutilate the straw, for the reason that such straw has considerable com- 130 mercial value if properly treated and not im-

properly broken. In some cases also it is desirable to preserve the straw of wheat and oats for commercial purposes. In other cases—that is, in many districts—wheat and oats straw is of such small commercial value that it is harvested by the use of “headers” and the straw is left standing and frequently burned on the field.

My improved traveling thresher meets the requirements of all the above-noted conditions. It takes the place of a header and performs the additional work of a thresher. Furthermore, it is of comparatively small cost, may be driven with ease, considering the work that it performs, and is extremely efficient for the purposes had in view.

It will of course be understood that the device described is capable of considerable modification within the scope of my invention as herein set forth and claimed.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a traveling thresher, the combination with a toothless concave and a cooperating beating-brush, of a transversely-movable endless conveyer receiving the threshed grain from said concave, and a housing inclosing said concave brush and conveyer, substantially as described.

2. In a traveling thresher, the combination with the primary threshing mechanism located for direct action on the heads of the standing

grain, of an endless conveyer receiving therefrom, a pneumatic elevator receiving from said conveyer, and a huller receiving from said pneumatic elevator, substantially as described.

3. In a traveling thresher, the combination with a concave and cooperating beater, of a reel for directing the heads of the standing grain, directly to said concave and beater, said reel comprising guides at three points only, an endless carrier moving in a triangular course over said guides and provided with cross-slats, the said guides being so arranged that the said slats travel a triangular course and move, first approximately vertically downward, then horizontally rearward and then abruptly forward and upward, substantially as described.

4. In a traveling thresher, the combination with primary threshing mechanism, involving a concave and rapidly-rotating beater, an endless transversely-movable conveyer receiving from said concave and beater, and a housing incasing said beater and extending over said endless conveyer to prevent the scattering of the grain and directing the same onto the said endless conveyer, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS O. HELGERSON.

Witnesses:

ELIZABETH H. KELEHER,
F. D. MERCHANT.