No. 748,539. PATENTED DEC. 29, 1903.

H. SNYDER.

DRIVING MECHANISM FOR MECHANICAL STOKERS.

APPLICATION FILED SEPT. 17, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

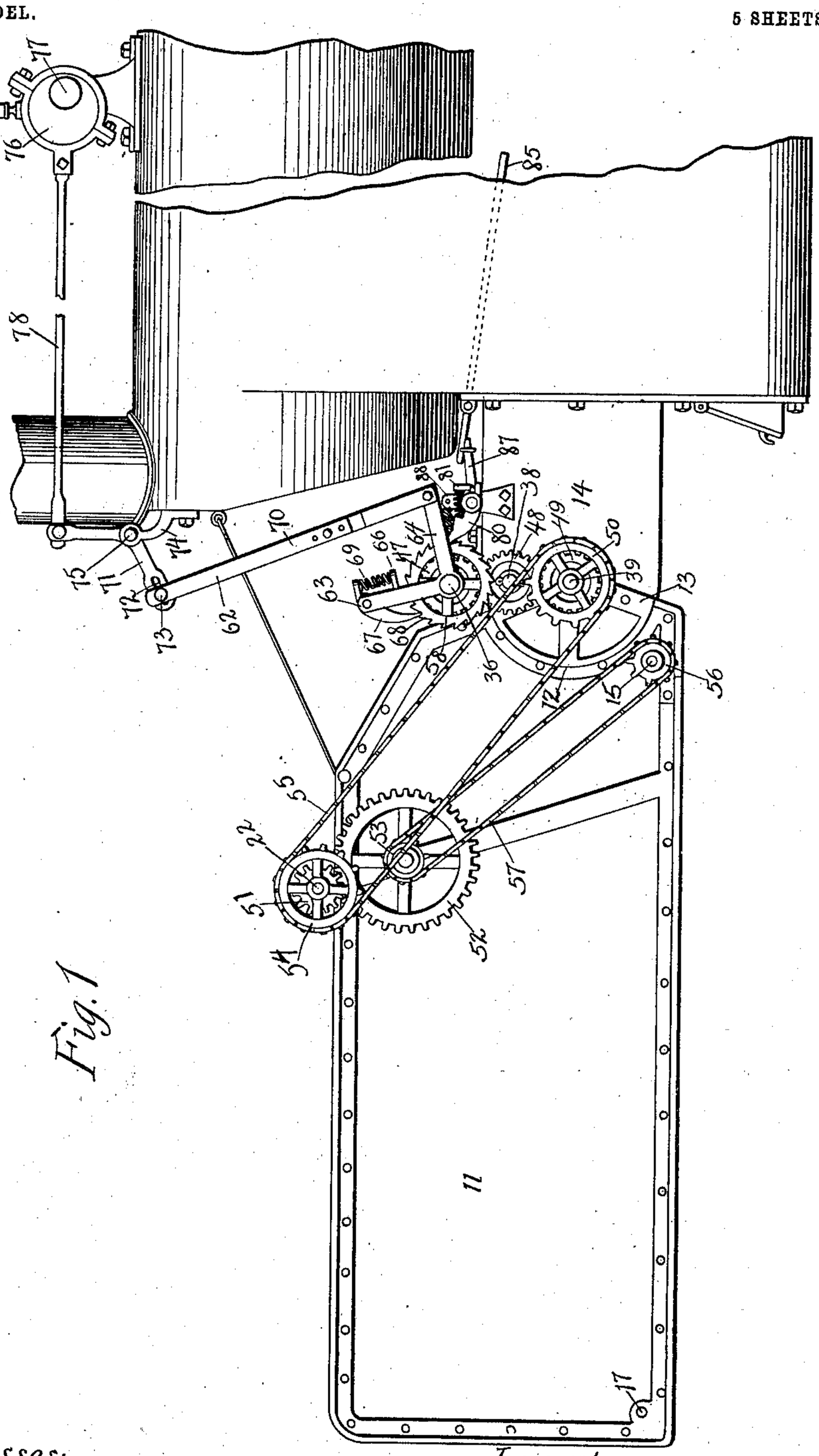

Fig. 1

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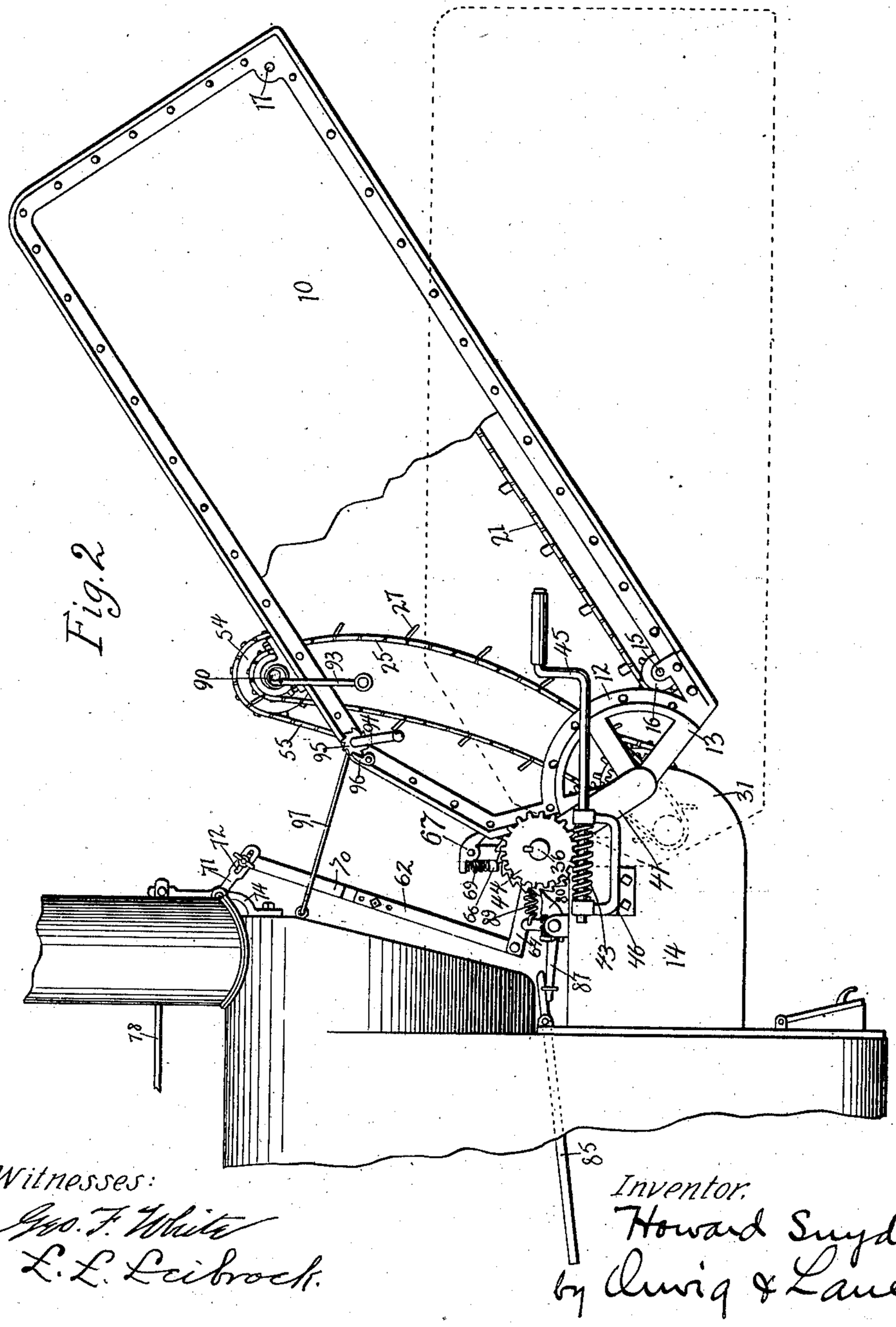
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 3.

Fig 3

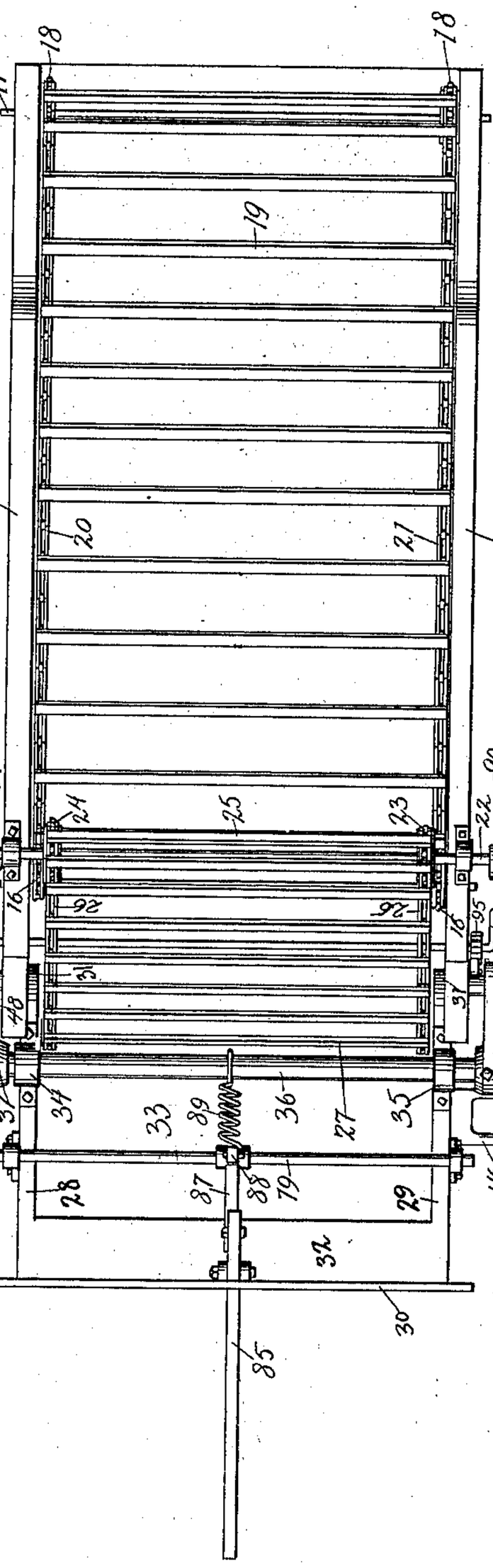
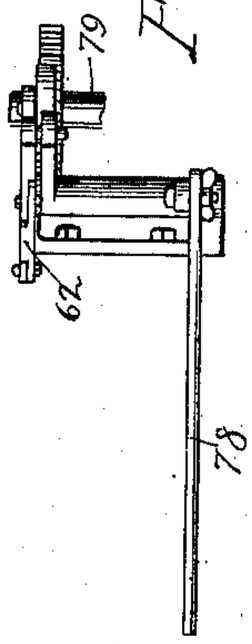


Fig. 4



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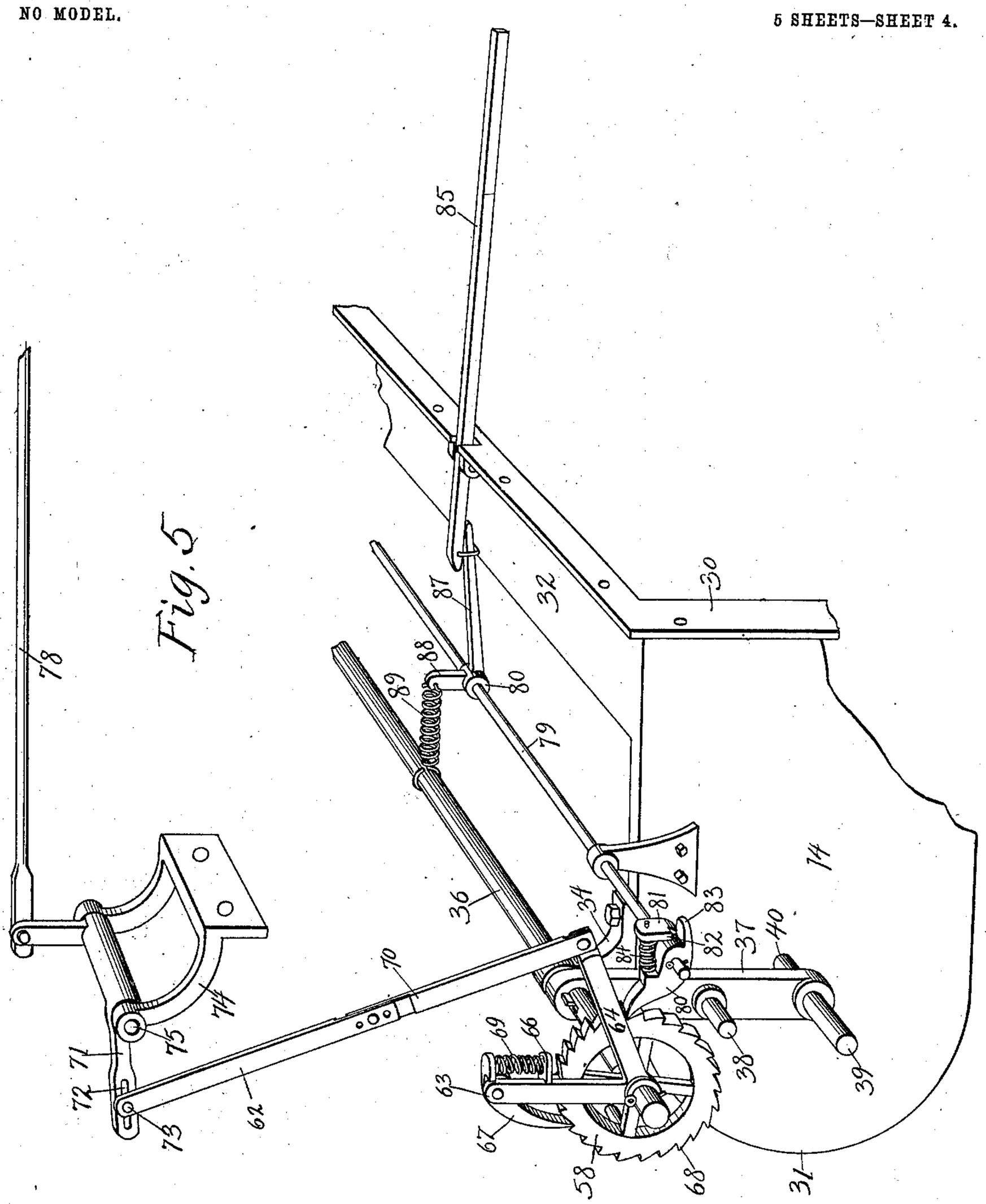
NO MODEL. 5 SHEETS—SHEET 4.

Fig. 5



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APPLICATION FILED SEPT. 17, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 6

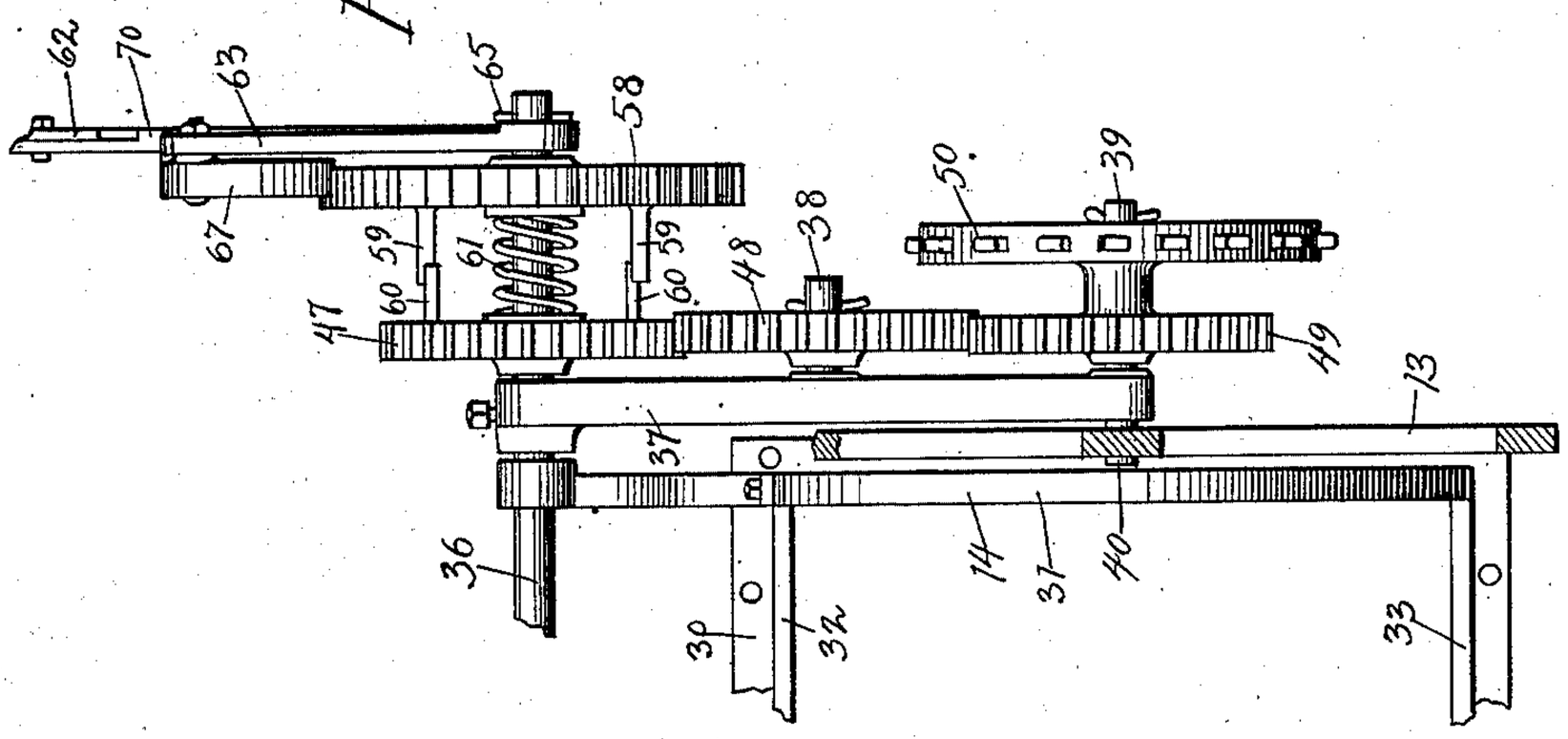


Fig. 7

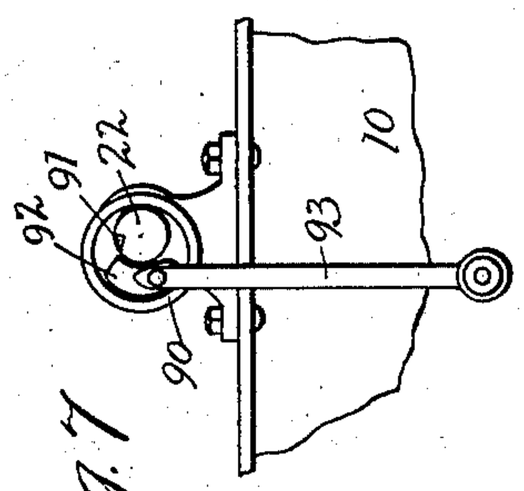
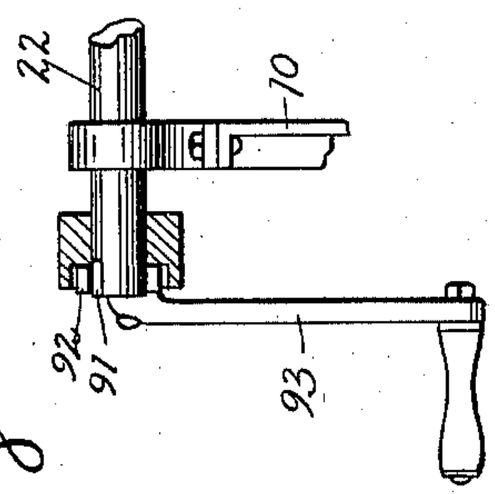


Fig. 8



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No. 748,539. Patented December 29, 1903.

UNITED STATES PATENT OFFICE.

HOWARD SNYDER, OF NEWTON, IOWA, ASSIGNOR TO FRED L. MAYTAG, OF NEWTON, IOWA.

DRIVING MECHANISM FOR MECHANICAL STOKERS.

SPECIFICATION forming part of Letters Patent No. 748,539, dated December 29, 1903.

Application filed September 17, 1902. Serial No. 123,795. (No model.)

To all whom it may concern:

Be it known that I, HOWARD SNYDER, a citizen of the United States, residing at Newton, in the county of Jasper and State of Iowa, have invented certain new and useful Improvements in Driving Mechanism for Mechanical Stokers, of which the following is a specification.

The objects of my invention are to provide a stoker designed to be attached to the ordinary straw-burning engine, the mechanism of which is capable of being driven from the main drive-shaft of the engine at any desirable speed, so that the straw which is placed in the stoker will be conveyed into the fire-box of the engine, as desired.

A further object is to provide means for supporting the stoker relative to the engine in such a manner that the rear end of the stoker can be raised or lowered at the desire of the operator relative to the point of attachment of the stoker to the engine and the mechanism for driving the stoker will be constantly kept in gear while the rear end of the stoker is raised or lowered.

A further object is to provide means for automatically throwing the mechanism for driving the stoker in and out of gear with the driving-shaft of the engine, also to provide means for manually operating the conveyers which are between the sides of the stoker-casing.

It is my object, further, to provide a worm gear-wheel by means of which the casing of my stoker can be thrown rearwardly and upwardly in a direction away from the lower portion of the engine and maintained in that position.

A further and very material object is to provide a driving mechanism for mechanical stokers of simple, durable, and inexpensive construction which can be readily and easily attached to the ordinary straw-burning engine immediately outside of the fire-box, so arranged that the conveyers in the stoker can be driven very slowly and the straw in the stoker will not be fed too rapidly into the fire-box of the engine even though the driving-shaft to which one end of the mechanism is attached is rotating very rapidly. This mechanism is adjusted so that it will cease to operate when the straw has attained a certain height in the fire-box of the engine, even though the driving-shaft of the engine is rotating.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the stoker, showing the way in which the driving mechanism of the stoker is attached to the end of the engine outside of the fire-box and the way in which said mechanism is connected with the main driving-shaft of the engine, a portion of the engine being broken away. Fig. 2 is a side elevation of the opposite side of the stoker from that which is shown in Fig. 1. This view shows the worm gear-wheel by which the stoker-casing is thrown upwardly and rearwardly relative to the lower front of the engine. This view also shows a portion of the casing broken away to illustrate fully the conveyers on the interior of the casing. Fig. 3 is a plan view of the stoker detached from the engine, the pawl-driving lever being cut through to show more clearly the mechanism directly beneath it. Fig. 4 shows the way in which the bell-crank lever is attached to the pawl-driving lever and to the connecting-rod between the bell-crank lever and the eccentric on the main shaft of the engine. This view shows in detail these connections. Fig. 5 shows in perspective a portion of one side of the framework which is attached to the engine and against which the stoker-casing rests when in position for use. This view is intended to illustrate the way in which the pawl-driving lever operates to rotate the wheel which operates the driving mechanism of the stoker. This view also shows clearly the pawl which holds said wheel from rotation toward the engine. The cog-wheels are designed to be mounted on the main supporting-lug, the casing mounted on said lug removed for bringing out these points more clearly. Fig. 6 is a detail view of the cog-wheels, which are mounted on the main supporting-lug and on the supporting-shaft for

my stoker and the way in which they are placed relative to each other and to the framework which is attached to the engine outside of the fire-box. Fig. 7 shows in detail the means designed to be mounted on the driving-shaft above the casing of the stoker, which is in the nature of an eccentric that allows the handle to remain perfectly still while the shaft is rotated. When it is desired to rotate the shaft by means of this eccentric-crank, the operator can do this by simply turning the crank; and Fig. 8 shows in perspective a detail of this eccentric-crank when in position for turning the shaft referred to in the short description of Fig. 7.

Referring to the accompanying drawings, I have used the reference-numerals 10 and 11 to indicate the side portions of the casing of my stoker. These side portions 10 and 11 are made solid and of thin material. In the forward end of each side of my casing and forming its front portion I have provided a semicircular portion 12, having an outwardly-projecting lug 13, designed to receive against its inner face the substantially semicircular end of a framework 14, which will be more fully disclosed hereinafter. This semicircular portion is so arranged that the casing can be moved upwardly and downwardly on the semicircular portion of the framework 14 when the semicircular portion of said framework rests in the semicircular portion at the front of my casing. Each side of this casing has an opening through its extreme forward end designed to receive its supporting-lugs. Extending transversely of the casing and rotatably mounted in its sides 10 and 11 is the sprocket-bearing roller 15, having the sprocket-wheels 16 near each end thereof. This roller is mounted near the forward end of the casing. Near the rear end of the casing and mounted near its bottom portion is the sprocket-bearing roller 17, having the sprocket-wheels 18 near each end thereof.

Between the sides 10 and 11 of the casing and forming the bottom of it is the endless conveyer slat-belt 19, having side chains 20 and 21 passing over the sprocket-wheels 16 and 18. Mounted on top of the sides 10 and 11 of the casing is the drive-shaft 22. Said drive-shaft has two sprocket-wheels 23 and 24 on it, said sprocket-wheel 24 being just inside of the side 11 and the sprocket-wheel 23 being just inside of the side 10 of the casing. Passing over these sprocket-wheels 23 and 24 is the floating feeder 25, provided with endless chains 26, said chains 26 being connected by angle-iron feed-plates 27, adapted to push with their vertically or outwardly extending members the material in the casing into the fire-box of the engine, and thus insure a proper delivery of the straw from the casing into the fire-box.

In the lower end of the floating feeder, around which this feeder passes, is a rod designed to rotate freely between the upper and lower portions of the feeder and keep its lower surface in its proper position against the straw which is being forced into the fire-box and above which this floating feeder operates. Attached to the rear of the engine and outside of the mouth of the fire-box is the framework 14, having the sides 28 and 29 therein extending substantially at right angles to the back portion 30, which is firmly attached to the engine proper. These side portions 28 and 29 are also substantially parallel with each other and extend rearwardly from its point of attachment on the engine. The rear ends 31 of these sides 28 and 29 are substantially semicircular in shape and designed to engage the semicircular portion at the front of each side of the casing. These semicircular portions 31 and the semicircular portions at the front of the casing against which they rest when the casing is in position are designed to coact with each other, and these sides 28 and 29 provide a firm brace against which the forward end of the casing rests. These sides are connected by the top portion 32 and the bottom portion 33. The forward end of the conveyer slat-belt 19 is designed to push the straw forwardly onto the bottom portion 33 of the framework, and this bottom 33 allows the straw to slide over it and into the fire-box, which is at the forward end of said framework, as the rear end of this framework fits around the mouth of the fire-box of the engine. Thus it will be seen as the conveyer 19 and the floating feeder are operated and as the lower end of the floating feeder extends partially over the bottom 33 of this framework the straw will be readily forced over this bottom portion 33 and into the fire-box of the engine. I support my casing relative to the framework and to the engine by the following means, and I drive my conveyer 19 and the floating feeder 25 by means hereinafter more fully disclosed, this driving mechanism forming the principal feature of my invention.

Extending transversely of the framework 14 and rotatably mounted on top of the sides 28 and 29 by means of the bearings 34 and 35 is the supporting-shaft 36. This supporting-shaft 36 has mounted near one end the supporting-lug 37. This supporting-lug 37 is held firmly in position on said supporting-shaft 36 and extends downwardly from its point of attachment on the shaft 36. It is also outside of the side 28 in the framework 14. Extending at right angles to the supporting-lug 37 and substantially parallel with each other are the cog-bearing lugs 38 and 39 and also the inwardly-projecting casing-supporting lug 40. This inwardly-projecting lug 40 is designed to fit inside of the opening at the front portion of the side 11 of the casing, and this side is so arranged that this side 11 of the casing is rotatable on said lug 40. At the opposite end of the supporting-shaft 36 from that upon which the supporting-lug 37 is attached is a supporting-lug 41, said supporting-lug having an inwardly-

projecting casing bearing-lug 42 thereon, said lug being designed to enter the opening at the extreme forward portion of the side 10 in the casing. This lug 41 is also firmly mounted on the supporting-shaft 36, so that when the shaft is turned in one direction the lower ends of the lugs will be moved rearwardly and upwardly relative to the supporting-shaft 36, and thus throw the casing which is mounted at the lower end of said lugs 37 and 41 upwardly and rearwardly from the framework 14, and thus prevent the straw which is on the interior of the receiving-casing from being pushed onto the bottom 33 of the framework 14. I rotate the shaft 36, and thus throw the casing outwardly and rearwardly from the rear of the framework by means of the worm-gear 43, which is designed to coact with the cog-wheel 44, mounted on the shaft 36, so that when the crank 45, upon which the worm-gear is mounted, is rotated in one direction in the bracket 46, which is mounted on the engine, the straw-receiving casing will be thrown upwardly and rearwardly from the rear of the frame 14 and when rotated in the opposite direction the straw-receiving casing will be allowed to move back to its original position against the semicircular portions 31 of the sides of the framework 14.

Rotatably mounted on the supporting-shaft 36 and outside of the supporting-lug 37 is the cog-wheel 47, said cog-wheel 47 being designed to be in mesh with the cog-wheel 48, which is mounted on the cog-bearing lug 38. Mounted on the cog-supporting lug 39 is the cog-wheel 49, which is in mesh with the wheel 48, so that as the cog-wheel 47 is rotated the cog-wheels 48 and 49 will be rotated and on account of the cog-wheel 48 being between the cog-wheels 47 and 49 the cog-wheels 47 and 49 will be rotated in the same direction. Mounted on the shaft 39 and integral with the cog-wheel 49 is the sprocket-wheel 50, so that when the cog-wheel 49 is rotated the sprocket-wheel 50 will be rotated in the same direction.

Mounted on the driving-shaft 22 and outside of the side 11 of the casing is the cog-wheel 51. Rotatably mounted on the outside of the side 11 of the casing and in mesh with the cog-wheel 51 is the cog-wheel 52, having a small sprocket-wheel 53 mounted integral with it and on its exterior side. Mounted on the shaft 22 outside of the gear-wheel 51 and made integral with said gear-wheel is the sprocket-wheel 54. Over the sprocket-wheel 54 and the sprocket-wheel 50 is the sprocket-chain 55, so that when the sprocket-wheel 50 is rotated the sprocket-wheel 54 will be rotated in the same direction, and the gear-wheel 51, which is in mesh with the gear-wheel 52 and integral with the sprocket-wheel 54, will drive the gear-wheel 52 and the sprocket-wheel 53, which is cast integral with the gear-wheel 52 in the opposite direction from that in which the sprocket-wheel 54 is rotating.

Mounted on the sprocket-bearing roller and outside of the side 11 of the casing is the sprocket-wheel 56. Passed over the sprocket-wheel 53 and the sprocket-wheel 56 is the sprocket-chain 57, so arranged that when the sprocket-wheel 53 is rotated in one direction the sprocket-wheel 56 will be rotated in the same direction as the sprocket-wheel 53 and in the opposite direction from the sprocket-wheel 54. These sprocket-wheels are arranged in the manner above set forth, so that as the sprocket-wheel 54 is rotated in such a way as to drive the straw which is beneath it in a direction toward the rear of the engine and as the sprocket-wheel 56 is rotated in the opposite direction from the sprocket-wheel 54 this will cause the conveyer 19 to push the straw forwardly onto the bottom 33 of the frame 14, and by this means force the straw into the fire-box. This conveyer 19 is moved on account of its being mounted on the shaft 15, upon which shaft the sprocket-wheel 56 is mounted and driven.

Rotatably mounted outside of the gear-wheel 47 on the supporting-shaft 36 is the main drive-wheel 58 of my mechanism, said main drive-wheel 58 having inwardly-projecting lugs 59, designed to engage the outwardly-projecting lugs 60, which extend from the gear-wheel 47, so that as the main drive-wheel 58 is rotated in one direction the gear-wheel 47 will be driven in a corresponding direction. Mounted on that portion of the shaft 36 which is between the main drive-wheel of my mechanism 58 and the gear-wheel 47 is the coil-spring 61, designed to hold these wheels apart, also to hold the gear-wheel 47 firmly in position when my driving mechanism is thrown out of operation, as hereinafter set out.

Mounted on the shaft 36 and outside of the main drive-wheel 58 is the pawl-driving lever 62. The pawl-driving lever has an angular portion at its lower extremity comprising the upright 63 and the portion 64, extending substantially at right angles to the upright 63. The parts 63 and 64 are integral with each other and have an opening through them at their point of meeting through which the shaft 36 extends. This pawl-driving lever is held on the shaft 36 by means of the retaining-pin 65. Projecting forwardly from the upright 63 and toward the engine is the lug 66 and a slight distance below the top of said upright. Pivotally mounted at the top of the upright 63 in the pawl-driving lever is the pawl 67, said pawl being designed to engage each of the ratchets 68 of the main drive-wheel 58 to force this drive-wheel to revolve on the shaft 36. The pawl 67 is held in engagement with the ratchet 68 by means of the coil-spring 69, which is attached to the rear end of the pawl and on the upper surface of the lugs 66, so that as the upright moves forwardly toward the engine the pawl will move in a corresponding direction and engage the

cog next in succession on the main drive-wheel when the main drive-wheel is held in position, as described hereinafter.

Pivotally attached to the rear end of the portion 64 in the pawl-driving lever is the adjustable connecting-rod 70. This rod is so arranged that the length of the stroke may be increased or diminished, and thus drive the main drive-wheel more or less rapidly. Pivotally attached to the rear of the engine and to the upper portion of the adjustable connecting-rod 70 is the bell-crank lever 71, having a slot 72, in which the pivot 73, which connects the pawl-driving lever with the bell-crank lever, can be adjusted to shorten or lengthen the stroke of the lower arm of the bell-crank lever as it acts on the pawl-driving lever. This bell-crank lever is attached to the rear of the engine by means of the brackets 74, and the bell-crank lever also swings on the pivot 75, which extends transversely of it and is mounted in the bracket 74, thus affording the lever a free rotary movement on its pivot.

Pivotally attached to the upper portion of the bell-crank lever at one end and at its other end to the eccentric 76, which is mounted on the main driving-shaft, is the rod 78, said rod extending longitudinally of the engine. I have arranged these levers and rods in the way set forth so that my mechanism for driving the stoker can be operated directly from the main driving-shaft of the engine upon which the eccentric is mounted. Rotatably mounted above the sides 28 and 29 of the frame 14 and in front of the supporting-shaft 36 is the pawl-bearing rod 79, having a pawl 80 rotatably mounted on one end of it and outside of the side 28 of the frame 14. This pawl is designed to engage the ratchets 68 of the main drive-wheel 58 and hold said main drive-wheel 58 against rotary movement in a direction toward the engine when said pawl is in engagement with the ratchets 68.

Integral with the rod 79 and adjacent to the pawl 80 is the retaining-lug 81, said lug having a projection 82 near its upper portion extending over the rearward projection 83 of the pawl 80. This projection 82 is designed to engage the rearwardly-projecting portion 83 of the pawl 80 when the rod 79 is rotated in a direction toward the engine, and thus force the pawl 80 out of engagement with the ratchets 68 on the main drive-wheel. Thus the operator has simply to rotate the rod 79 in a direction toward the engine and the pawl 80 will not engage the ratchets 68 on the main drive-wheel, and the pawl 80 will not hold the main drive-wheel against rotary movement in a direction toward the engine, and thus the pawl 67 will not rotate the drive-wheel 58 on account of the spring 61 constantly holding the main drive-wheel 58 in such a way that it will tend to rotate it toward the engine. Thus the pawl 67 will be held in engagement with one of the ratchets 68 on the main drive-wheel and will not leave that position until the main drive-wheel is held firmly against rotation in a direction toward the engine by means of the pawl 80. It will be clearly seen that on account of this arrangement of cog-wheels, pawls, and springs that none of the mechanism of my stoker will be driven to force the straw into the fire-box when the pawl 80 is out of engagement with the ratchets 68 on the main drive-wheel 58. This is true, because the projecting lugs 59 and 60 only engage each other when the main drive-wheel 68 is being rotated in a direction away from the engine, so that when the pawl 80 is out of engagement with the ratchets 68 on the main drive-wheel 58 and when the pawl-driving lever is being driven by the main drive-shaft of the engine the main drive-wheel 58 will simply rotate backwardly and forwardly on the shaft 36, and the mechanism for operating the stoker will not be driven at all. Connecting the pawl 80 and the lugs 81 is a coil-spring 84, designed to hold the pawl 80 against the main drive-wheel 58 when this pawl 80 is in engagement with this drive-wheel.

Instead of rotating the shaft 79 by hand to throw the pawl 80 out of engagement with the drive-wheel 58 I have provided an attachment by which it will be thrown out of engagement with the main drive-wheel automatically when the straw reaches a certain predetermined height in the fire-box. This result is accomplished by the following-described mechanism: Pivotally attached near the rear of the engine and above the mouth of the fire-box is a rod 85, said rod extending into the fire-box near the top thereof and projecting at its forward end a slight distance rearwardly from its pivotal point of attachment to the engine. The portion of the rod 85 which extends in front of its point of attachment is of considerable length and is so arranged that when the straw reaches a certain height in the fire-box the forward end of the rod 85 will be forced upwardly, and thus cause the rear end of the rod 85 to be forced downwardly.

Firmly mounted on the rod 79 is the bell-crank lever 86, one of the arms of said bell-crank lever extending forwardly from the rod 79 until it engages the under surface of that portion of the rod 85 which extends rearwardly from its point of attachment. The outer end of this arm 87 of the bell-crank lever 86 is designed to be forced downwardly when the rear end of the rod 85 is forced downwardly, and thus rotate the rod 78, to which the bell-crank lever is firmly attached, in a direction toward the engine and throw the pawl 80 out of engagement with the main drive-wheel 58. To the other arm, 88, of the bell-crank lever and connecting it with the supporting-shaft 36 is the coil-spring 89, designed to hold the rod 79 and the pawl 80, by which it is mounted, against rotation in a direction toward the engine when it is de-

sired to have the pawl in engagement with the main drive-wheel 58, so that the pawl 80 will be held against the main drive-wheel until the straw has reached a predetermined height in the fire-box, which causes it to be forced out of engagement with this drive-wheel.

The main drive-wheel 58 while driven to rotate the shaft 36 has what I term an "intermittent rotary motion." I mean by the term "intermittent rotary motion" that the wheel 58 and the shaft 36, as well as the other parts of the device which are driven by the wheel and shaft, are rotated a slight distance and in the same direction and then maintained in that position momentarily and again driven a slight distance. The object of this is to have the shaft 36 and the wheel 58 rotate at a slow rate of speed while the driving mechanism from which this wheel and shaft are driven is operating at a greater speed, the object being in this particular mechanism to drive the straw-advancing conveyers very slowly and at certain predetermined intervals controlled by the particular driving mechanism I have described, while the driving-shaft of the engine is being driven at a high rate of speed. I realize fully that the speed of the straw-advancing mechanism has been controlled by arrangements of gearing and that this straw-advancing mechanism has been thrown out of operation so as to drive the intermittent periods, said periods being controlled by the amount of straw fed into the fire-box; but I am not aware that the straw-advancing mechanism, which is driven directly from the driving-shaft of the main engine, has been so driven as to advance the straw a slight distance and then stop momentarily to drive again for a short distance and another momentary stop take place, and so on, the duration of the pause in the straw-driving mechanism being determined by the adjustments of the mechanical parts of the device.

Mounted on one end of the drive-shaft 22 and outside of the casing I have provided an eccentric-crank 90, the upper body portion of which has an opening through it designed to admit the shaft 22. Said shaft has a slight indentation 91 so constructed as to allow the pawl 92 to engage one side of said indentation when the crank-shaft 93 is rotated. This crank-shaft 93 is firmly attached to the body portion of the eccentric-crank. The pawl, however, is pivotally attached to this body portion and is designed to be out of engagement with the drive-shaft 22 except when the eccentric-crank is used for driving the mechanism of my stoker. This eccentric will hang in the position shown in Fig. 7 and will not rotate with the shaft 22 when the shaft 22 is being driven by the mechanism above described. It depends directly from its point of attachment except when it is used by the operator to operate the conveyer 19 and floating feeder 25. This eccentric-crank is designed to be used while the operator is feeding the straw into the engine before he has started the fire in the fire-box or when the drive-shaft of the engine is not in operation.

Rotatably mounted near the top and between the sides 10 and 11 of the casing I have provided the crank bearing-shaft 94, having a ratchet-wheel 95 firmly mounted on it. The ratchets of said wheel are to be engaged by the pawl 96 and hold the crank-shaft 94 in a direction toward the engine when so desired by the operator. Attached to this crank-shaft 94 and to the rear of the engine is the rope or chain 97, so that when the shaft 94 is rotated in a direction away from the engine the casing will swing its pivot 42 and the semicircular portions at the front of the casing will be moved on the semicircular portions 31 at the rear end of the frame 14, so that the rear end of the casing will be swung upwardly and allow the straw to be forced more easily between the bottom 33 of the frame 14 and the lower end of the floating feeder 25. By raising or lowering the rear end of this casing simply the gear-wheels (shown in Fig. 6 of the drawings) will not be thrown out of engagement with each other, nor will they be thrown out of engagement with each other when the casing is thrown upwardly and rearwardly from the frame 14 by means of the worm-gear 43. When the casing is thrown upwardly and rearwardly from the frame 14, the straw which is on the interior of the casing will not be forced into the fire-box.

In practical use and assuming that my stoker is attached in the way above described to the rear end of the engine and adjacent to the mouth of the fire-box of the engine, and that the pawl 81 is in engagement with the ratchets 68 on the main drive-wheel, and that the forward end of the casing is in engagement with the rear semicircular end of the frame 14, the operator then fills the casing with straw or other material of a similar nature upon the conveyer 19 and at the rear of the floating feeder 25. He then rotates the driving-shaft 22 by means of the eccentric-crank 90. When this shaft is rotated, all of the wheels in the driving mechanism will be rotated, and consequently the conveyers will be so moved as to force the straw forwardly and over the bottom 33 of the frame 14 and into the fire-box. He then lights the straw in the fire-box, and he still operates the driving mechanism by means of the eccentric-shaft until the water in the boiler of the engine has become hot and the main driving-shaft 77 is in operation. When this shaft begins to rotate in a direction away from the rear of the engine, the eccentric 76, which is attached to the bell-crank lever 71 by means of the rod 78, will cause the lower arm of the bell-crank lever 71 to be moved upwardly and downwardly in a vertical plane, and the pawl-bearing lever will force the pawl 67, which is in engagement

with the ratchets 68 of the main drive-wheel 58, rearwardly, and thus cause the drive-wheel 58 to be rotated in a direction away from the rear of the engine. When the lower arm of the bell-crank lever 71 moves upwardly, the pawl 80, which is in engagement with the ratchets of the main drive-wheel 58, will hold that drive-wheel against rotation toward the engine. Then as the lower arm of the bell-crank lever moves downwardly the pawl 67 will be drawn rearwardly one notch, and then as the lower arm of the bell-crank lever rises again the wheel 58 will be rotated in a direction away from the engine one notch, and it will be held in this position by means of the pawl 80, thus revolving the main drive-wheel 58 very slowly. The pawl-driving lever may be so adjusted relative to the lower arm of the bell-crank lever 71 that one ratchet may be taken at every revolution of the main drive-wheel or more than one ratchet may be taken by simply adjusting the length of the rod 70 and the pivot 73. As this drive-wheel 58 is revolved in a direction away from the rear of the engine, the cog-wheel 47 will be driven in a corresponding direction on account of the projecting lugs 59 engaging the projecting lugs 60 on the wheels 58 and 47, respectively. The cog-wheel 48 will be rotated on its axle in a direction toward the engine and in the opposite direction from the wheel 47. The cog-wheel 49 will be rotated in a direction away from the rear of the engine on account of its being in mesh with the cog-wheel 48. This will cause the sprocket-wheel 50, which is integral with the wheel 49, to be rotated in a direction away from the rear of the engine. Then as the sprocket-chain is passed over the wheel 50 and over the sprocket-wheel 54, which is mounted on the shaft which drives the floating feeder, the feeder will be driven in such a way as to force the straw onto the bottom 33 of the frame 14 and into the fire-box. The cog-wheels 51 and 52, which are in mesh with each other, are driven in opposite directions by means of this mechanism above referred to and on account of the cog-wheel 51 being made integral with the sprocket-wheel. The cog-wheel 51 will be rotated in a direction toward the engine, and the cog-wheel 52 will be rotated in a direction away from the engine. This cog-wheel 52 is so arranged that the sprocket-wheel 56 will be rotated in a direction toward the engine, and thus cause the conveyer 19 to be driven in such a way as to force the straw which is upon it forwardly toward the fire-box of the engine and beneath the floating feeder 25, whence it is forced into the fire-box. When the straw in the fire-box has reached any predetermined height at which the rod 85 may have been adjusted, the pawl 80 will be forced out of engagement with the drive-wheel 58, and thus prevent any more straw from being forced into the fire-box, because as the lower arm of the bell-crank lever 71 moves upwardly and downwardly the drive-wheel 58 will be driven forwardly and rearwardly and simply moved forward and backward on its axle without driving any of the other mechanism, as the pawl 80 is out of engagement with it and does not prevent rotation of the main drive-wheel in a direction toward the engine. This moves back and forward on account of the spring 61 holding one of the ratchets 68, which is engaged by the pawl 67 against that pawl, thus preventing the operation of the conveyer driving mechanism in the stoker.

Assuming that the operator desires to feed straw faster or slower into the fire-box, he can vary the speed to some extent by raising and lowering the casing by means of the crank-shaft 94. He can hold it in a raised position by turning the pawl 96 into engagement with the ratchets on the ratchet-wheel 95. In case it is desirable to throw the casing out of engagement with the frame 14, this can be done by operating the wormed gear 43, which will throw this casing upwardly and rearwardly from the rear portion of the frame 14. When the casing is in this raised position, easy access may be had to the interior of the fire-box. Any desirable mechanism may be used for preventing the fire from catching on the straw which is in the casing while it is burning in the fire-box.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States therefor, is—

1. In a device of the class described, the combination of a frame attached near and forming the mouth of the fire-box of an engine or furnace, substantially semicircular ends at the rear of the sides of said frame, a supporting-shaft mounted at the top of said sides, lugs depending from said shaft and detachably connected with it, a casing mounted on said lugs, a worm gear-wheel in mesh with said gear-wheel, and a crank for turning said worm gear-wheel, for the purposes stated.

2. In a device of the class described, the combination with a straw-receiving casing capable of being pivotally attached near the fire-box, of a straw-burning engine or furnace, means for swinging said casing rearwardly and upwardly from the engine, for the purposes stated.

3. In a device of the class described, the combination of a casing capable of being pivotally attached to a straw-burning engine or furnace, means for raising and lowering said casing on its pivot and means for raising said casing upwardly and rearwardly from the engine and for maintaining it in that position, for the purposes stated.

4. In a device of the class described, the combination of an engine or furnace, a frame mounted near the mouth of the fire-box of said engine or furnace, sides in said frame substantially semicircular rear ends for said sides, a casing pivotally attached to said frame having forward portions designed to

fit over said semicircular ends, for the purposes stated.

5. In a device of the class described, the combination of an engine or furnace, a frame mounted near the mouth of the fire-box of said engine or furnace, sides in said frame, substantially semicircular rear ends for said sides, a casing pivotally attached to said frame having forward portions designed to fit over said semicircular ends, and means for raising the casing upwardly and rearwardly from said semicircular ends, for the purposes stated.

6. In a device of the class described, the combination with a straw-burning engine or furnace, of a frame firmly attached at the mouth of the fire-box of said engine or furnace, a straw-receiving casing pivotally mounted on said frame, means for raising or lowering said casing vertically relative to the frame, a worm-gear attached near the mouth of the fire-box and so arranged as to enable the operator to swing the casing upwardly and rearwardly from said frame and maintain said casing at its upper rearward limit of movement, for the purposes stated.

7. In a device of the class described, the combination with a straw-burning engine or furnace, of a frame mounted near the mouth of the fire-box of said engine or furnace, substantially semicircular ends at the rear of the sides of said frame, a casing having semicircular forward portions designed to fit over said semicircular ends and pivotally attached to said frame, means for moving said casing upwardly and downwardly on said semicircular ends, for the purposes stated.

8. In a device of the class described, the combination with a straw-burning engine or furnace, of a frame mounted near the mouth of the fire-box, of said engine or furnace, substantially semicircular ends at the rear of the sides of said frame, a casing having semicircular forward portions designed to fit over said semicircular ends and pivotally attached to said frame, means for moving said casing upwardly and downwardly on said semicircular ends, means attached near the mouth of the engine for throwing the casing upwardly and rearwardly from said semicircular ends, for the purposes stated.

9. In a device of the class described, the combination with an engine or furnace, of a frame firmly attached near the mouth of the fire-box of said engine or furnace, semicircular rear ends for the sides of said frame, a supporting-shaft mounted on said frame, supporting-lugs depending at each end of said supporting-shaft, a casing pivotally mounted at the lower ends of said supporting-lugs, a worm-gear mounted near the mouth of the fire-box of the engine or furnace for holding said lugs in a vertical position and for swinging the lower ends of said lugs upwardly and rearwardly so that the casing can be swung in a corresponding direction and maintained in position away from the semicircular ends of said frame so that easy access may be had to the fire-box, for the purposes stated.

10. In the device of the class described, the combination with an engine or furnace, of a frame firmly attached near the mouth of the fire-box of said engine or furnace, semicircular rear ends for the sides of said frame, a supporting-shaft mounted on said frame, supporting-lugs depending at each end of said supporting-shaft, a casing pivotally mounted at the lower ends of said supporting-lugs, a worm-gear mounted near the mouth of the fire-box of the engine or furnace for holding said lugs in a vertical position and for swinging the lower ends of said lugs upwardly and rearwardly so that the casing can be swung in a corresponding direction and maintained in position away from the semicircular ends of said frame so that easy access may be had to the fire-box, a slat conveyer mounted near the bottom of said casing and a floating-feeder mounted at the upper forward portion of said casing, means for driving said conveyer and feeder, said means being mounted on the supporting-shaft and on the casing, substantially as and for the purposes stated.

11. In a device of the class described, a frame mounted near the mouth of the fire-box in an engine or furnace, a supporting-shaft mounted on said frame, supporting-lugs depending from said shaft, a gear-wheel mounted outside of one of said lugs, a second gear-wheel in mesh with said gear-wheel and rotatably mounted on the lug nearest said gear-wheel, a third gear-wheel rotatably mounted at the lower end of said lug and in mesh with said second gear-wheel, a sprocket-wheel cast integral with the third gear-wheel, means connected at one end with the main shaft of the engine for driving said cog-wheels and said sprocket-wheel, a casing mounted on said lugs, a slat conveyer at the bottom of said casing, a floating feeder mounted near the forward end of said casing, a driving mechanism attached to said casing for operating the floating feeder and the slat conveyer, means for connecting said driving mechanism with said sprocket-wheel, for the purposes stated.

12. In a device of the class described, the combination of an engine or furnace, supporting-lugs mounted near the mouth of the fire-box of the engine or furnace, a casing pivotally mounted on said lugs, means for swinging the casing upwardly on said lugs, and means for swinging the casing upwardly and rearwardly from the engine, for the purposes stated.

13. In a device of the class described, the combination of an engine or furnace, a shaft rotatably mounted near the mouth of the fire-box of said engine or furnace, supporting-lugs on said shaft, a casing pivotally mounted on said lugs, means for swinging said casing upwardly and rearwardly from the engine, for the purposes stated.

14. In a device of the class described, the combination with an engine or furnace, of a frame mounted outside of the fire-box of said engine or furnace, a supporting-shaft mounted at the top of said frame, lugs depending from said supporting-shaft, a gear-wheel mounted outside of one of said lugs and near one end of said supporting-shaft, a main drive-wheel outside of said gear-wheel and rotatably mounted on said shaft, lugs on the gear-wheel extending toward the main drive-wheel, lugs on said drive-wheel extending toward the gear-wheel and engaging the lugs on it when the drive-wheel is rotated in a direction away from the engine, a pawl-bearing lever mounted on said supporting-shaft and outside of the main drive-wheel, a pawl for engaging the ratchets of said driving-wheel attached to said lever, means pivotally attached to the front of the engine and attached to an eccentric on the main drive-wheel for forcing said pawl in a direction away from the engine and thus causing the main drive-wheel to be rotated in the same direction, said means also causing the pawl to be thrown toward the engine so that the drive-wheel may be rotated a notch at a time, for the purposes stated.

15. In a device of the class described, the combination of an engine or furnace, of a frame mounted outside of the fire-box of said engine or furnace, a supporting-shaft mounted at the top of said frame, lugs depending from said supporting-shaft, a gear-wheel mounted outside of one of said lugs near one end of said supporting-shaft, a main drive-wheel outside of said gear-wheel rotatably mounted on said shaft, lugs on the gear-wheel extending toward the main drive-wheel, lugs on the drive-wheel extending toward the gear-wheel and engaging them when the wheel is rotated in one direction, a pawl-bearing lever mounted on said supporting-shaft outside of the main drive-wheel, a pawl for engaging the ratchets of said drive-wheel attached to said lever, means pivotally attached to the front of the engine and to an eccentric on the main driving-shaft of the engine for forcing said pawl in a direction away from the engine and thus causing the drive-wheel to be rotated in the same direction, said means also causing the pawl to be drawn toward the engine thus allowing the drive-wheel to be rotated, a second pawl in engagement with the ratchets of said drive-wheel to prevent said wheel from rotating in the opposite direction from that in which the first-mentioned pawl drives it, for the purposes stated.

16. In a device of the class described, the combination with an engine or furnace, of a frame mounted outside of the fire-box of said engine or furnace, a supporting-shaft mounted at the top of said frame, lugs depending from said supporting-shaft, a gear-wheel mounted outside of one of said lugs and near one end of said supporting-shaft, a main drive-wheel outside of said gear-wheel and rotatably mounted on said shaft, lugs on the gear-wheel extending toward the main drive-wheel, lugs on said drive-wheel extending toward the gear-wheel and engaging the lugs on it when the drive-wheel is rotated in a direction away from the engine, a pawl-bearing lever mounted on said supporting-shaft and outside of the main drive-wheel, a pawl for engaging the ratchets of said drive-wheel attached to said lever, means pivotally attached to the front of the engine and attached to an eccentric on the main drive-wheel for forcing said pawl in a direction away from the engine and thus causing the drive-wheel to be rotated in the same direction, said means also causing the pawl to be thrown toward the engine so that the drive-wheel may be rotated a notch at a time, a pawl mounted between said engine and said drive-wheel having its rear end in engagement with the drive-wheel so that as the first-mentioned pawl rotates the drive-wheel in a direction away from the engine this pawl will hold the drive-wheel against movement in the opposite direction as the pawl mounted on said driving-lever moves rearwardly, means for automatically throwing the pawl which is mounted between the engine and the main drive-wheel out of engagement with this drive-wheel, for the purposes stated.

17. In a device of the class described, the combination with an engine or furnace, of a frame mounted outside of the fire-box of said engine or furnace, a supporting-shaft mounted at the top of said frame, lugs depending from said supporting-shaft, a gear-wheel mounted outside of one of said lugs and near one end of said supporting-shaft, a main drive-wheel outside of said gear-wheel and rotatably mounted on said shaft, lugs on the gear-wheel extending toward the main drive-wheel, lugs on said drive-wheel extending toward the gear-wheel and engaging the lugs on it when the drive-wheel is rotated in a direction away from the engine, a spring mounted on the supporting-shaft and between said gear-wheel and the main drive-wheel for rotating the drive-wheel a slight distance in a direction toward the engine, a pawl-bearing lever mounted on said supporting-shaft and outside of the main drive-wheel, a pawl for engaging the ratchets of said driving-wheel attached to said lever, means pivotally attached to the front of the engine and attached to an eccentric on the main drive-shaft of the engine and the main drive-wheel, thus causing the main drive-wheel to be rotated in the same direction as the drive-shaft of the engine, said means also causing the pawl to be thrown toward the engine so that the drive-wheel may be rotated a notch at a time, for the purposes stated.

18. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main

drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, for the purposes stated.

19. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving arm pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on the supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower ends, a driving mechanism in said casing, means for connecting the driving mechanism in the casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, for the purposes stated.

20. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on the supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower ends, a driving mechanism in said casing, means for connecting the driving mechanism in the casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, means for raising and lowering the casing vertically relative to the engine, for the purposes stated.

21. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally

and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on the supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower end, a driving mechanism in said casing, means for connecting the driving mechanism in the casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, means for swinging said casing upwardly and rearwardly from said frame and maintaining it in that position, substantially as and for the purposes stated.

22. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on the supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower end, a driving mechanism in said casing, means for connecting the driving mechanism in the casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, means for raising and lowering the casing vertically relative to the engine, means for swinging said casing upwardly and rearwardly from said frame and maintaining it in that position, substantially as and for the purposes stated.

23. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on the supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-

wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower end, a driving mechanism in said casing, means for connecting the driving mechanism in the casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, means for operating the driving mechanism of my stoker manually for the purposes stated.

24. In a device of the class described, the combination with a straw-burning engine, of a bell-crank lever mounted at the rear upper end of said engine, an eccentric on the main drive-shaft of said engine, a rod connecting said eccentric with the upper arm of the bell-crank lever, a pawl-driving lever pivotally and adjustably connected with the lower arm of said bell-crank lever, a frame mounted near the fire-box of the engine and outside of it, a supporting-shaft passing through an opening in said pawl-driving lever mounted on said frame, a pawl on said pawl-driving lever, a main drive-wheel to be engaged by said pawl mounted on said supporting-shaft, a cog-wheel mounted on said supporting-shaft and inside of said drive-wheel, a rod mounted on the frame and between the engine and the supporting-shaft, a pawl mounted on said rod capable of engaging said drive-wheel and prevent it from moving in a direction toward the engine when my device is in full operation, a spring for holding the pawl on said rod in engagement with said drive-wheel, a rod extending into the fire-box and at its top portion for throwing the pawl on said rod out of engagement with the drive-wheel, a spring mounted on the supporting-shaft which engages with the rod to hold the pawl on said rod in engagement with the ratchets of the drive-wheel, a gear-wheel mounted on said supporting-shaft and inside of said drive-wheel, a supporting-lug depending from said supporting-shaft and adjacent to said gear-wheel, a second gear-wheel mounted on said supporting-lug and in mesh with said gear-wheel, a third gear-wheel mounted on said lug and in mesh with the second gear-wheel, a sprocket-wheel integral with said third gear-wheel, a second lug at the opposite end of said supporting-shaft from said lug, a casing pivotally mounted on said lugs and to their lower end, a driving mechanism in said casing, means for connecting the driving mechanism in said casing with said sprocket-wheel, a slat conveyer mounted at the bottom of said casing and attached to said driving mechanism, a floating feeder mounted on said mechanism, means for raising and lowering the casing vertically relative to the engine, means for swinging said casing upwardly and rearwardly from said frame and maintaining it in that position, means for operating the driving mechanism of my stoker manually, for the purposes stated.

25. In a device of the class described, the combination of a frame attached near and forming the mouth of the fire-box of an engine or furnace, substantially semicircular ends at the rear of the sides of said frame, a supporting-shaft mounted at the top of said sides, lugs depending from said shaft, said lugs being detachably connected with said shaft, a straw-receiving casing pivotally mounted on said lugs, a ratchet-bearing crank-shaft mounted at the upper forward portion of said casing, a pawl designed to coact with the ratchets on said crank-shaft pivotally attached to said casing, a rope attached to the front of the engine and to said casing, a rope attached to the front of the engine and to said crank-shaft, and means mounted on said frame for swinging the casing upwardly and rearwardly from the engine, for the purposes stated.

26. In a device of the class described, the combination of an engine, a frame mounted outside of the fire-box of the engine, a shaft extending across said frame, a straw-receiving casing depending from said shaft, having conveyers therein, means for intermittently rotating said shaft to drive said conveyers, and means for operatively connecting the shaft with the conveyers, for the purposes stated.

27. In a device of the class described, the combination with an engine or furnace, of a frame mounted near the fire-box of said engine or furnace, a shaft mounted on said frame, a straw-receiving casing mounted on said shaft, conveyers in said casing operatively connected with said shaft, and means for transmitting an intermittent rotary motion to said shaft, for the purposes stated.

28. In a device of the class described, the combination of an engine, a shaft mounted near the fire-box of said engine, conveyers operatively connected with said shaft, and means connected with the main driving-shaft of the engine for transmitting to said shaft an intermittent rotary motion whereby the conveyers may be driven intermittently.

29. In a device of the class described, the combination of an engine, a rotatably-mounted shaft, a straw-receiving casing mounted on said shaft, conveyers in said casing operatively connected with said shaft, a driving mechanism connected with the main driving-shaft of the engine, arranged to rotate said shaft intermittently and to drive said conveyers a slight distance at each intermittent rotary motion of the shaft.

30. In a device of the class described, the combination of straw-advancing conveyers, a casing outside of said conveyers, a rotatably-mounted shaft for supporting said casing, means attached to the main engine and con-

nected with the main driving-shaft of the engine for rotating the supporting-shaft intermittently and causing the conveyers to be operated intermittently as the driving-shaft of the engine is rotated.

31. In a device of the class described, the combination of straw-advancing conveyers, a casing outside of said conveyers, a rotatably-mounted shaft for supporting said casing, means attached to the main engine and connected with the main drive-shaft of the engine for rotating the supporting-shaft intermittently and causing the conveyers to be operated intermittently as the driving-shaft of the engine is rotated, and means controlled by the flow of the straw for throwing the driving mechanism out of operation and thus preventing the intermittent rotary motion of the shaft, substantially as and for the purposes stated.

32. In a device of the class described, the combination of straw-advancing conveyers, a casing outside of said conveyers, a rotatably-mounted shaft for supporting said casing, means attached to the main engine and connected with the main driving-shaft of the engine for rotating the supporting-shaft intermittently and causing the conveyers to be operated intermittently as the driving-shaft of the engine is rotated, means controlled by the straw for automatically throwing into and out of operation the driving mechanism which rotates the shaft intermittently and thus cause and prevent the intermittent rotation of the shaft, for the purposes stated.

33. In a device of the class described, the combination of an engine, a frame mounted near the fire-box of the engine, a straw-receiving casing mounted on said frame, straw-advancing conveyers in said casing, a driving mechanism mounted on said frame and operatively connected with said conveyers, and the main driving-shaft of the engine designed to operate intermittently said conveyers while the main driving-shaft of the engine is rotated, for the purposes stated.

34. In a device of the class described, the combination of an engine, a frame mounted near the fire-box of the engine, a straw-receiving casing mounted on said frame, straw-advancing conveyers in said casing, a driving mechanism mounted on said frame and operatively connected with said conveyers, and the main driving-shaft of the engine designed to operate intermittently said conveyers while the main driving-shaft of the engine is rotated, and means for regulating the distance through which the conveyers are driven at each intermittent period.

35. In a device of the class described, the combination of an engine, a casing mounted near the fire-box of said engine, intermittently-driven straw-advancing conveyers mounted in said casing, and means for swinging the casing upwardly and rearwardly from said engine, for the purposes stated.

36. In a device of the class described, the combination of an engine or furnace, of a straw-receiving casing mounted near the fire-box of said engine or furnace, straw-advancing conveyers mounted in said casing, means for intermittently driving the straw-advancing conveyers, means for mechanically regulating the duration of each intermittent motion, and means for raising the casing upwardly and rearwardly from the engine, for the purposes stated.

37. In a device of the class described, the combination of a straw-burning engine or furnace, a straw-receiving casing, straw-advancing conveyers mounted in said casing, a driving mechanism operatively connected with said conveyers, and with the main drive-shaft of the engine for operating said conveyers intermittently and at a slow rate of speed while the main drive-shaft of the engine is rotated at a high rate of speed, for the purposes stated.

38. In a device of the class described, the combination of a straw-burning engine or furnace, a straw-receiving casing, straw-advancing conveyers mounted in said casing, a driving mechanism operatively connected with said conveyers, and with the main drive-shaft of the engine for operating said conveyers intermittently and at a slow rate of speed while the main drive-shaft of the engine is rotated at a high rate of speed, and means for swinging the casing upwardly and rearwardly from the engine, for the purposes stated.

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