

(No Model.)

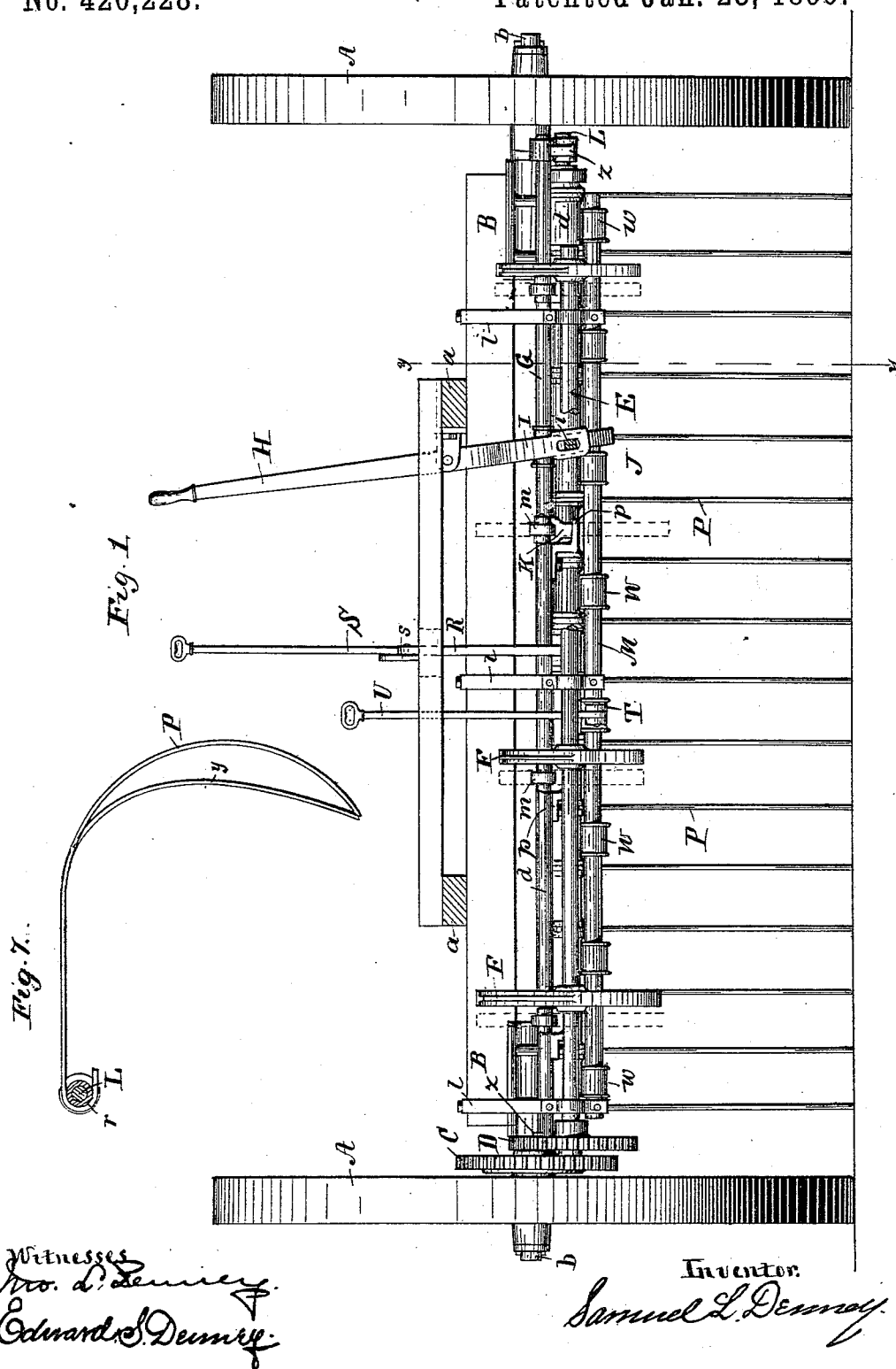
4 Sheets—Sheet 1.

S. L. DENNEY.

COMBINED HAY TEDDER AND HAY RAKE.

No. 420,228.

Patented Jan. 28, 1890.



Witnesses  
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 Edward S. Deming

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(No Model.)

4 Sheets—Sheet 2.

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Fig. 2.

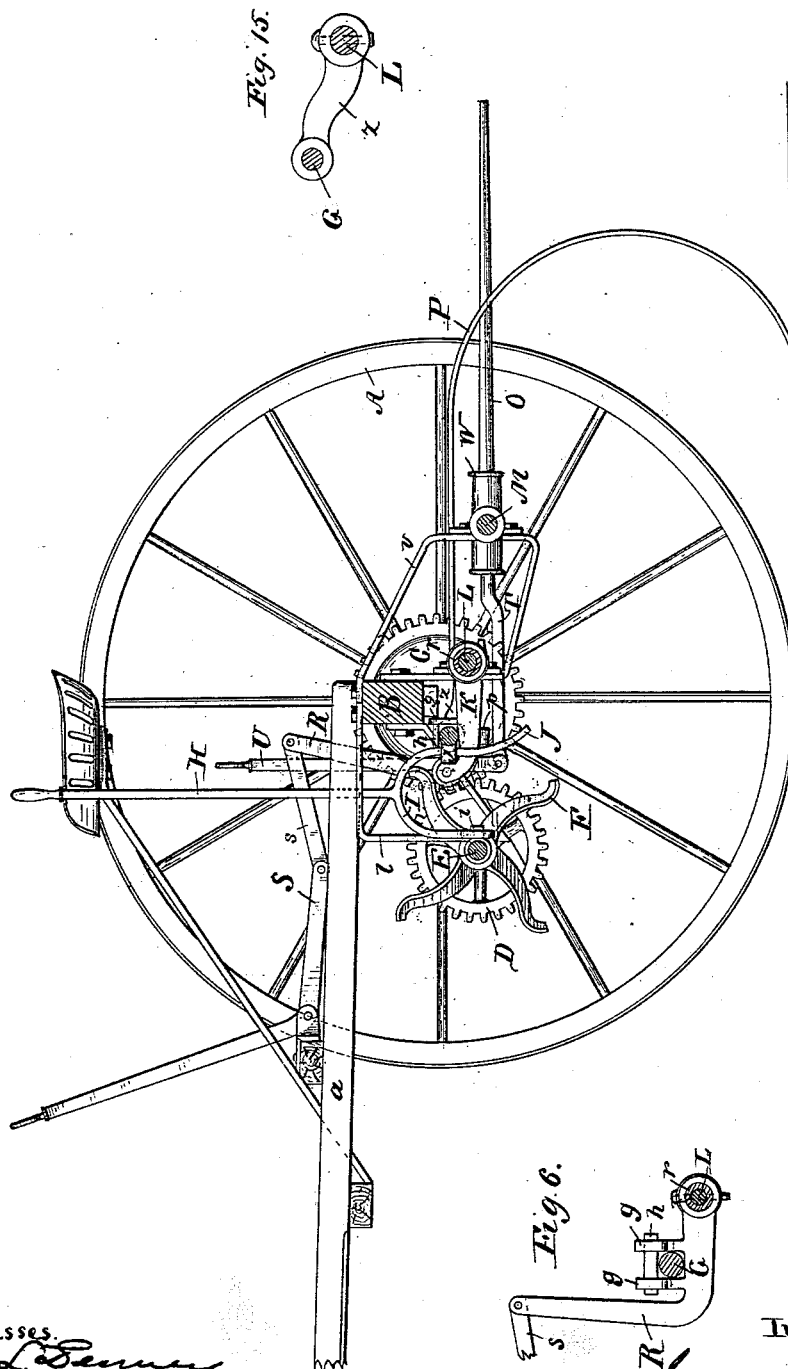


Fig. 15.

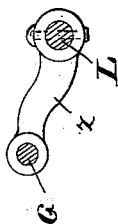
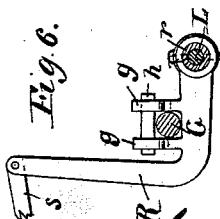


Fig. 6.



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Fig. 3.

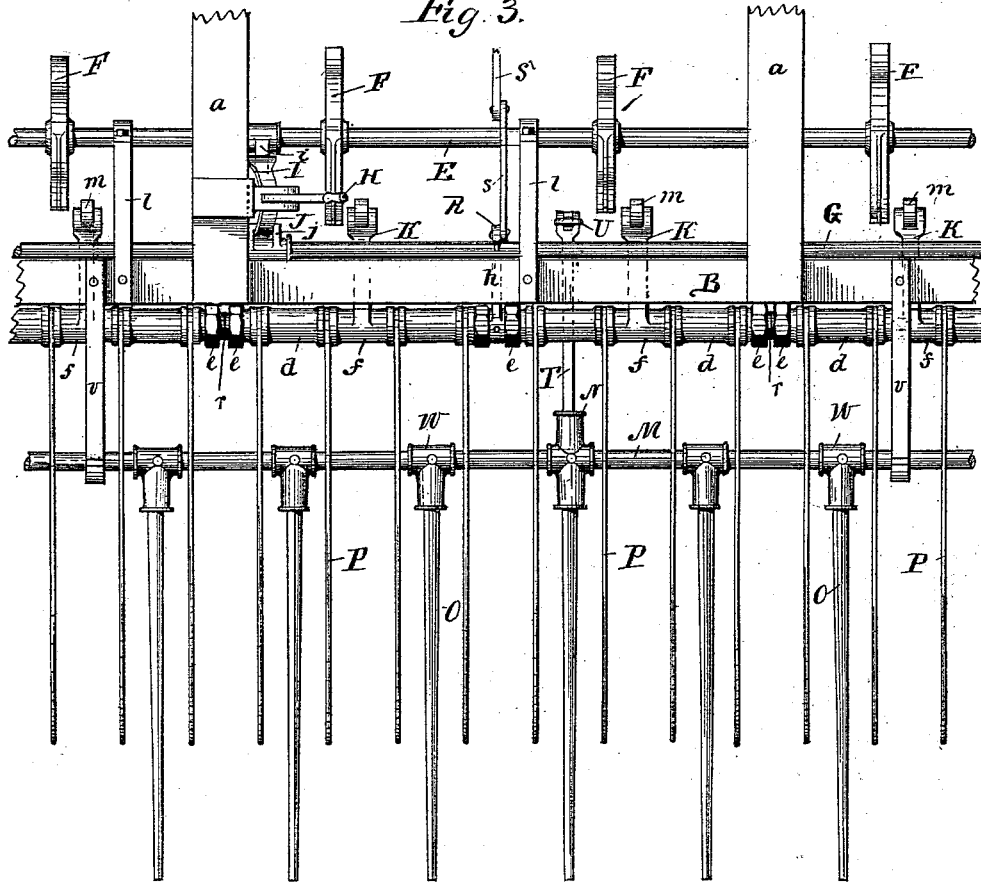


Fig. 8.

Fig. 9.

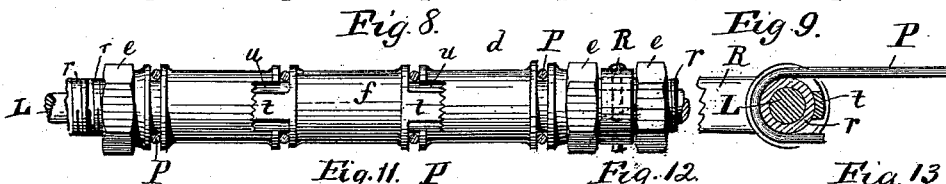


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 10.

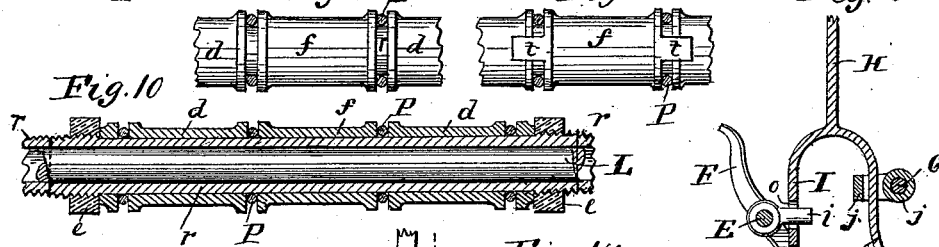
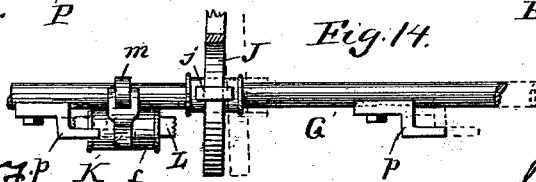


Fig. 14.



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(No Model.)

4 Sheets—Sheet 4.

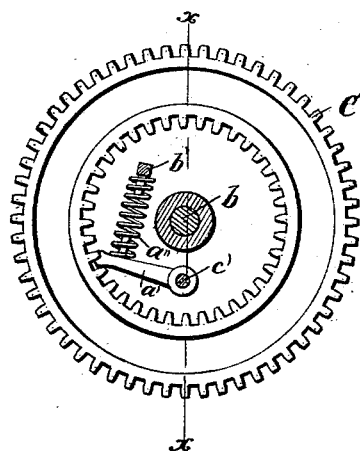
S. L. DENNEY.

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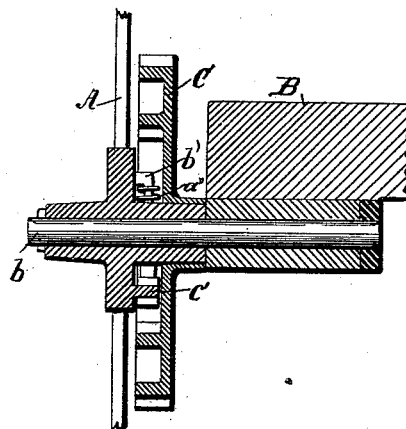
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*Fig. 4.*



*Fig. 5.*



Witnesses.

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# UNITED STATES PATENT OFFICE.

SAMUEL L. DENNEY, OF MINNEAPOLIS, MINNESOTA.

## COMBINED HAY-TEDDER AND HAY-RAKE.

SPECIFICATION forming part of Letters Patent No. 420,228, dated January 28, 1890.

Application filed January 7, 1889. Serial No. 295,659. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL L. DENNEY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and valuable Improvements in Combined Hay-Tedders and Hay-Rakes, of which the following is a specification.

My invention relates to improvements in horse hay-rakes which are fitted with attachments by means of which they may be operated also as hay-tedders when desired; and it consists, generally, in the construction and combination hereinafter described, and particularly pointed out in the claims.

My invention further consists in an improvement upon my prior patent upon a combined hay tedder and rake, No. 312,336, dated February 17, 1885.

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of my improved hay tedder and rake, the shafts and seat being removed. Fig. 2 is a vertical cross-section of the same on the line *y y* of Fig. 1. Fig. 3 is a detail plan view of tappet-shaft, rake-head, and teeth-clearers, with their various connections and supports. Fig. 4 is a detail elevation of the main gear-wheel, showing ratchet and pawl. Fig. 5 is a central longitudinal section of the driving-wheel, hub, and main gear on the line *x x*, Fig. 4. Fig. 6 is a detail of the bell-crank, rake-lifting lever or arm. Fig. 7 is a detail of a modified form of rake-tooth. Fig. 8 is a detail of a portion of the rake-head. Fig. 9 is a cross-section of the same. Fig. 10 is a longitudinal section of the same. Figs. 11 and 12 are details of modifications of the interlocked ferrules of the toothed sections. Fig. 13 is a detail of a portion of the bifurcated lever for shifting the mechanism to change the machine from a rake to a tedder, and vice versa, showing its connection with the tappet-shaft and rod engaging the arms of the rake-head. Fig. 14 is a detail of said rod; and Fig. 15 is a detail of the arms which support said rod.

In the drawings, A is the main or driving wheel; B, the main cross-bar of the rake-frame or axle arranged above the working mechanism and having at either end the metal spindles *b*, on which the main or driving wheels of the rake are journaled.

*a* are the shafts or thills, preferably rigidly secured to the cross-bar B.

C is the main gear or ratchet wheel journaled upon the inner end of the hub of one of the driving-wheels, having an inner gear or ratchet in which engages the pawl *a'*, pivoted at *c'* to the hub of the driving-wheel, a suitable spring *a''* bears upon the pawl, and a spur *b'*, by means of which the pawl is kept in engagement with the inner gear or ratchet. By this means the forward motion of the driving-wheel carries the main gear C forward with it, but allows it to be rotated backward without moving the gear-wheel.

The rake-head is of peculiar and improved construction, and consists of the shaft or tube L, supported in bearings on the brackets *v*, parallel with and slightly back of and below the cross-bar B. Arranged loosely upon this shaft are the series of tubes or sleeves *r*, preferably each of sufficient length to carry four rake-teeth. Arranged upon the tubes *r* are the ferrules *f*, preferably provided with end spurs *t*, placed between other ferrules *d*, having notches or recesses *u* to receive the spurs *t*, the ends of the spurs and the bottom of the notches being preferably similarly serrated, whereby the angular position of the arms K of the ferrules *f* may be adjusted as desired, although, if preferred, this construction may be modified, as shown in Figs. 11 and 12, the spurs being dispensed with in Fig. 11, and in Fig. 12 the spurs lying in notches of exactly the width to receive the spurs without means for angular adjustment. The rake-teeth P are bent around the tubes *r*, each tooth being placed between the meeting ends of the ferrules *d* and *f*, the ferrules being then firmly clamped together, so as to hold the teeth rigidly in place, by means of the set-nuts *e*, which engage the threaded ends of the tubes *r*. As many tooth-sections as desired may be provided and any desired number of teeth arranged in each section; but I prefer to place four teeth in each section, as their weight is sufficient to cause them to fall with force enough in tedding to penetrate through the layer of grass or hay upon the ground. The ferrules *f* are provided with forwardly-projecting arms K, carrying anti-friction rolls *m*. Journaled upon the brackets *l* in front of the axle and parallel therewith is the tappet-

shaft E, carrying the tappets F, having preferably two arms so arranged as to strike the rolls *m* as the shaft is rotated, and thus depress the arms K and partially rotate the tooth-sections, so as to raise the teeth from the ground. The tappet-shaft is provided with the pinion or small gear-wheel D, arranged to mesh with the gear C when "in gear," whereby motion is imparted to the shaft to operate the tooth-sections. The tappet-shaft is adapted to slide longitudinally in its bearings, so as to throw the wheel D into or out of gear with the wheel C when in gear, making the machine a tedder, and when out of gear making it a rake, as hereinafter described.

Slidably arranged immediately above the arms is a locking-rod G, supported in suitable bearings on the arms *z*, which are rigidly secured to the rake-head shaft L and project forward underneath the axle, said rod G being provided on its under side with the projecting hooks or lugs *p*, adapted to engage the arms K and lock them, so as to prevent the independent movement of the tooth-sections. Pivoted to the frame of the rake in a position convenient to the operator is the bifurcated lever H, one member or prong J of which engages the rod G by means of the collar *j*, rigidly secured to said rod, through a suitable orifice in which the member J passes. The other member I of the lever engages the tappet-shaft E preferably by means of the spur-collar *i*, arranged loosely on said shaft, but held in any suitable manner from sliding thereon, its spur passing through a slot *o* in the member I of said lever. By operating this lever the tappet-shaft and locking-rod may be thrown laterally simultaneously and in the same direction, they and their attachments being so arranged that when the tappet-shaft is thrown into gear with the gear-wheel C the rod G is out of engagement with the arms K, whereby the motion of the machine causes the tappet-shaft to rotate, and the tappets striking the rolls upon the tooth-section arms causes the tooth-sections to rise and fall, the machine thus acting as a tedder. The pinion or small gear D of the tappet-shaft should bear such relation in size to the main gear and the number of arms of the tappets be such that the teeth of a tooth-section will be raised from the ground long enough to carry them over the bunch of hay which they have gathered, and be released so as to drop immediately in front of the bunch. The tappets are also so arranged on their shaft that no two arms will strike at the same time, so as to make the movement of the machine as even and uniform as possible. By a reverse throw of the lever H the tappet-shaft is thrown out of gear with the main gear, and the spurs *p* of the rod G respectively engage the arms K, and the machine is thus transformed into a rake. When thus arranged, the rake teeth are raised by means of the L-shaped arm R, rigidly secured

to the shaft L and engaging the rod G by means of the lugs *g*, between which the rod G rests, and the key *h* passing through suitable holes in the lugs *g* and bearing upon the rod G. The arm R is connected by the link *s* to the bell-crank lever S, which is pivotally supported upon the frame of the machine in a position convenient to the operator. Upon throwing the lever S backward the upwardly-projecting arm R is drawn forward and downward, carrying with it the rod G, which, bearing upon the arms K also depresses them, thus raising all of the rake-teeth simultaneously.

The prong or member J of the bifurcated lever H is preferably given a slight rearward bend, so as to allow freedom of movement of the ear *j* to and fro along it in the operation of the rake. The tooth-clearers O are preferably arranged upon a shaft M, supported in suitable bearings upon the brackets *v*, which are rigidly secured to the frame of the machine. A forwardly-projecting arm T, rigidly secured to the shaft M and having the handle U pivoted thereto, by means of which the angle of the tooth-clearers can be changed as desired, according to the work to be done by the machine, the clearers being depressed more when the machine is used as a tedder than when used as a rake. In order that the teeth may clear themselves of the grass when raised from the ground, either in raking or in tedding, I may prefer to arrange in each section a tooth having a secondary brace or wire *q* of less curve than the tooth, so that the grass or hay will more readily be disengaged from it. The tooth-clearers O, I prefer to secure to the shaft M by means of the iron sockets W, into which they are fitted, and which are bolted or otherwise rigidly secured to the shaft, one of which sockets W may be provided with a forwardly-projecting socket N, into which the arm T may be secured; or said arm may be made integral with the socket W. The several brackets *l* and *v*, which are rigidly secured upon the axle or main cross-bar B, are an important feature of my improvement, as these can all be made exactly similar, so that in setting up the machine the bearings for the various shafts are adjusted in exactly the right positions, and if a bracket or other part be broken a new part can be substituted readily for it and the relation of the working parts to each other always maintained accurately. Another very important feature of my improvement is the locking-bar G, adapted to engage a rigid arm on each of the tooth-sections, instead of a locking-bar arranged to engage each of the teeth of the rake, as in my prior patent. Great practical difficulties are found to exist in the application of this prior device for locking the teeth, since the rake-teeth in use always become more or less bent or distorted, so as to stand out of line with each other and at unequal distances apart, and as a result in the act of locking the bar will engage and secure with its hooks only a

portion of the teeth, and in the act of unlocking some of the teeth which are bent out of line are liable not to be released from the hooks, and consequently in proceeding to operate the machine as a tedder when the tappet-arms strike the tooth-section arms the machine is almost certain to be broken, as the tappet-arms and the tooth-section arms also become interlocked, whereas by the use of the locking-bar G, the arms of the tooth-sections always remaining in line, no matter how much the individual teeth may be sprung, the operations of locking and unlocking are always positive and sure. Besides, the machine is rendered much more efficient and easily operated as a rake, for the reason that the lifting bell-crank lever R extends forward from the rake-head, so as to add its weight to the leverage power instead of detracting from it, as in the other construction, and the weight of the locking-bar and its supporting-arms *z* serve as a partial counter-balance to the weight of the teeth, instead of being added to their weight, as in the other construction, so that with an equal leverage very much less power is required to operate the rake than before, and the cost of construction is both simplified by the use of a very much less number of locking devices or hooks and cheapened by reason of the increased simplicity, and also in the use of lighter operative parts—as of tappet-arms and tooth-section arms—and the greatly-reduced liability to breakage, as above set forth. The tappet-shaft and the locking-bar are in this improved construction also brought close together and in position to be readily operated by the means of a single lever simultaneously and accurately in a manner very much superior to any means possible where the locking-bar and its attachments are arranged under the teeth and at a considerable distance from the tappet-shaft.

Operation: When used as a tedder, the lever H is thrown over, so as to carry the tappet-shaft laterally a sufficient distance to cause the pinion D to mesh with the gear C, in which position the tappets should in their rotation strike the rolls *m*, and the lugs *p* of the rod G are freed from the arms K. Upon the machine being propelled forward, the pawl *a'*, engaging with the ratchet or inner gear of the wheel C, causes the wheel C to be turned with the hub of the driving-wheel upon which it is journaled. The pinion D, engaging with the gear C, is therefore rotated oppositely, the tappet-arms alternately striking upon the anti-friction rolls *m*, thus successively raising and allowing to fall the several tooth-sections. The teeth rising with a gradual movement tend to roll the gathered bunch of grass bottom upward, and the parts are so adjusted that the teeth shall fall directly in front of the bunches thus dropped, thus leaving them upturned and loose in most favorable position for curing. When used for raking, the machine is changed to a rake by throwing the lever H in the op-

posite direction, whereby the tappet-shaft and rod G are carried in the opposite direction, disengaging the pinion D from the gear C and causing the lugs *p* to respectively engage the arms K, thus locking the tooth-sections together and preventing independent movement between them. The operation of the lever S, as described, serves to raise the rake to dump the accumulated hay. Whenever it is necessary, from working in hay of different thickness or condition, to vary the elevation of the teeth-clearers, their position can be instantly changed by raising or lowering the handle U, as described.

I claim—

1. In a device of the class described, the combination, with the tappet-shaft E, and the locking-rod G, of a rake-head composed of independent tooth-sections arranged loosely upon the common shaft L, each comprising the tube *r*, the arm-carrying ferrule *f*, the ferrules *d*, arranged on either side of the ferrule *f*, the lock-nuts *e*, and the teeth P, encircling said tube *r* and clamped between the meeting ends of said ferrules and said nuts, substantially as described.

2. In a device of the class described, the combination, with the driving-wheel A, the gear-wheel C, journaled on its hub and having pawl-and-ratchet connection with said driving-wheel, and the pinion D, adapted to engage with said gear-wheel C, of the tappet-shaft E, rigidly secured to said pinion D and slidably journaled upon the frame of the machine, a rake-head composed of independent tooth-sections, each provided with the arm K, adapted to be struck by the tappets of the tappet-shaft, the hook-carrying rod G, slidably supported in said machine and adapted to engage the arms K and thereby to lock said tooth-sections together, the bifurcated lever H, engaging said tappet-shaft and rod G and adapted to reciprocate the same, the arm R, rigidly secured to the shaft of the rake-head and engaging the rod G, and the lever S, linked to said arm R and adapted to operate the same and to raise and lower the rake-teeth, substantially as described.

3. In a combined hay tedder and rake, the combination, with a rake-head comprising a series of independent tooth-sections having forwardly-projecting arms adapted to be tripped by suitable mechanism in the operation of tedding, and a slidable bar having a series of hooks adapted to engage said arms and to lock said tooth-sections together, of the forwardly and upwardly extending L-shaped arm R, rigidly secured to said rake-head and engaging said rod, and the bell-crank lever S, linked to said arm, adapted to be operated substantially as described.

4. In a combined hay tedder and rake having a series of independent tooth-sections provided with forwardly-projecting arms adapted to be tripped in the operation of the machine as tedder, the combination, with a tappet-shaft slidably journaled in front of said tooth-

sections and parallel therewith, and adapted when "in gear" to be rotated by the forward movement of the machine upon the ground through suitable gear-connections with one of the driving-wheels, and a slidable rod arranged immediately above the arms of said tooth-sections parallel with said tappet-shaft and provided with a series of hooks adapted to engage with said arms and to lock said tooth-sections together, of the pivoted lever H, loosely engaging with both said tappet-shaft and slidable rod and adapted to reciprocate the same simultaneously and in the same direction, said rod being out of engagement with said tooth-sections when the tappet-shaft is in gear, and vice versa, substantially as described.

5. In a combined tedder and rake, the com-

bination of a sectional rake-head having forwardly-projecting arms adapted to be tripped in the operation of tedding, a slidable locking-bar arranged above said arms and provided with hooks adapted to engage said arms and to lock them together, and an arm rigidly secured to the rake head shaft and engaging said locking-bar and adapted to be depressed and lifted so as to raise and lower the rake-teeth, substantially as and for the purposes set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SAMUEL L. DENNEY.

Witnesses:

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EDWARD S. DENNEY.