2 Sheets—Sheet 2.

W. T. NICHOLS.

ROTARY HARROWS.

No. 187,769. Patented Feb. 27, 1877.

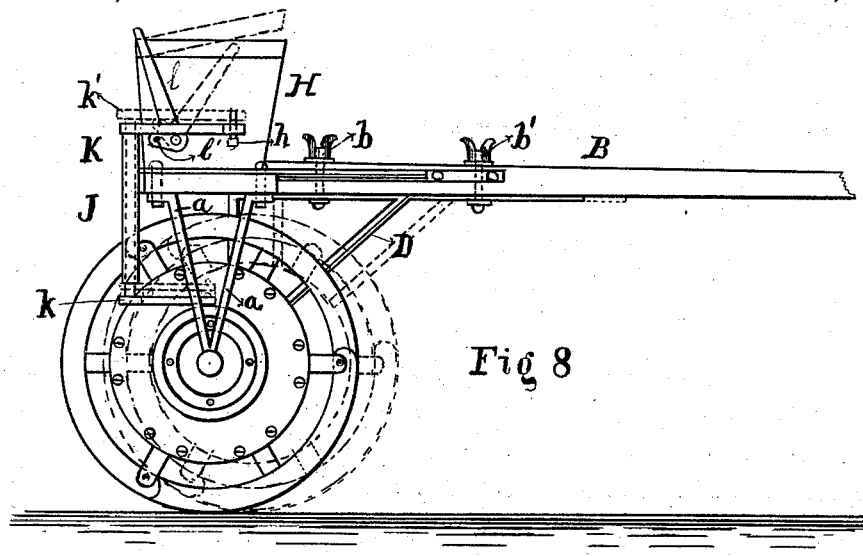

Fig 8

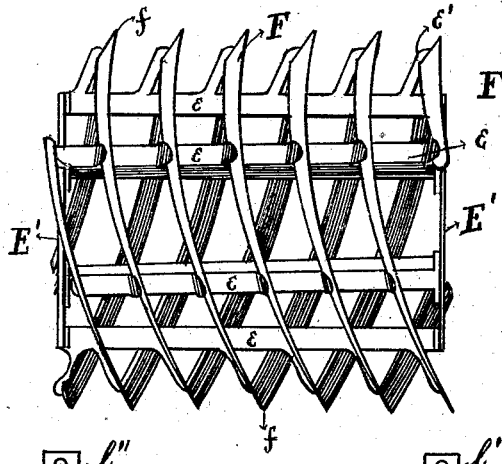

Fig 9

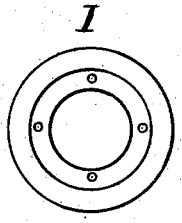

Fig 14

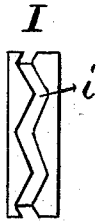

Fig 15

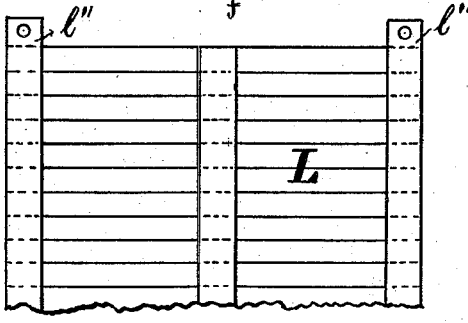

Fig 10

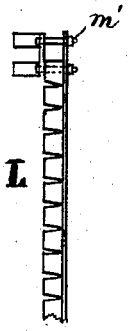

Fig 11

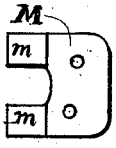

Fig 12

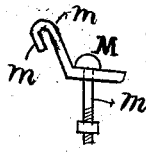

Fig 13

Attest
W. C. Corlies
E. S. Lloyd

INVENTOR
William T. Nichols
Per Coburn Hudson
Atty's.

UNITED STATES PATENT OFFICE.

WILLIAM T. NICHOLS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN ROTARY HARROWS.

Specification forming part of Letters Patent No. **187,769**, dated February 27, 1877; application filed December 28, 1876.

To all whom it may concern:

Be it known that I, WILLIAM T. NICHOLS, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Harrows or Scarifiers, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of the machine. Fig. 2 is an inverted plan view, showing the construction and attachment of the axles, the spiral stirrers being removed; Fig. 3, a transverse section taken on the line *x x*, Fig. 1; Figs. 4 and 5, detail views of the inner ends of the axles; Figs. 6 and 7, views of the adjusting-collar; Fig. 8, an end elevation of the machine; Fig. 9, a front elevation of one of the rotary stirrers removed from its axle; Figs. 10 and 11, plan and edge views of a covering for the spirals to convert them into rollers; Figs. 12 and 13, plan and end views of the device for attaching the roller-covering to the scarifier; and Figs. 14 and 15, end and front views of the cam for driving the seeding apparatus.

My invention relates to a machine for thoroughly stirring and pulverizing the earth, to prepare it for seeding, by means of rotary scarifiers or pulverizers.

The invention consists in a rotary scarifier composed of a skeleton frame, around which are spirally wound two or more cutting-strips attached to arms projecting from the skeleton frame, and set at an angle to the axis, so as to be dishing. It also consists in the combination of a jointed shaft with two of these rotary scarifiers mounted thereon, whereby their angle to each other may be adjusted. It also consists in the combination of a seeding device with the rotary scarifiers and special devices for operating the former by the latter at pleasure; and it further consists in various devices and combinations of devices, as will be hereinafter fully set forth.

In the drawings, A represents a simple frame, to which is attached a tongue, B. From each end of the frame depend hangers *a*, in which is supported a shaft, C. This shaft is made in two parts, the inner ends of which are halved, as shown in Figs. 4 and 5 of the drawings, and pivoted together, so that the shaft may be moved backward and forward, the bearings in the hangers *a* being sufficiently large to accommodate this movement. An angular-braced hanger, D, is also attached to the lower side of the tongue, the lower end of which is constructed with a recess, *d*, as shown in Fig. 3 of the drawings, within which is placed the inner ends of the two parts of the shaft C, and through which the bolt passes which unites them. The hanger D is attached to the tongue B by two bolts, one of which, *b*, passes through a slot, d^1, in the hanger, and the other of which, *b'*, is inserted in any one of a series of holes, d^2, in the upper arm of the hanger. Both bolts pass through the tongue, and are provided with screw-nuts for tightening them up.

It is evident that, by means of these devices, the hanger D may be adjusted back and forth on the tongue, thereby adjusting in a similar manner the jointed shaft C. The scarifiers E are constructed of a skeleton cylindrical frame composed of two disks, E', joined together by cross-bars *e*, attached to their edges, each of which are provided with a series of lugs or short arms, *e'*. These lugs or arms *e'* are inclined or set at an angle to the bars *e*, as shown in Figs. 1 and 9 of the drawings.

Narrow bands or strips of metal F are wound spirally around this skeleton frame. These spiral strips should be two or more in number, and are fastened by rivets to the arms *e'*. The strips F are set with one edge, *f*, projecting outward beyond the arms *e'*. The edge *f* is sharpened or beveled, and as the arms *e'* are inclined, as above described, the strips F attached thereto will stand in a dishing position to the axis of the cylinders, around which they are wound. The origin of the several spirals is at different points around the cylinder, so that there is always a free space between the end of one spiral and the nearest turn of the next one.

The disks E are perforated to receive the shaft C, on each division of which one of the spiral scarifiers is mounted, the joint in the shaft being between them. It is evident, therefore, that the adjustment of the shaft described above will also adjust the scarifiers, so that they may stand directly in line with

3 Sheets—Sheet 1.

J. R. BROWN, dec'd.

C. D. OWEN and L. SHARPE, Executors.

GRINDING MACHINE.

No. 187,770. Patented Feb. 27, 1877.

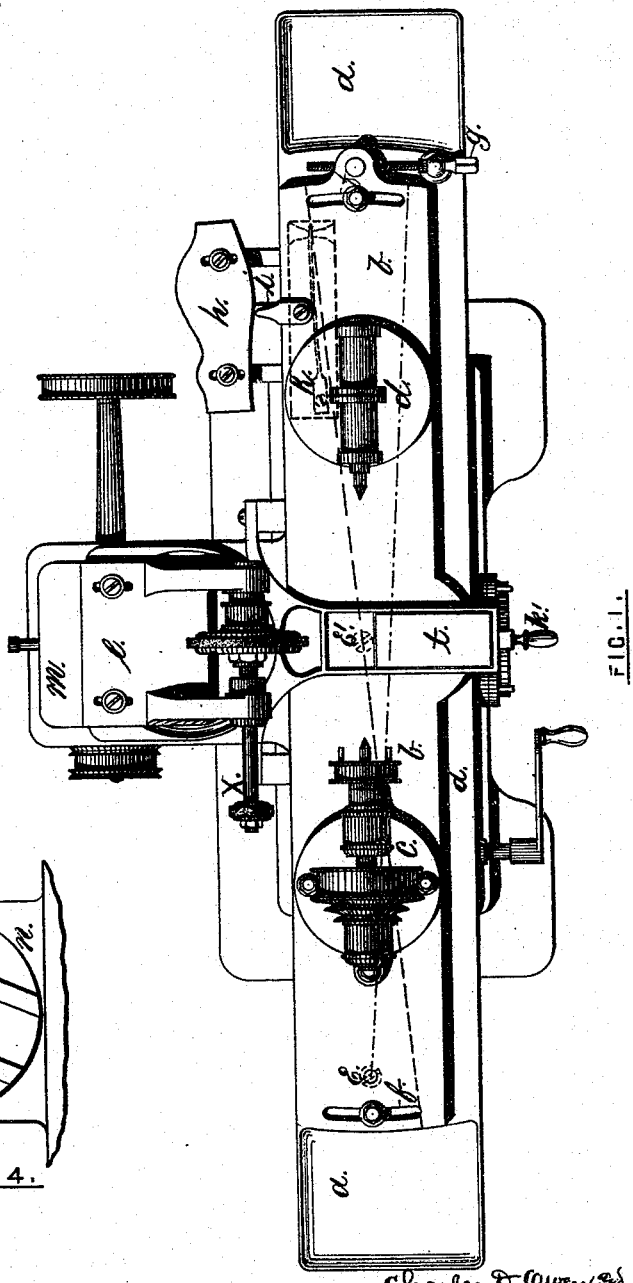

FIG. 1.

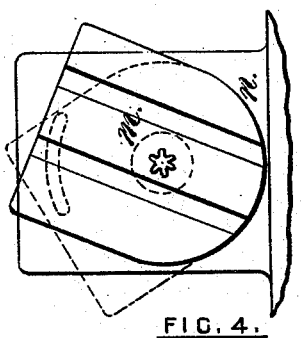

FIG. 4.

WITNESSES.

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Executors of
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by Joseph A. Miller
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