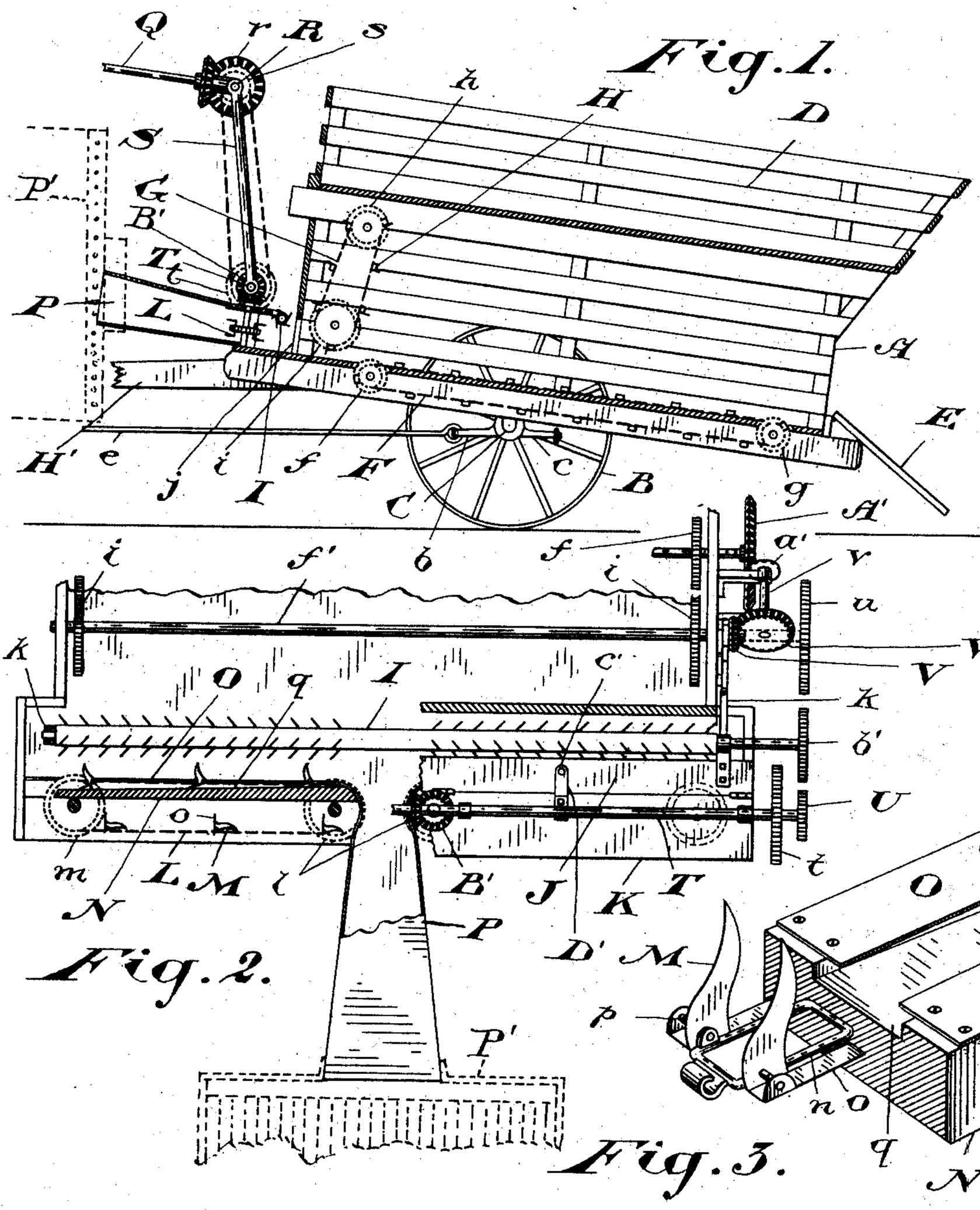
No. 706,532. Patented Aug. 12, 1902.

J. A. COWAN.

AUTOMATIC FEEDER FOR STRAW BURNING FURNACES.

(Application filed July 15, 1901.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses

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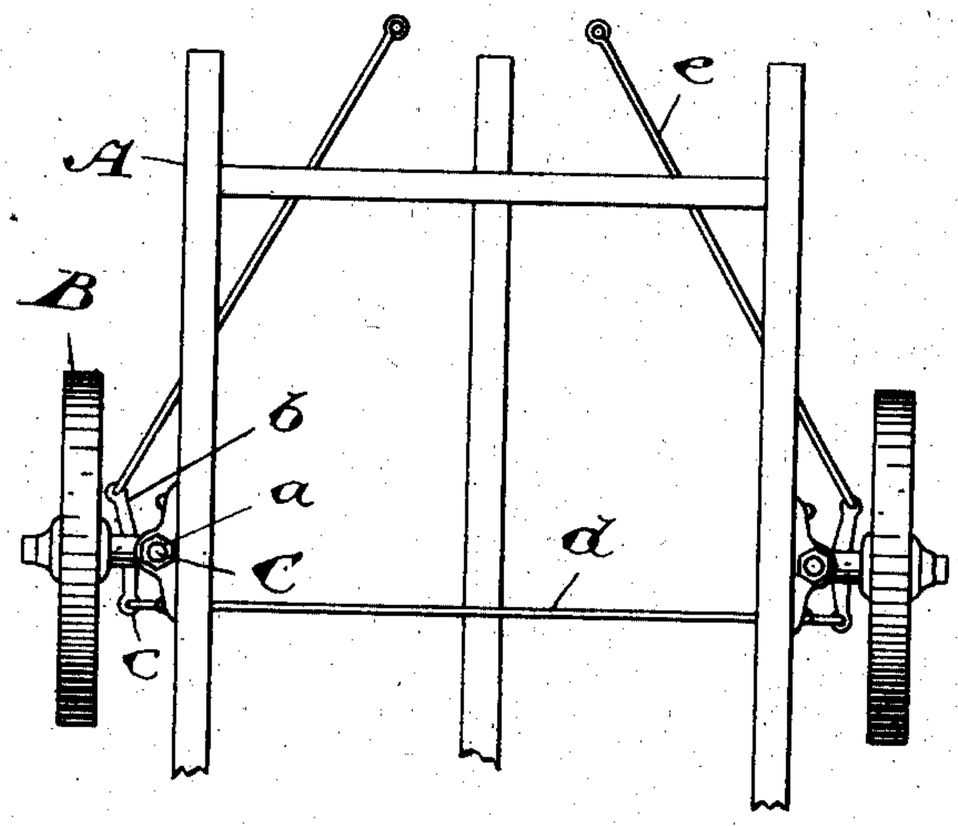

Fig. 4.

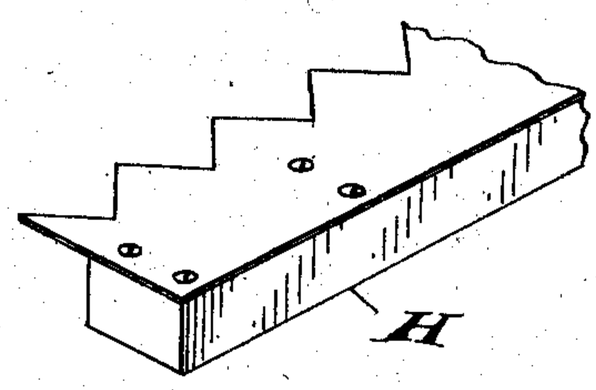

Fig. 5.

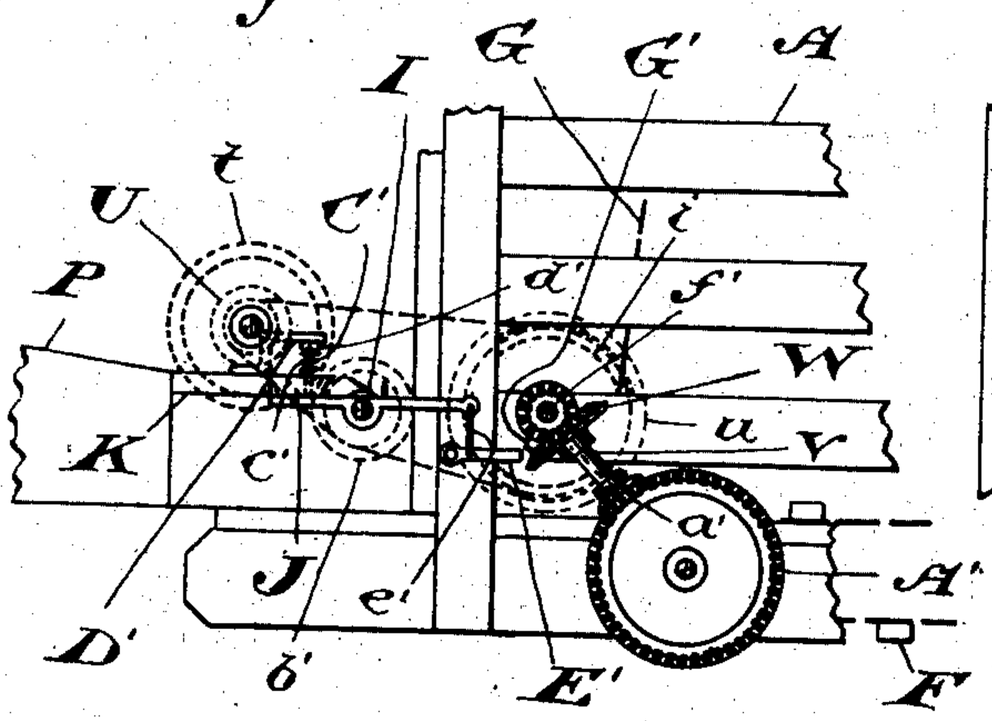

Fig. 6.

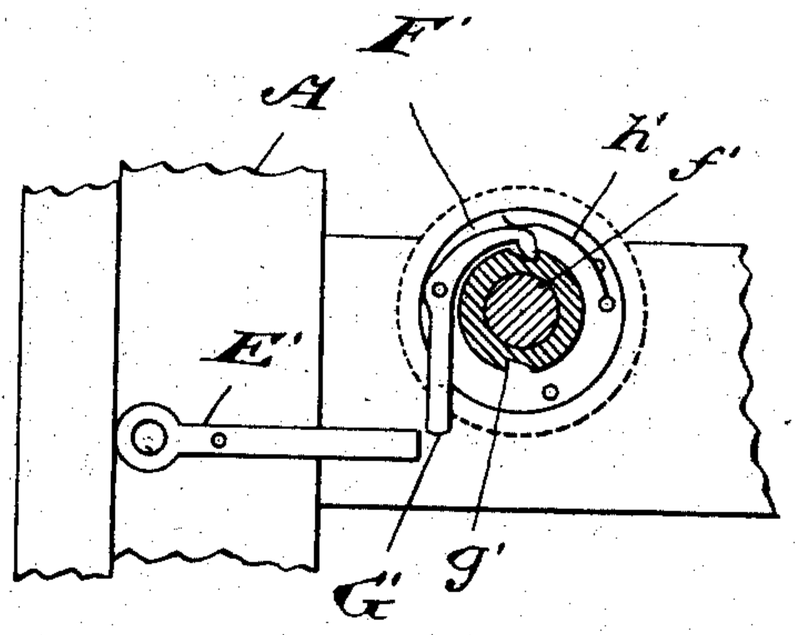

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN A. COWAN, OF CALGARY, CANADA.

AUTOMATIC FEEDER FOR STRAW-BURNING FURNACES.

SPECIFICATION forming part of Letters Patent No. 706,532, dated August 12, 1902.

Application filed July 15, 1901. Serial No. 68,387. (No model.)

To all whom it may concern:

Be it known that I, JOHN ALEXANDER COWAN, agent, of the town of Calgary, in the district of Alberta and Dominion of Canada, have invented certain new and useful Improvements in Automatic Feeders for Straw-Burning Furnaces, of which the following is a specification.

The object of my invention is to devise certain improvements in apparatus for feeding straw automatically and continuously to a furnace, described and claimed in my prior United States application, No. 40,201, filed the 17th day of December, 1900; and it consists, essentially, in improvements in the means employed for carrying the straw to the forward edge of the cage at the bottom, in the means provided for regulating the feed, and in the means for forcing the straw to the mouth of the furnace, substantially as hereinafter more specifically described and then definitely claimed.

Figure 1 is a longitudinal section of my improved feeder, with the end of a furnace shown in dotted lines. Fig. 2 is an enlarged sectional plan of the front portion of the apparatus, with the end of a furnace shown in dotted lines. Fig. 3 is an enlarged perspective detail of one of the carrier-hooks of the transverse feed. Fig. 4 is a skeleton plan view illustrating the method of steering the device. Fig. 5 is a perspective detail of a portion of one of the serrated carrier-slats of the vertical carrier of the straw-cage. Fig. 6 is an enlarged detail in elevation of a portion of the driving mechanism. Fig. 7 is an enlarged detail of the mechanism whereby the vertical carrier is thrown into and out of action.

In the drawings like letters of reference indicate corresponding parts in the different figures.

A is a straw-cage formed of suitable slatwork and mounted on the wheels B. These wheels are journaled on L-shaped axles C, the vertical portions of which are journaled in the bearings *a* on the sills of the cage. To the horizontal parts of these axles are secured the forwardly-extending arms *b* and the rearwardly-extending arms *c*. The arms *c* are connected by the link *d*, and suitable traction-rods *e* are pivotally secured to the arms *b*. When the apparatus is being drawn by a traction-engine, the traction-rod *e* will be connected to the steering-chains of the traction-engine, so that as the steering-chains of the traction-engine are drawn upon to turn the engine the traction-rods *e* will also be drawn upon to swing the wheels B of the straw-cage, and thus steer it after the traction-engine. The link *d* insures the wheels B moving in unison.

At the upper part of the cage A is formed the straw-rack D, intended to carry a sufficient supply of straw for the traction-engine when moving from place to place. The rear end of the straw-cage is open, as shown in Fig. 1, when in use, but is preferably provided with a hinged flap E, which is turned down, as indicated, to aid the attendant in throwing straw into the machine. On the floor of the straw-cage runs an endless slat conveyer F, which is carried by the sprocket-wheels *f* and *g*. At the front end of the cage a vertical conveyer G is carried on the sprocket-wheels *h* and *i*. The cross-slats H of this conveyer are serrated, as shown at Fig. 5, as ordinary teeth tend to comb through the straw without taking an effective grip of it. The conveyer G is preferably not set perpendicular to the floor of the straw-cage, but is inclined rearwardly, as the front surface of this straw naturally tends to incline in the same direction. The lower sprocket-wheels *i* of this conveyer are located close to the opening *j* at the bottom of the forward end of the straw-cage and just in front of the forward sprocket-wheels *f* of the conveyer F. In front of and toward the top of the opening *j* is located the spiked roller I, which is journaled in the arms *k*, secured to the hinged lid J of the transverse feed-box K. It will be noticed that the spikes of this roller are inclined outwardly at opposite sides of the center and that just at the center they are set in a plane at right angles to the axis of the roller. This arrangement of the spikes tends to feed the straw inward toward the center.

In front of the roller I are located the transverse conveyers L, carried on the sprocket-wheels *l* and *m*, so that a central gap is left between the conveyers. The conveyer-chains are provided with a series of links *n*, on which are pivoted swinging hooks M by means of

pins p, extending from lugs formed on the sides of the links m. (See Fig. 3.) These hooks are provided with tailpieces o, which extend backward in the direction from which the chain is moving. Behind the inner side of each conveyer L is secured a backboard N, provided with a groove q, of sufficient width for the links of the chain, and the swinging hooks with their tailpieces. The grooves q are deep at the outer end of each backboard and gradually become shallower as the center of the machine is reached. It follows from this that when straw is passing through the apparatus and the conveyers are moving in toward the center of the machine the pressure of the straw causes the hooks to cant farther back at the outer sides of the machine than they do at the center, so that as the hooks move in toward the center their carrying capacity is increased. As the hooks when at the outer sides of the machine have but little straw to carry, and as at the center they have to carry all the straw gathered in their passage from the outer sides of the machine by the arrangement of the parts described, they are perfectly adapted to the work to be done. A shield O covers the front of each backboard and is provided with the necessary openings for the proper working of the swinging hooks and the sprocket-wheels l and m. These shields extend around the inner sprocket-wheels l and form the throat of the feed-box P, which is shown as entering the end of a furnace P'. (Shown in dotted lines in Figs. 1 and 2.) The throat and the feed-box both flare or expand in size outwardly from the machine. The feed-box itself is preferably of somewhat greater width than depth and may be made of any suitable material.

The power to drive the machine is taken from a shaft Q, which in turn is driven in any suitable manner from the engine with which the feed is being used. This shaft conveys power by bevel-gearing r to the transverse shaft R. This shaft is journaled in one or more swinging arms S, journaled on the top of the transverse feed-box K. On the shaft R is secured a sprocket-wheel s, which by a suitable sprocket-chain drives the sprocket-wheel t on the shaft T. At one end of the shaft T is secured the sprocket-wheel U, which by suitable sprocket-chain drives the sprocket-wheel u, fast on the end of the shaft carrying the sprocket-wheels i of the vertical conveyer G. On the same shaft is located the bevel-pinion V, which engages with the bevel gear-wheel W, fast on the inclined shaft v, suitably journaled on the frame of the cage and bearing in its other end a bevel-pinion a', engaging the bevel gear-wheel A', fast on the end of the shaft carrying the sprocket-wheels f of the conveyer F. The end of the shaft of the spiked roller I is provided with a sprocket-wheel b', and the sprocket-chain passing around the sprocket-wheels U and u also engages the sprocket-wheel b'. (See Fig. 6.) The transverse shaft T drives the transverse conveyers L by means of bevel-gearing B', which imparts a motion preferably to the spindles of each of the inner sprocket-wheels l. (See Figs. 1 and 2.)

From the driving connections described it is evident that the parts may be given their proper motion.

The straw is placed in the cage from behind and when the machine is in operation is continuously fed forward to the feed-opening j by the carriers F and G. Upon passing through this opening it is engaged by the spiked roller I, which rests on top of it and holds it down and feeds it toward the center. After passing under the roller I it is engaged by the transverse conveyers L, carried to the center, and forced through the throat of the feed-box. In this feed-box it is compressed, as the loose straw is fed in faster than it emerges from the other end. This elastic compression is important, as I am thus enabled to push forward the straw to the mouth of the furnace. The straw must be compressed to enable it to push forward the straw in front of it. After it passes the throat it is then by the flare of the feed-box allowed to expand, and it is then easy for the compressed straw in the throat to push it forward to the mouth of the furnace. In other straw-feeds it has been usually necessary to convey the straw by positive means right to the mouth of the furnace.

As already described, the spiked roller I is carried by the hinged lid J of the transverse feed-box. The roller is normally held down by means of coil-springs C' engaging the top of the lid and the under side of the brackets D', secured to the transverse feed-box K. To make the tension adjustable, these coil-springs are preferably arranged around rods c', secured to the brackets and provided with nuts d', which may be screwed down when desired to increase the tension of the springs.

To the end of one of the arms k is pivoted the link e', the other end of which is pivoted on the stop-arm E', pivoted at one end on the side of the straw-cage.

Secured to the shaft f' of the sprocket-wheels i is a driving-disk F', on which is pivoted the dog G'. One end of this dog is hooked, so that it will engage in one of the notches g', formed on the hub of the bevel-pinion V. (See Fig. 7.) It is normally pressed inward to engage with these notches by a spring, such as h'. The path of the tail of this dog when the shaft is in rotation is just clear of the normal position of the end of the stop-arm E'. If the conveyers F and G carry unusually heavy bunches of straw through the feed-opening j, the spiked roller will lift, thus raising the stop-arm E' into the path of the tail of the dog G'. The dog is thus lifted out of the notch in the hub of the bevel-pinion V, with which it is engaged, and is held out until the dropping of the spiked

roller I again causes the stop-arm E′ to release its tail. It is then thrown back against the hub of the bevel-pinion by the spring *h′* and again engages one of the notches *g′*. By the construction described the feed of the machine is entirely stopped until the extra quantity of straw has been disposed of by the transverse conveyers.

It will be seen that my machine gives a more regular and constant feed than it is possible to give by hand, and as the cold drafts which always enter the furnace when the doors are open for hand-feeding are entirely done away with the steaming of the boiler will be much more even and regular.

The machine is provided with a tongue H′, by means of which it may be connected with the engine. When traveling, the separator will be connected to the rear. Water-tanks may also be carried to supply the boiler of the engine when the outfit is on the road.

What I claim as my invention is—

1. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage; means for moving the straw to the front part of the bottom; a spiked roller suitably supported and driven above the bottom in front of the point to which the straw is moved; suitably supported and driven transverse conveyers in front of, and below the said roller, and adapted to carry the straw to the center; and a feed-box adapted to receive straw from the said conveyers, substantially as described.

2. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage; means for moving the straw to the front part of the bottom; a spiked roller suitably supported and driven above the bottom in front of the point to which the straw is moved, the spikes of the rollers being inclined outwardly on each side of the center; suitably supported and driven transverse conveyers in front of, and below the said roller and adapted to carry the straw to the center; and a feed-box adapted to receive straw from the said conveyers, substantially as described.

3. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage; means for moving the straw to the front part of the bottom; a spiked roller suitably supported and driven above the bottom in front of the point to which the straw is moved; suitably supported and driven transverse conveyers in front of, and below the said roller, and adapted to carry the straw to the center; and a feed-box adapted to receive straw from the said conveyers, the said feed-box being contracted at the throat where it receives the straw and flaring toward the delivery end, substantially as described.

4. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage having a feed-box contracted at the throat and flaring toward the delivery end, and mechanism adapted to draw straw from the cage and force it into the throat of said contracted and flaring feed-box, substantially as described.

5. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage; means for moving the straw to the front part of the bottom; a vertically-movable spiked roller supported and driven above the bottom and in front of the point to which the straw is moved; means operated by the vertical movement of the said roller for stopping the mechanism moving the straw from the cage; suitably supported and driven transverse conveyers in front of and below the said roller and adapted to carry the straw to the center; and a feed-box adapted to receive straw from the said conveyers, substantially as described.

6. In an automatic feeder for straw-burning furnaces, the combination of a box or cage for straw; a transverse conveyer arranged in communication with the front part of the bottom of the cage; means to move straw in the cage to the conveyer; a suitably supported and driven spiked roller located behind the transverse conveyer and adapted to act on the upper surface of the straw passing to the conveyer; and a feed-box adapted to receive straw from the conveyer, substantially as described.

7. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage having an opening at the bottom of its front side; an endless conveyer suitably supported and driven to move straw to the front of the cage; a suitably supported and driven endless upright conveyer adapted to discharge the straw through the opening at the front of the cage; suitably supported and driven endless conveyers adapted to take the straw and move it to the center; and a feed-box into which the said transverse conveyers force the straw, substantially as described.

8. In an automatic feeder for straw-burning furnaces, the combination of a straw-cage having an opening at the bottom of its front side; an endless conveyer suitably supported and driven to move straw to the front of the cage; a suitably supported and driven endless upright conveyer adapted to discharge the straw through the opening at the front of the cage; suitably supported and driven endless conveyers adapted to take the straw and move it to the center; a suitably-supported roller vertically movable and adapted to rest on the straw passing from the upright conveyer to the transverse conveyers; means operated by the rise and fall of the said roller for throwing the horizontal conveyer into and out of gear; and a feed-box into which the said transverse conveyers force the straw, substantially as described.

9. In an automatic feeder for straw-burning furnaces, the combination of a box or cage for straw; a transverse conveyer arranged in communication with the front part of the bottom of the cage; means to move straw in the cage to the conveyer; a feed-box arranged to receive straw from the conveyer, the said

transverse conveyer comprising a chain running on sprocket-wheels, swinging hooks pivoted on the said chain, tailpieces on the said hooks, and a backboard with a groove therein to engage the tailpieces, said groove decreasing in depth from the end from which the hooks are moving toward the opposite end, substantially as described.

10. In an automatic feeder for straw-burning furnaces, the combination of a box or cage for straw; a feed-box; transverse conveyers arranged in communication with the front part of the bottom of the cage and arranged to draw straw to the middle and force it into the feed-box; and means to move the straw in the cage to the transverse conveyers, the transverse conveyers comprising chains running on sprocket-wheels, swinging hooks pivoted on the said chain, tailpieces on the said hooks, and a backboard with a groove therein to engage the tailpieces, said groove decreasing in depth from the end from which the hooks are moving toward the opposite end, substantially as described.

Regina, North-West Territories, June 13, 1901.

JOHN A. COWAN.

In presence of—
GEORGE W. BROWN,
S. H. BEATON.