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No. 825,426. PATENTED JULY 10, 1906.

D. SMITH.

STRAW CUTTER.

APPLICATION FILED JAN. 31, 1905.

2 SHEETS—SHEET 1.

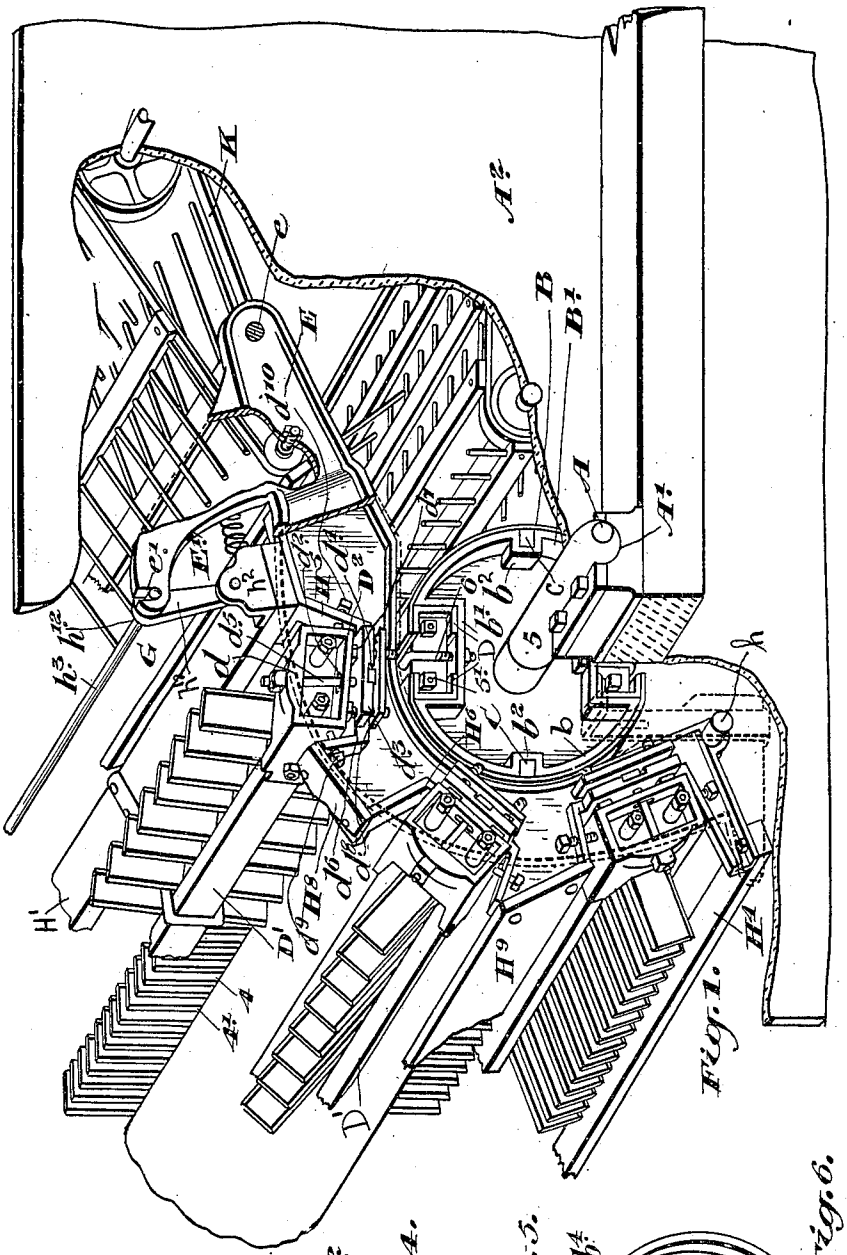


Fig. 1.



Fig. 4.



Fig. 5.

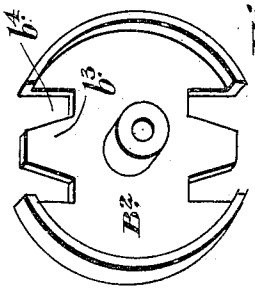


Fig. 6.

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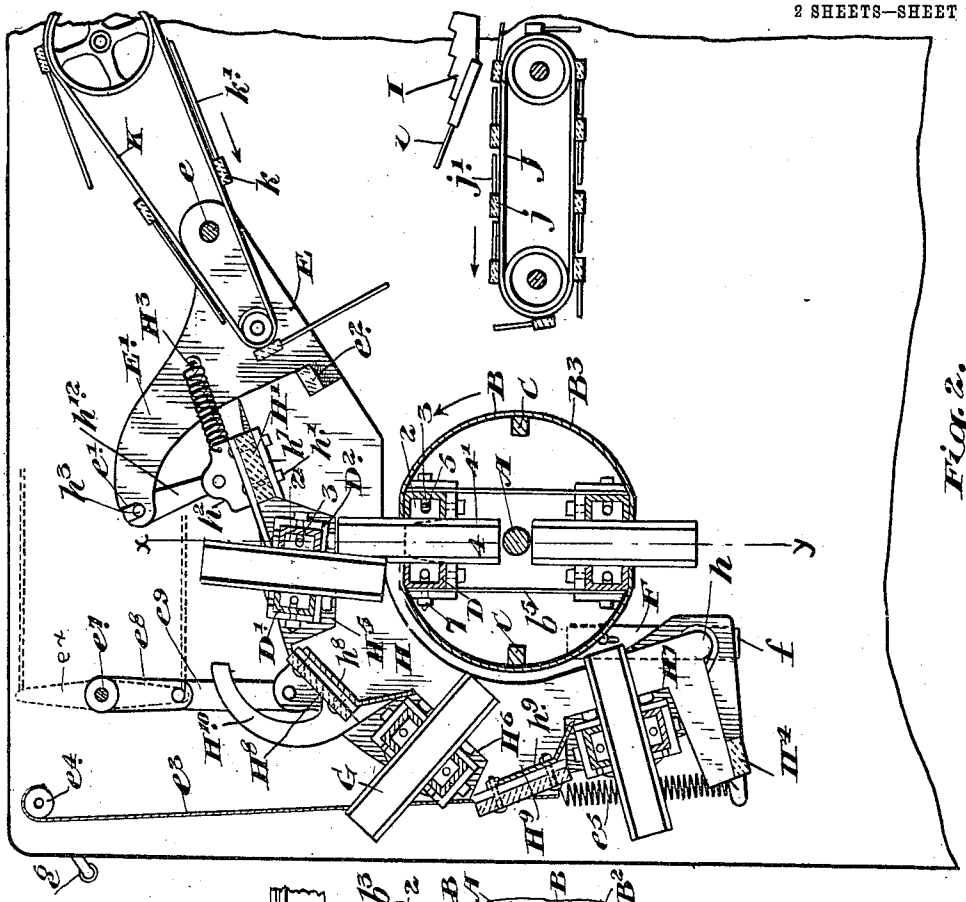


Fig. 2.

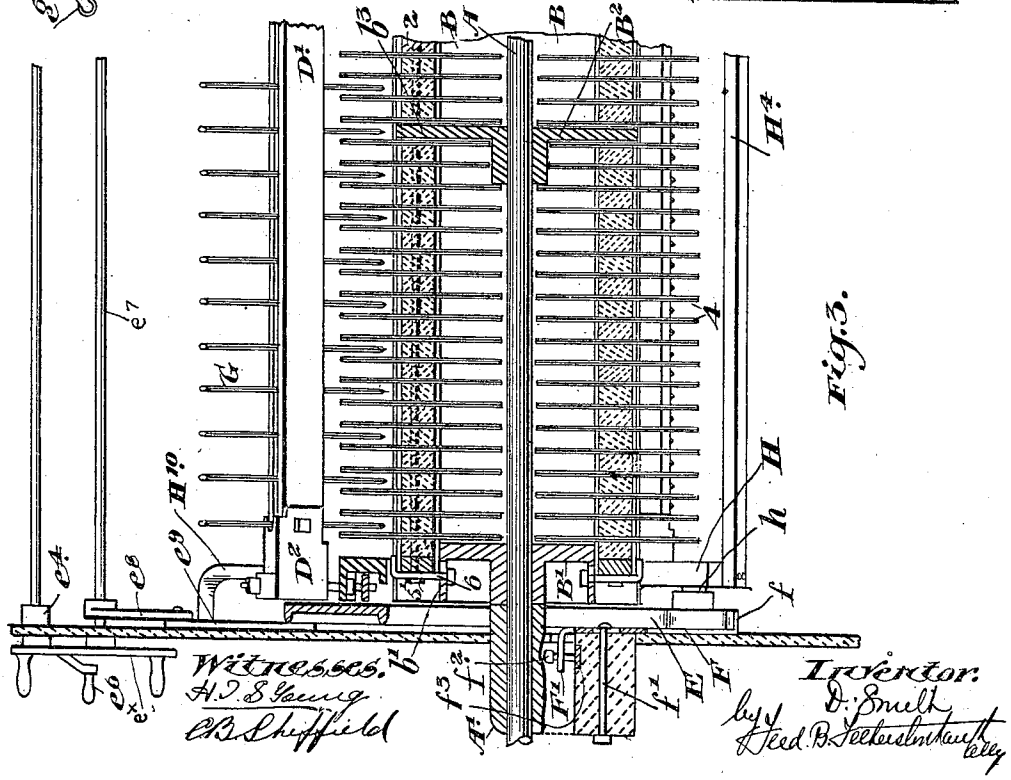


Fig. 3.

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UNITED STATES PATENT OFFICE.

DAVID SMITH, OF DURHAM, CANADA.

STRAW-CUTTER.

No. 825,426. Specification of Letters Patent. Patented July 10, 1906.

Application filed January 31, 1905. Serial No. 243,554.

To all whom it may concern:

Be it known that I, DAVID SMITH, of the town of Durham, in the county of Grey, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Straw-Cutters, of which the following is a specification.

My invention relates to improvements in straw-cutters adapted to be used in connection with threshing-machines or separately, as desired; and the object of the invention is to devise a straw-cutter which will cut the straw very fine and suitable for feed and with a minimum expenditure of power, which will not be liable to choke or get out of order, in which the knives will require less attention than in an ordinary straw-cutter and yet may be readily adjusted when worn, in which the stationary knives will recede and consequently any liability of breakage if undue presssure is put upon them or foreign matter gets in between them, and in which the knives may be readily thrown out of operation in case it is desired to leave the straw uncut where it is desired to stack it; and it consists, essentially, of a main rotatable cutting-cylinder provided with knives arranged, preferably, radially opposite to each other and secured within suitable holders and a coacting frame suitably hinged and provided with stationary knives and holders for the same secured in the frame, such frame being suitably supported and partially surrounding the cylinder and suitable conveyers extending to the knives, the said knives being arranged as hereinafter more particularly explained.

Figure 1 is a distorted perspective view, looking from one side, of my straw-cutter, the major portion of the frame and the opposite side being broken away. Fig. 2 is a sectional elevation of my straw-cutter. Fig. 3 is a cross-sectional elevation through the line $x\,y$, Fig. 2. Fig. 4 is a detail, partially broken away, of the end holding-blocks for the cross-bars supporting the stationary knives. Fig. 5 is a distorted perspective detail of the block separating the knives. Fig. 6 is a detail of the central disk.

In the drawings like characters of reference indicate corresponding parts in each figure.

A is the main shaft of the rotating cylinder, which is journaled in suitable bearings A′ on each side of the frame, only one side of the machine being shown in Figs. 1 and 2, the machine being broken away intermediate of its width. The side boards A^2 of the frame are also broken away, as indicated in Fig. 1.

B is the main cylinder, and B′ designates the end disks of the same, such end disks being provided with reinforcing-rims *b*. The rims *b* have rectangular recesses *b*′, located diametrically opposite to each other, and the rectangular recesses b^2, located diametrically opposite each other.

C represents cross-bars which extend at each end into the recesses b^2.

B^2 is a central disk secured on the shaft A and provided with the projections b^3, arranged diametrically opposite to each other, and the recesses b^4 at each side thereof.

D represents channel-iron cross-bars with the channel to the inside, such channel-bars extending through the recesses *b*′ of the disk B and the recesses b^4 of the disk B^2.

2 represents blocks having notches 3 in the sides thereof, and 4 designates knives having the double cutting edges 4′ 4′. The blocks fit into the channels of the channel-iron cross-bars D and are alternately arranged with the knives 4 from the central disk B^2 to the outer disks B′, being securely held in place by the longitudinal tie-rods 5, which are provided with nuts 5′, fitting onto their threaded ends. The rods extend through the notches 3 of the blocks.

In order to hold the knives from lateral displacement, I provide the L-bolts 6, which extend through the recessed portion of the rim *b* and over the end block 2, and in order to hold the channel-iron bars in position in the recesses *b*′ in the rims I provide the side bolts 7, which extend through the sides of the recesses into the channel-irons.

It will be noticed that the knives are arranged in two sets in the cylinder B, such sets being arranged radially opposite each other and held in place in the same way. The two sets of channel-iron bars are connected, preferably, by stays b^5. The cylinder is completed exteriorly by the substantially semicylindrical covers B^3, which extend over the bars C and the channel-iron cross-bars D to the knives and are secured to the channel-iron cross-bars by screws or other suitable means. The covers B^3 serve to prevent the cylinders and knives thereof being choked up interiorly.

E represents the sides of the stationary knife-frame, which are pivotally supported on the cross-rods *e*, journaled in the side boards A^2, and are provided with upwardly-

extending horns E′ and having end notches e' and inwardly and laterally extending projecting lugs e^2. The sides E are arranged in segmental form partially around the cylinder B and are supported at the bottom by the inwardly-extending lips f of the brackets F. Each bracket F is held in place by the bolts f', extending through slots in the bracket and through the frame, and the set-screws f^2, extending through the bent upper end F′ of the brackets F, such set-screws projecting against the plate f^3 on top of one of the longitudinal timbers, as indicated.

By means of the set-screws f^2 the brackets F may be adjusted vertically, so as to set the stationary knives G, hereinafter referred to, nearer to or farther from the cylinder B.

In order to raise the stationary knife-frame clear of the cylinder when it is desired not to cut feed, I provide a cord or chain e^3, which passes around a drum e^4, journaled in the sides A^2 of the frame, said cord being connected by a spiral spring e^5 to the bottom of the sides E of the frame. There would of course be two cords e^3 provided, and the drum would be provided at the end with a crank-handle e^6, whereby the cord may be wound up, so as to raise the frame. I also provide an auxiliary means for raising the frame, so as to be able to raise the knives G clear should any obstruction pass between the stationary knives and the rotary knives. Such means consists of a cross-rod e^7, having arms e^8 thereon near the ends and pivotally connected by links e^9 to lugs on the frame E. It is desirable that this should be operated from the opposite or feeding side of the threshing-machine, so that the knives may be immediately relieved when desired. In order to effect this, I provide at the outer end of the rod e^7 outside the side boards a suitable double arm $e^\times$ and cords extending to the opposite end of the machine, as indicated by dotted lines, Fig. 2. It will thus be seen that the frame may be raised slightly, when required, so as to relieve the coacting stationary and rotary knives from an obstruction or foreign substance which might pass through between.

H represents the sides of the supplemental frame, which are provided with laterally-extending trunnions h, whereby they are journaled in suitable bearings at the bottom of the sides E. The upper ends of the sides H are supported upon the lugs e^2 of the sides E and are connected together by a cross-bar H′, secured by bolts h' to the top rib of the sides H of the supplemental frame.

h^2 represents brackets secured on the ends of the bar H′ and connected by arms h^{12} to the cross-rods h^3, which extend from notch e' to notch e' on the opposite side. The rod h^3, the arms h^{12}, and the brackets h^2 serve with the bar H′ to rigidly brace the frame at the top, so that when the frame rises, should any obstruction strike the knives G, it will rise evenly away from the cylinder B no matter where the obstruction or foreign substance may be located crosswise between the knives. In order to bring the stationary knives and supplemental frame down again, I provide a spiral spring H^3 at each end, which is connected to the bracket h^2 and the horn E′. The bottom of the sides H of the supplemental frame are connected together by a cross-bar H^4, as indicated, and the outer edge of the sides H of the supplemental frame are provided with a series of exterior recesses H^5 and H^6 and bracing cross-boards H^8 and H^9, secured to the edge of the side by suitable bolts.

The sides H preferably have reinforced or ribbed outer edges, as indicated, and beneath these edges are secured the angular deflecting-plates h^7, h^8, and h^9, which serve to guide the cut feed through the knives.

The knives G are secured between blocks 2′ and are held by channel-iron cross-bars D′ exactly the same as the knives 4. The ends of the channel-bars D′ and blocks carrying each set of knives are held in hollow blocks D^2, which are located in the recesses H^5, H^6, and H^7. Each set of knives is held at the ends in its respective recess in exactly the same way, and I shall simply describe the manner of holding and adjusting the knives in the one recess—*i. e.*, the top one, H^5. The top of the end block D^2 is provided with an arc-shaped projection d, having a tapered hole d'.

d^2 is a slotted hole in the bottom side of the hollow block.

d^3 is a flange extending out beyond the reinforcing-rib and provided with a cross-notch d^4.

d^5 is a bolt the square head of which fits into the notch d^4. The bolt d^5 extends upwardly through the flange d^3, the slot d^2, and hole d' and is provided with a nut at the upper end.

d^6 and d^7 are set-screws extending through the ribbed sides of the recess H^5 and designed to contact with the bottom of the block D^2.

d^8 is a plate which is held against the head of the bolt d^5, so as to hold it from turning in its cross-notch d^4.

d^9 and d^{10} are set-screws passing through the ribbed sides of the recess H^5 and designed to contact with the sides of the block D^2.

By adjusting the set-screws d^6 and d^7, as well as the set-screws d^9 and d^{10}, the end blocks D^2 may be tilted as desired, so as to give the proper draw to the stationary set of knives G in relation to the rotating set of knives 4. The three sets of knives G may be given such a desired forward tilt as may be found most conducive to the best results, and each stationary set of knives coacts with the rotating set of knives, they being so placed that the knives of the rotating sets pass between the knives of the stationary sets.

I is the straw-deck, provided with the discharging-fingers *i*, and J is the endless conveyer, suitably supported and driven and provided with cross-bars *j*, having feeding-fingers *j'*.

K is an endless conveyer suitably driven and supported and provided with cross-slats *k*, having the feeding-fingers *k'*, as indicated. It will be noticed that the fingers *k'* are longer than the fingers *j'*.

By means of the fingers *j'* and *k'* the straw is fed to the knives, which, rotating at a high rate of speed, effectually and finally chop the straw into a suitable condition for feed.

Should any obstruction meet the knives, the supplemental frame, comprising the sides H and their connecting cross-bars, will recede, carrying the knives G away from the knives 4 and allowing such obstruction to pass through. If the obstruction is larger than will allow of the obstruction to pass through, the horns H^{10} on the upper portion of the supplemental frame will strike the bottom of the arms e^8, and thereby break the joint between arms e^8 and bar e^9 and cause the carrying-frame comprising the sides E and their coacting cross-bars to rise upwardly on the pivot *e* and allow of the obstruction to pass through.

As hereinbefore described, if it is not desired to cut feed the frame, comprising the sides E and their connecting-bars, may be raised.

In order to adjust or relieve the stationary rotary knives, all it is necessary to do is to loosen the nuts on the ends of the rods, holding the rods and intervening blocks tightly together, when the knives may be adjusted and withdrawn or reversed, as may be desired.

What I claim as my invention is—

1. In a straw-cutter, the combination with the rotating cylinder provided with substantially radially-arranged knives, of a frame partially encompassing the cylinder and provided with a series of sets of stationary knives between which the rotary knives rotate, the said frame being pivotally supported at the top at the feeding end and slotted bars provided with turned-in lips on which the lower end of the frame rests, bolts extending through the slots in the bars and a set-screw extending through the bent upper end of the bar and resting on the frame as and for the purpose specified.

2. In a straw-cutter, the combination with the rotating cylinder provided with substantially radially-arranged knives, of a main frame partially encompassing the cylinder and comprising the sides and connecting cross-bars, a rod upon which the frame is pivoted at the top, a support for the frame at the bottom and a supplemental frame comprising sides and connecting cross-bars, the sides being provided with trunnions journaled in bearings in the sides of the aforesaid main frame and the said supplemental frame partially encompassing the cylinder, and lugs projecting from the sides of the aforesaid main frame and projecting under the top of the sides of the supplemental frame and stationary knives carried by the supplemental frame as and for the purpose specified.

3. In a straw-cutter, the combination with the rotating cylinder provided with substantially radially arranged knives, of a main frame partially encompassing the cylinder and comprising the sides and connecting cross-bars, a rod upon which the main frame is pivoted at the top, a support for the frame at the bottom and a supplemental frame comprising sides and connecting cross-bars, the sides being provided with trunnions journaled in bearings in the sides of the aforesaid main frame and the said supplemental frame partially encompassing the cylinder, lugs projecting from the sides of the aforesaid main frame and projecting under the top of the sides of the supplemental frame and stationary knives carried by the supplemental frame, the cross-rod extending through the side boards of the machine, the depending arms, the links pivotally connected to the bottom of the arms and the sides of the main encompassing frame and the horns of the supplemental frame designed to come in contact with the bottom of the said arms to break the joint when the cross-rod is partially rotated as and for the purpose specified.

4. The combination with the rotating cylinder and the substantially radially arranged sets of alined knives, of the encompassing frame suitably supported and the supplemental frame supported on the encompassing frame and provided with peripheral recesses and the sets of stationary alined knives suitably supported in said recesses and means for tilting each set as and for the purpose specified.

5. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined knives, the intervening blocks extending into the channel-iron cross-bars and means for holding the blocks and knives securely together as and for the purpose specified.

6. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined knives, the intervening blocks extending into the channel-iron cross-bars and having side notches and the rods extending through the blocks and provided at the end with suitable nuts as and for the purpose specified.

7. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined

knives, the intervening blocks extending into the channel-iron cross-bars and having side notches, the rods extending through the blocks and provided at the end with suitable nuts and the intermediate stays connecting the channel-iron cross-bars in the opposite recesses as and for the purpose specified.

8. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined knives, the intervening blocks extending into the channel-iron cross-bars and having side notches, the rods extending through the blocks and provided at the end with suitable nuts, the L-shaped bolts extending through the inner sides of the recesses and projecting over the end blocks as and for the purpose specified.

9. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined knives, the intervening blocks extending into the channel-iron cross-bars and having side notches, the rods extending through the blocks and provided at the end with suitable nuts, and the bolts extending through the sides of the recesses into the channel-iron cross-bars as and for the purpose specified.

10. In a straw-cutter, the cutting-cylinder comprising the end disks having peripheral recesses therein, the channel-iron cross-bars fitting each side of the recesses, the alined knives, the intervening blocks extending into the channel-iron cross-bars, means for holding the blocks and knives securely together and the semicylindrical encompassing covers for the cylinder as and for the purpose specified.

11. The combination with the supplemental frame, of a set of stationary alined knives and channel-iron cross-bars and intervening blocks and means for holding the ends of the bars in place and means for tilting the ends of the bars as and for the purpose specified.

12. The combination with the supplemental frame, of a set of stationary alined knives and channel-iron cross-bars and intervening blocks, the hollow end blocks into which the channel-iron bars and intervening blocks fit and means for securing the intervening blocks and knives together and holding them within the hollow end blocks as and for the purpose specified.

13. The combination with the supplemental frame comprising sides having recesses located opposite to each other, of the alined sets of knives, means for holding them together, the end blocks within which such means extend provided with arc-shaped upper projections and tapered hole through the projection, and a slot in the lower side of the block, set-screws extending through the reinforcing edge of the sides, set-screws extending through the flanges underneath the end blocks and plates through which such set-screws extend, and bolts fitting in notches in the flanges and extending up through the slots in the end blocks and the tapered hole in the arc-shaped projection on the top of the end blocks as and for the purpose specified.

14. In a straw-cutter, the combination with the main encompassing frame provided with upwardly-projecting horns having end notches, of the supplemental frame comprising the sides and connecting cross-bars, the bracket secured to the upper cross-rod, a cross-rod fitting in the notches in the horns aforesaid, and the arms connecting the brackets to said cross-rod as and for the purpose specified.

15. In a straw-cutter, the combination with the main encompassing frame provided with upwardly-projecting horns having end notches, of the supplemental frame comprising the sides and connecting cross-bars, the brackets secured to the upper cross-bar, a cross-rod fitting in the notches in the horns aforesaid, and the arms connecting the brackets to said cross-rod and the springs connecting the brackets to the horns as and for the purpose specified.

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Witnesses:
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