D. J. POWERS.

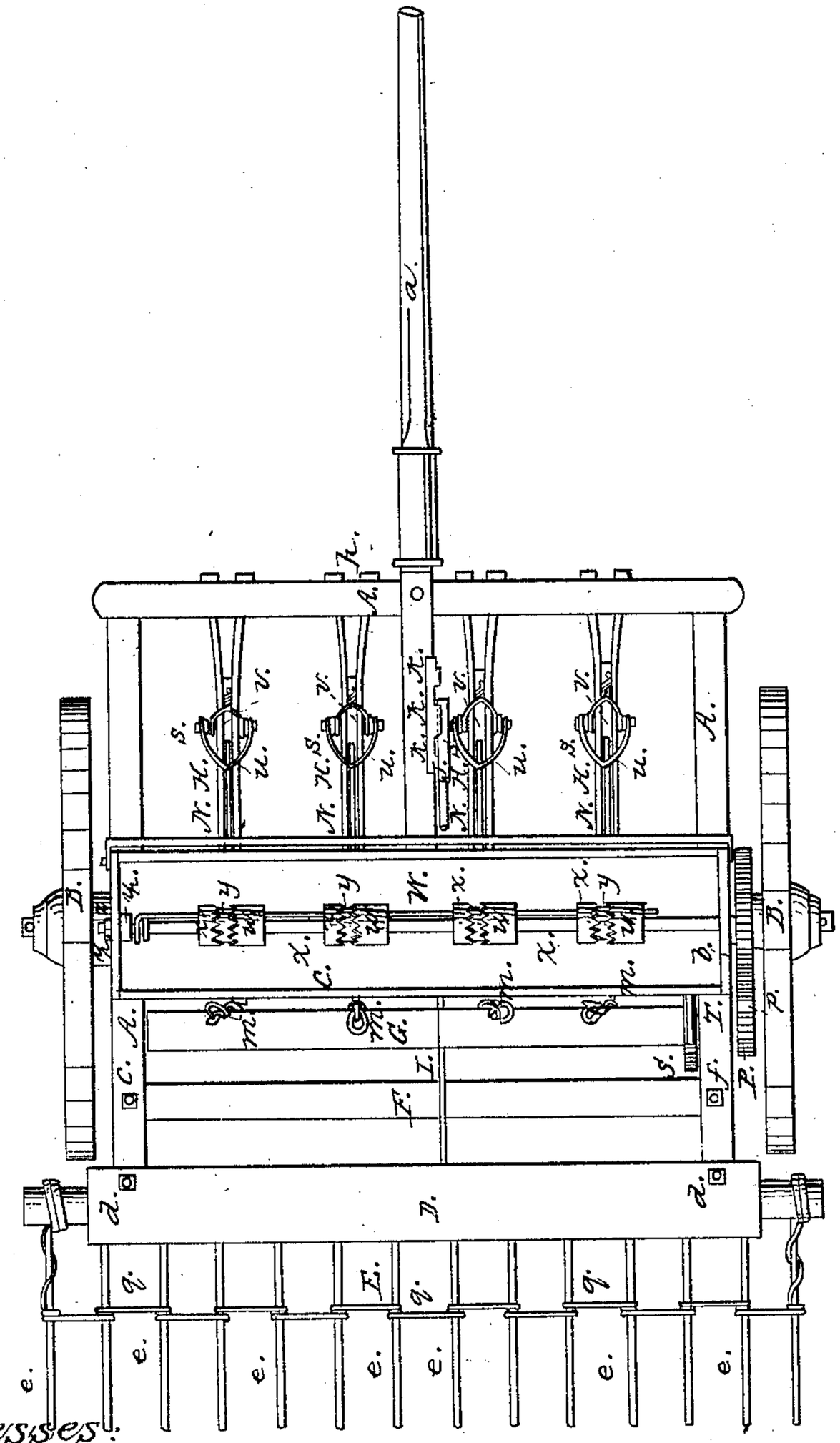
Grain Drill.

2 Sheets—Sheet 1.

No. 36,966.

Patented Nov. 18, 1862.

Fig. 1.



Witnesses:

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Wm. Frank Browne

Inventor:

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2 Sheets—Sheet 2.

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Fig. 2.

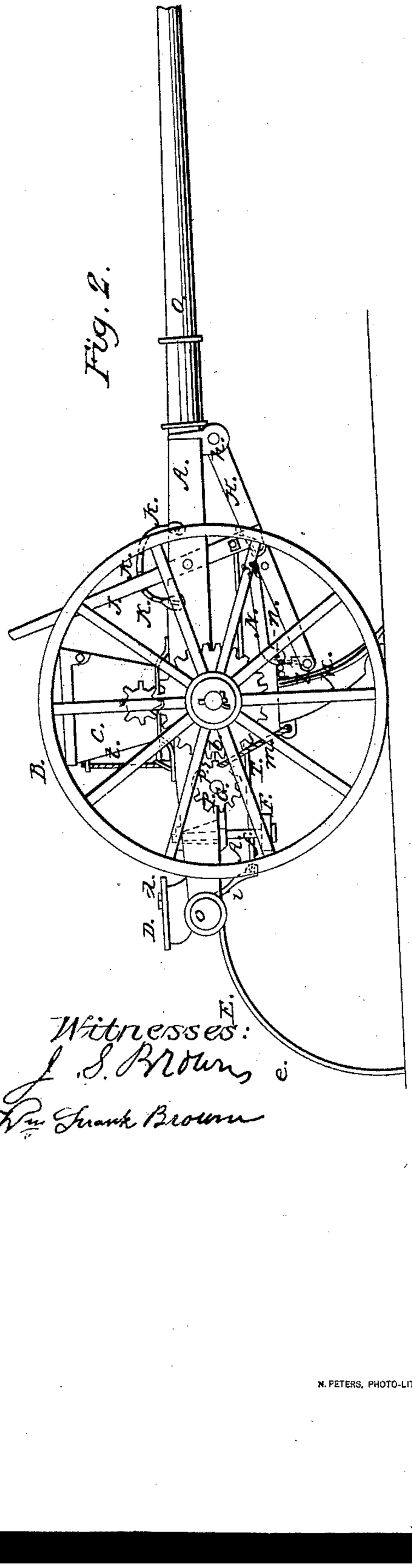


Fig. 5.

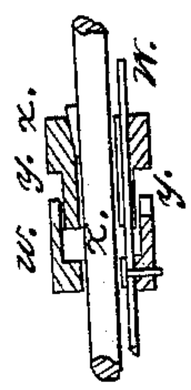


Fig. 3.

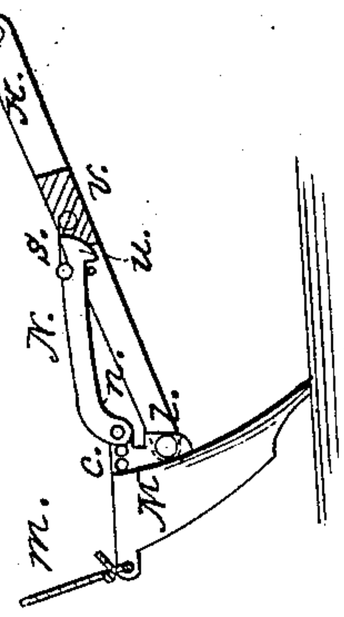
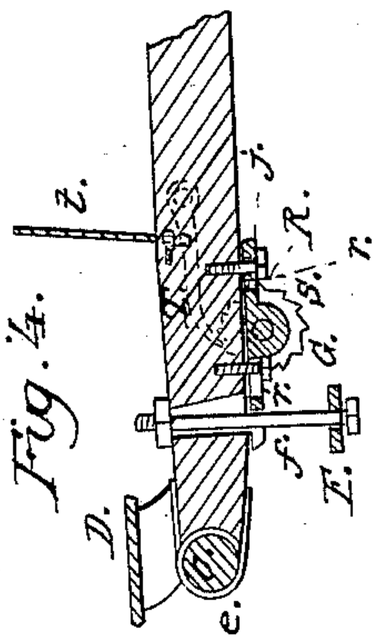


Fig. 4.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

D. J. POWERS, OF MADISON, WISCONSIN.

IMPROVEMENT IN GRAIN-DRILLS.

Specification forming part of Letters Patent No. **36,966,** dated November 18, 1862.

To all whom it may concern:

Be it known that I, D. J. POWERS, of Madison, in the county of Dane and State of Wisconsin, have invented a new and Improved Grain-Drill; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a plan of the machine; Fig. 2, a side elevation thereof; Fig. 3, a side view of a part detached; Figs. 4 and 5, sections of parts detached.

Like letters designate corresponding parts in all of the figures.

A simple rectangular frame, A, supported on two wheels, B B, and drawn by the pole or tongue *a*, serves to mount all the working parts of the drill on. An ordinary seed box or hopper, C, extends transversely across the middle of the machine. Its cover serves as a seat for the driver when he desires to sit in that position; but I locate another seat, D, on the rear end of the frame of the machine, from which seat the driver can see the working of every part of the machine without turning his head, and can more easily control those parts which require his attention and management. This seat simply rests on blocks or other supports on the rear ends of the side pieces of the frame A, and is secured thereon by a screw-bolt, *d*, at each end, or is sustained by any equivalent means. It thus extends the whole width of the frame, enabling the driver to shift his position when desirable, and being of wood possessing considerable elasticity. It requires no springs to render it sufficiently elastic to ride softly. It is as simple and cheap as possible.

In a proper position before and below the seat D there is a foot-board, F, for the feet of the driver to rest on. It extends also the whole width of the frame, and is suspended at each end by a screw-bolt, *f*, extending downward from the side timber of the frame, or by any equivalent means, whereby its height may be adjusted at pleasure.

The bars H H, by which the drill-teeth M M are borne and drawn, are hinged, in the usual manner, at *h h* to the front timber of the frame. Each bar is represented as composed of two strips of metal separated a little, and between these strips there is a stop or block, *v*, near the middle of the bar; but the mode of constructing the bars is not essential. Each drill-tooth is hinged to the rear end of its bar at *l*, and a little above this hinge, at *n*, an arm or dog, N, is also hinged to the drill-tooth. The dog extends forward to the stop *v*, (when the drill-tooth is in its operating position,) and its front end, *u*, bears against the face of the stop *v*, being pressed down against it (between the side strips of the bar H, according to the construction represented in the drawings) by a spring, *s*, substantially as shown. The contiguous faces *u v* of the dog and stop are inclined in relation to the direction in which the dog acts to such a degree that as the drill-tooth M pushes forward against the dog by the ordinary resisting force of the ground, while the machine is moving forward the combined force of the spring *s* and the friction of the said two faces *u v* against each other will afford a sufficient resistance to hold the drill-tooth in place with as much rigidity and firmness as if its attachmant to the bar H were entirely unyielding; but whenever a root, stone, or other obstruction meets the drill-tooth, rendering it liable to break, the combined friction of the two inclined faces *u v* and power of the spring *s* yield to the suddenly-increased force acting on the drill-tooth, and the dog rises and slides along over the stop with much resistance at the start, but with very slight resistance after the first friction of their inclined surfaces is overcome. When the obstruction is passed, the force of the spring *s*, together with the wedge action of the face *u* of the dog on the stop *v*, brings the dog, and consequently the drill-tooth, back to its place again. The result of this construction and arrangement is important and valuable. When a simple spring is used to hold the drill-tooth there is a continual yielding and vibration of the tooth in the ground, very injurious to its proper action, especially as the spring is necessarily weaker in its action at the first moment of resistance, or when it should be the strongest. A wooden pin, prepared to break when obstructions are in the way, is a very imperfect, uncertain, inconvenient, and unmechanical device; but the combined action of the spring and friction, as described, affords the greatest resistance at the first and rapidly diminishes it after it once begins to yield. Thus it is obvious that all the advantages of a stiff unyielding as well as those of a per-

fectly yielding, attachment of the drill-teeth to the bars are secured at the same time.

The ear or projection of each drill-tooth, to which the dog N is hinged, has a set of holes, as shown in Fig. 3, so that the joint may be shifted from one to another to enable the drill-tooth to be adjusted to different angles without disturbing the relations of the face *u*, stop *v*, and spring *s*.

From an eye on each drill-tooth M a cord, *m*, or its equivalent, extends upward to a roller, G, which reaches across from side to side of the frame. These several cords pass up through eyes or loops on the roller and terminate in rings, or their equivalents, for preventing the cords from drawing through the eyes of the roller and for taking hold of when the drill-teeth are to be raised directly by hand. The whole arrangement is clearly shown in Fig. 1. Thus when it is desired to raise a single drill-tooth the driver, sitting in a convenient position on the seat D, draws up the cord *m* of the drill-tooth to be raised through the eye in the roller, without turning the roller and consequently without affecting the other drill-teeth. These cords *m m* are all of equal length, so that by turning the roller they are all wound up equally thereon, thus raising all the drill-teeth simultaneously and to equal heights. I provide for thus raising all the drill-teeth together by bringing the roller G into gear or action, directly or indirectly, with the driving-wheel in the forward movement of the machine itself, substantially as follows: On one end of the roller G there is a pinion, P, which, when the drill-teeth are to be raised together, is designed to be brought into gear with the cog-wheel *b*, situated on the driving-wheel B, for the general purpose of communicating motion to the seeding apparatus in the seed-box C; but this pinion P is to be kept ungeared from the said cog-wheel while the machine is in operation, as indicated in Fig. 2. The end of the roller G on which the pinion is situated has a sliding bearing, R, Fig. 4, by means of slots *r r* therein, and bolts *j j* or their equivalents. The suspending-bolt *f* of the adjacent end of the foot-board F, in its ordinary position, is in contact with the rear end of the bearing R when the pinion P is out of gear with the cog-wheel *b;* but it is allowed to have a limited forward-swinging movement by the enlargement of the aperture of the frame through which it is suspended, as shown in Fig. 4, so that the driver may swing that end of the foot-board forward, and thus likewise move the bearing R sufficiently to bring the pinion P into gear with the cog-wheel *b*. The motion of the driving-wheel B then immediately causes the roller G to revolve and wind up the cords *m m* thereon, till all the drill-teeth are raised to their full height. At that moment a blank portion, *p*, of the periphery of the pinion P, having no cogs, meets the cogs of the cog-wheel *b* and acts as a cam to throw the pinion out of gear with the cog-wheel, the end of the roller yielding backward. A ratchet-wheel, S, on the roller G, inside of the frame, and a pawl, T, on the frame, catching into said ratchet-wheel, hold the roller, with the cords *m m* wound thereon, as far as turned by the pinion P, before it is thrown out of gear with the cog-wheel *b*, the latter being still kept from gearing again with the pinion by the cam *p*. The machine thus moves automatically on, just the same as before the pinion was brought into gear, without a moment's stop. Different means might be employed for bringing the roller G into gear or connection with the moving or operating parts of the machine, and I do not limit myself to any special device for the purpose, the roller G, brought into automatic operation with the working or forward motion of the machine, being the essential feature of the invention. The cam *p* is not necessarily on the periphery of the pinion P in this arrangement, but may be connected with the pinion otherwise, or with the roller direct. When the drill-teeth are to be lowered again the driver lifts the pawl T from the ratchet-wheel S by drawing a cord, *t*, or by equivalent means, and the drill-teeth turn the roller back and descend by their own weight.

In this device it is necessary that the roller G should not make a complete revolution to raise the drill-teeth, since the blank or cam *p* occupies a part of the periphery of the pinion P, and only that part of the pinion having cogs or teeth can come into gear with the cog-wheel *b* before it is thrown out of gear by the said cam, when all further motion is stopped. A suitable brake or stop holds the pinion P in the right position to gear into the cog-wheel, ready for the next occasion to raise the drill-teeth thereby. There may also be, if desired, any suitable provision for holding the bearing R and foot-board F back in place and to regulate the descent of the drill-teeth to the ground. The advantages of thus raising the drill-teeth, through the roller G, by the ordinary movement of the machine automatically, and without labor on the part of the driver, are too obvious to require recital.

I distribute the seed to the drill-teeth and regulate the quantity sown by substantially the following device: Upon a shaft, X, which extends lengthwise through the seed-box C, and is caused to revolve by a pinion on one end gearing into the cog-wheel *b* of the driving-wheel, is fastened a series of short cylinders, *x x*, respectively, over the apertures in the bottom of the seed-box leading to the several drill-teeth. One end of each cylinder *x* is of larger diameter than the other end, the shoulders where the two cylindrical portions meet being notched, substantially as shown in Fig. 1. Then another series of short cylinders, *w w*, is fastened to a rod, W, running parallel with and a little to one side of the shaft X. These cylinders *w w* slide concentrically over the shaft X, and also one end of each slides over the small end of each corresponding one of the cylinders *x x*, as shown in Fig. 5. This overlapping end of each cylinder *w* is also notched

in a manner precisely similar to the shoulder on each cylinder *x;* but each notch projection is situated opposite to a notch in the other, and vice versa, as represented in Fig. 1, so that there is a zigzag space, *y*, between each pair of cylinders *w x*, substantially as shown. Thus the two notched surfaces of each pair may be brought together, matching into each other, like the teeth of two cog-wheels, till the space *y* is totally closed; or they may be separated, so as to have the space as wide as desired. The two sets of cylinders are so secured respectively on the shaft X and rod W that the spaces *y y* between the several pairs *w x* are of uniform width throughout, and by adjusting the rod W lengthwise on the shaft X all the said spaces are equally enlarged or contracted. This adjustment is effected by means of a nut, Z, to be turned on a screw-thread, *z*, cut on the end of the shaft X, the rod W being swiveled on the nut, as shown in Fig. 1; or any equivalent means of adjustment may be employed. The rod W obviously slides freely through the cylinders *x x*. The zigzag spaces *y y* receive the grain from the hopper or seed-box and carry it down round to the apertures leading to the drill-teeth in perfectly-regulated quantities, and they are adjusted in size to sow any amount of grain to the acre; or they may be entirely closed, if desired, so as not to sow at all. I am aware that separate seed apertures or cavities have been varied in size by a similar adjustment; but I am not aware that continuous zigzag feeding-spaces like these have ever been employed. They work more freely and distribute the grain more evenly than separate cavities. The rod W incidentally serves to agitate the grain in the hopper.

On the rear end of the frame of the machine I locate a rake, E, for the purpose of pulverizing the earth more finely, and of covering in the grain, grass-seed, and manure when spread on the ground. This rake is constructed like a hay-rake, and may be used for that purpose. Its teeth *e e* are best made of spring-wire, coiled or otherwise secured on a head or shaft, *o*, which has suitable bearings for turning on the rear end of the frame A. A spring-wire, *q*, Fig. 1, extends from tooth to tooth at some distance from the upper ends thereof, and is coiled around each successively, substantially as shown. This not only serves to keep the teeth separated at the proper distances apart, but imparts an additional elasticity and firmness to the teeth singly and collectively. The rake is raised and lowered by a lever, J, connecting-rod I, and arm *i* on the rake-shaft, substantially as shown. A suitable catch, K, with notches *k k'*, serves to hold the lever J in any desired position, so that the rake may be held thereby either up or down, or be adjusted to any intermediate position. This rake is a decided improvement on a harrow following a grain-drill. By its elastic teeth it yields and does not offer so much resistance to the forward motion of the machine. It is also much lighter, and does not sink at times so deeply in the ground, in these respects, also, requiring less power than a harrow, while it is as efficient in action. It is likewise quickly raised from the ground when it is not to be used, or when obstructions are in the way. It may be employed as a hay-rake, either mounted on the drill-frame or otherwise. Thus economy in the cost of implements is subserved.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The suspended adjustable foot-board F, arranged substantially as and for the purpose herein specified.

2. The combined application of a spring and friction-surfaces to sustain the drill-teeth M M upon their bars H H firmly and rigidly while in operation, but so as to yield with sufficient readiness when they meet obstructions, substantially as herein specified.

3. The roller G, arranged, in combination with the operating-gearing of the machine, so that the drill-teeth may be raised together by the automatic action of the machine itself in its forward movement without stopping or halting, substantially as herein specified.

4. The continuous zigzag seeding-apertures *y y*, adjustable in width, substantially as and for the purpose herein set forth.

D. J. POWERS.

Witnesses:
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EDM. F. BROWN.