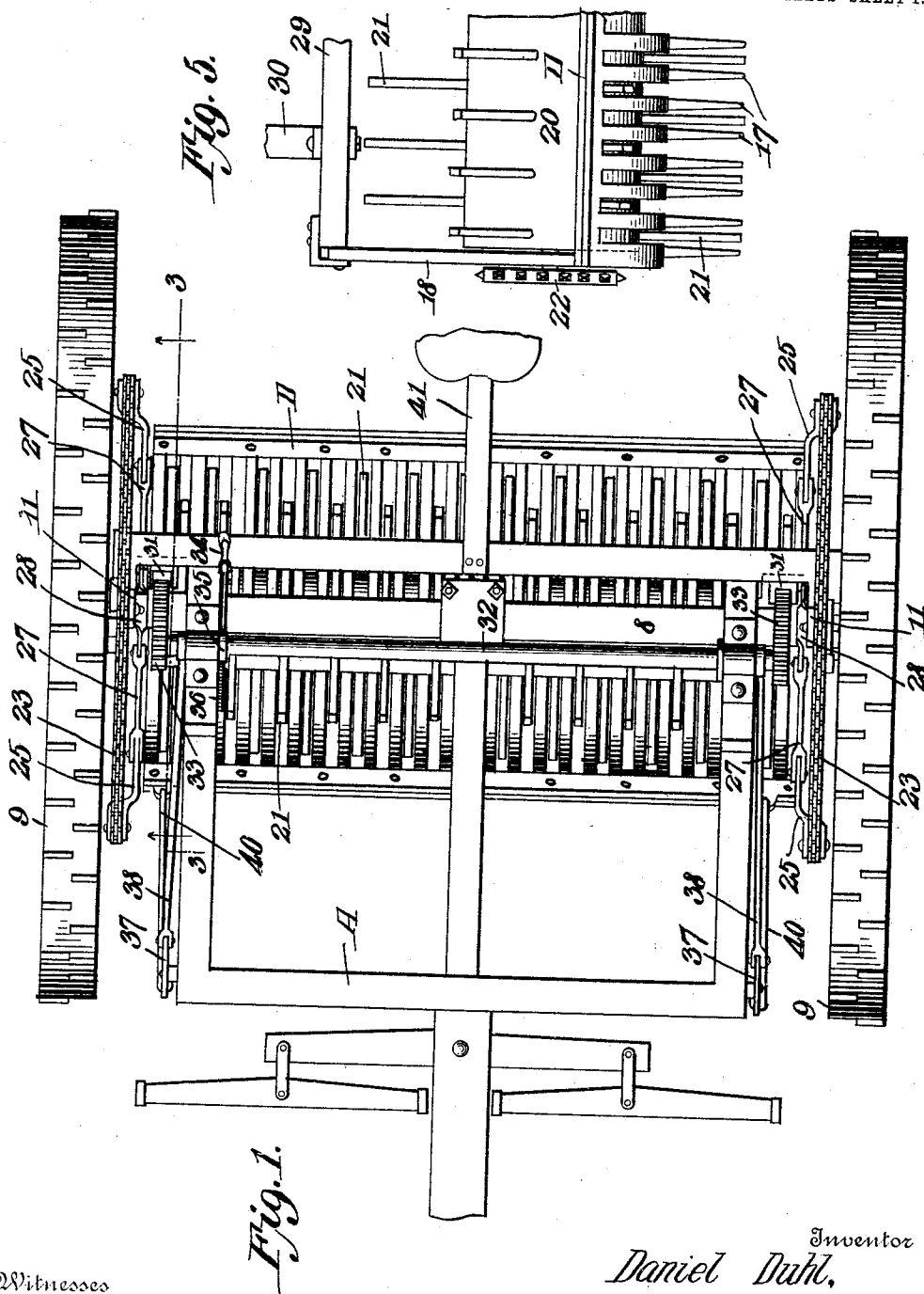


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HARROW AND CLOD CRUSHER.
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3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

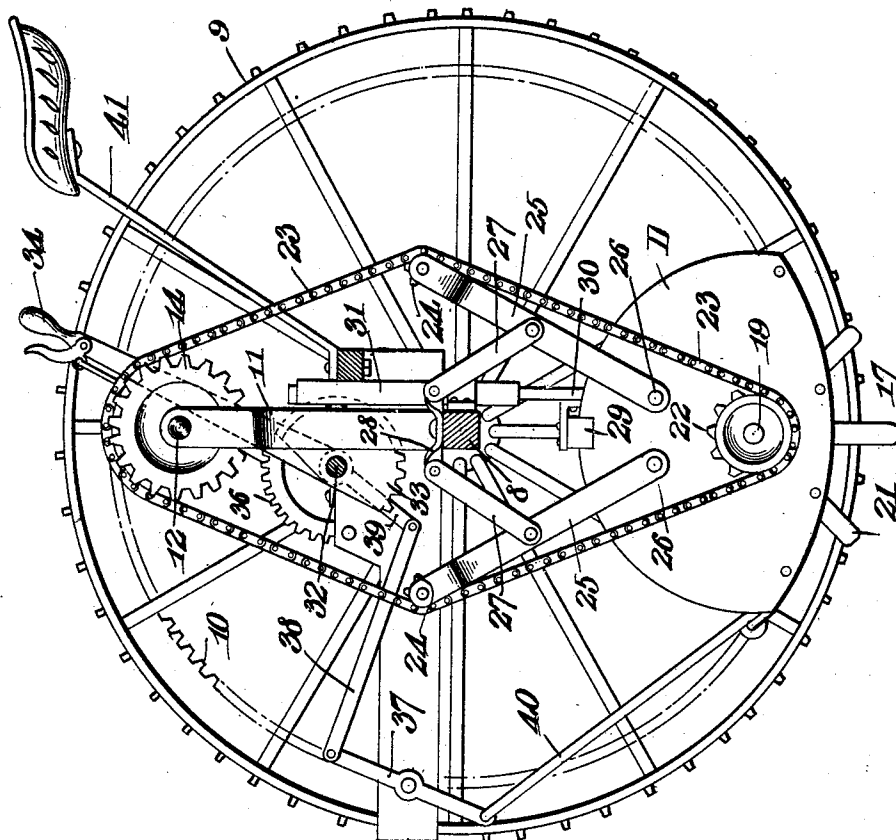


Fig. 2.

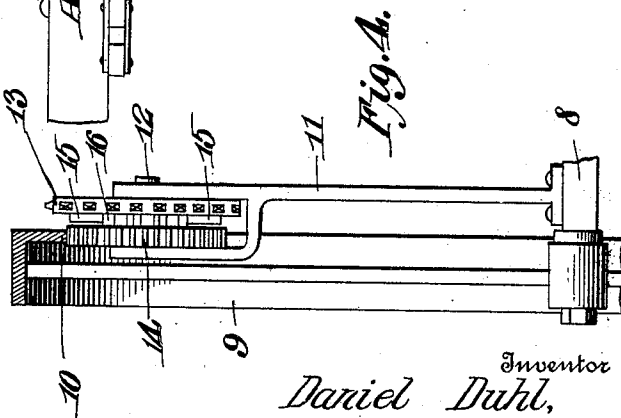


Fig. 4.

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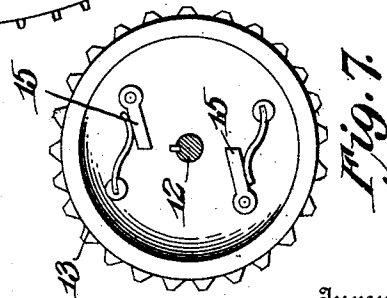
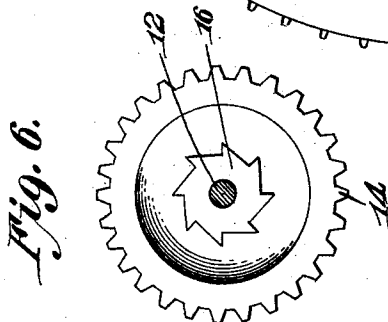
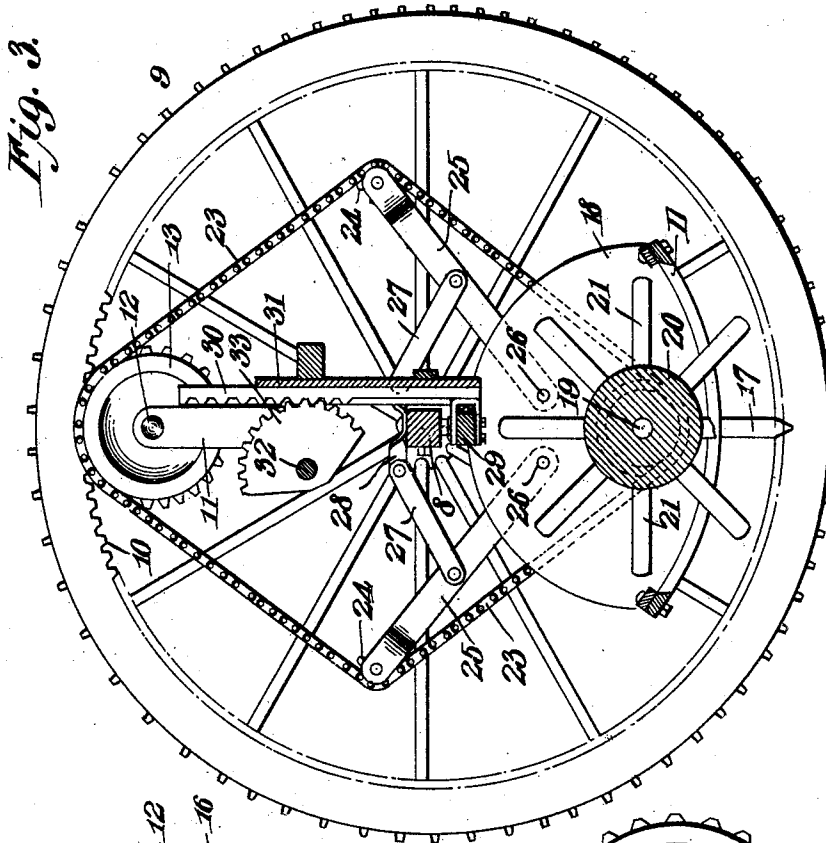
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3 SHEETS—SHEET 3.



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978,714.

Specification of Letters Patent.

Patented Dec. 13, 1910.

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To all whom it may concern:

Be it known that I, DANIEL DUHL, a citizen of the United States of America, residing at Wellston, in the county of Jackson and State of Ohio, have invented new and useful Improvements in Harrows and Clod-Crushers, of which the following is a specification.

This invention relates to harrows and clod crushers, and it has for its object to produce a simple and improved implement combining a drag harrow with a rotary harrow, the two coacting in such a manner that the surface of the ground will be thereby crushed and reduced to a suitable condition for receiving the seed.

A further object of the invention is to construct an apparatus of the character described in which the ground-engaging implements may be conveniently raised and lowered while the device is in operation, thereby enabling the device to operate upon the ground to any desired depth within the limits of the size of the machine.

Still further objects of the invention are to construct an apparatus of the character described which shall possess superior advantages in point of simplicity and durability and general efficiency.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts which will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention; it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifications within the scope of the invention may be resorted to when desired.

In the drawings,—Figure 1 is a top plan view of a machine constructed in accordance with the invention. Fig. 2 is a side elevation of the same, the near wheel having been removed. Fig. 3 is a longitudinal vertical sectional view taken on the plane

indicated by the line 3—3 in Fig. 1. Fig. 4 is a vertical transverse sectional view taken through a portion of one of the transporting wheels and adjacent parts. Fig. 5 is a vertical transverse sectional view taken through a portion of the drag, a portion of the revolving toothed cylinder and the related parts. Figs. 6 and 7 are detail views in side elevation of the members constituting a clutch mechanism which is used in connection with the invention.

Corresponding parts in the several figures are denoted by like characters of reference.

The frame A of the machine is supported upon an axle 8 having transporting wheels 9 which are supported for rotation upon said axle, said transporting wheels being provided with internal gears, as shown at 10. Supported upon the axle near the ends of the latter are uprights 11 which are forked at their upper ends to form bearings for short shafts 12 carrying sprocket wheels 13 and gear wheels 14, the former being firmly fixed upon the shafts 12, while the latter are rotatable upon said shafts. The sprocket wheels 13 and gear wheels 14 are provided with interengaging clutch members including spring-actuated pawls 15 and a ratchet wheel 16, whereby when the machine travels in a forward direction the ratchet wheels, actuated by the transporting wheels with the internal gears of which they are in mesh, will serve to propel the sprocket wheels, while when the machine travels in a rearward direction, the gear wheels will rotate upon the shafts 12. When turns are made, the sprocket wheel at one side of the machine will remain idle, while the sprocket wheel at the opposite side will be rotated, thus imparting motion to the parts driven thereby.

D is a drag which consists of a grate or slotted concave which may be made up of a plurality of curved bars suitably connected together and spaced apart, each of said bars being provided at a point intermediate its front and rear ends with a downwardly extending tooth 17 which is firmly fixed in a ground-engaging position. The drag includes end pieces 18 which afford bearings for a shaft 19 carrying a cylinder 20 which

is provided with radially extending teeth 21 arranged in circumferential series so as to project successively through the slots in the concave intermediate the grate bars when the cylinder is rotated. The teeth 17 and 21 may be of any suitable construction, either cylindrical, squared, flat or of other suitable conformation, and the ends of said teeth may be either blunt or pointed, as may be preferred.

The cylinder 20 is provided adjacent to its ends which project through the end pieces 18 of the drag with sprocket wheels 22 which are connected with the sprocket wheels 14 by means of chains 23, said chains being guided over idlers 24 which are supported for rotation upon the ends of links 25 which are pivotally mounted at 26 upon the inner faces of the end pieces 18 of the drag. The links 25 are connected by toggles 27 with ears or lugs 28 which are fixed upon the axle 8. It will be seen that by this arrangement, if the drag be lifted in the direction of the axle, the links 25 will be spread apart by the action of the toggles 27, and the idlers 24 will thus serve as tighteners to keep the chains 23 taut under varying conditions and at the various positions to which the drag may be adjusted.

For the purpose of supporting the drag the end members 18 thereof are connected by means of a cross bar 29 with which upstanding rack bars 30 are securely connected, said rack bars being slidably supported in guide members 31 which may be regarded as constituting a part of the frame of the machine. A rock shaft 32 which is supported for oscillation in suitable bearings in the frame is equipped with rack segments 33 meshing with the racks 30, said rock shaft being operable by means of a hand lever 34 having a suitable stop member 35 of conventional construction engaging a suitably supported quadrant 36, whereby the parts may be retained securely in adjusted position.

For the purpose of assisting the drag in resisting the strain to which it will be subjected, and in order to relieve undue strain upon the rack bars, whereby the drag is supported, a mechanism is provided including levers 37 which are pivotally supported upon the frame of the machine at each side of the latter. The upper end of each lever 37 is connected by a link 38 with an arm 39 extending radially from the rock shaft 32, and the downwardly extending arm of each lever 37 is connected by a link 40 with one end of the drag D. It will be readily seen that under this construction, whenever the rock shaft is actuated to raise or lower the drag, the link connection between the drag and the lever 37 will remain unbroken, and the links 40 will consequently constitute braces to relieve strain upon the drag when the machine is traveling in a forward direc-

tion. A seat 41 for the driver has been shown suitably supported upon the frame of the machine.

In the operation of this invention it will be seen that the drag by itself constitutes a harrow having a single row of earth-engaging teeth; the concave carrying said earth-engaging teeth being adapted to slide over the surface of the ground. In addition to this, however, the cylinder which is mounted for rotation adjacent to the concave is provided with earth-engaging teeth which successively project through the slots in the grate or concave and which coact with fixed teeth 17 to break and pulverize the soil in an extremely thorough and effective manner. The action it will be seen in a manner resembles that in a toothed cylinder concave of a threshing machine, and it is very obvious that no particle of soil that is too large to pass between two of the teeth fixed upon the concave can avoid being crushed by one of the cylinder teeth. The depth of the operation is capable of perfect regulation by raising or lowering the drag upon which the toothed cylinder is supported for rotation, and by the mechanism herein described the chains which serve to transfer motion to the toothed cylinder will be kept taut at all positions of the latter. The drag and its related parts will be reinforced against excessive strain in all positions which they may occupy by means of the lever and link mechanism which is adjustable by the rock shaft whereby the drag is raised and lowered. By sufficiently lifting the drag, it may be supported above the ground a sufficient distance to avoid contact therewith, thus enabling the machine to be conveniently transported from place to place.

Having thus described the invention, what is claimed as new, is:—

1. In an implement of the character described, a carrying frame, a drag supported for vertical adjustment, a toothed cylinder supported for rotation upon the drag, and means for rotating the cylinder at various adjustments, said means including sprockets on the frame and cylinder, an endless chain on said sprockets, links pivoted upon the drag and carrying idler sprockets engaging said chain and toggles connecting the links with the carrying frame.

2. In a machine of the character described, an axle having transporting means, a frame connected with the axle, uprights supported upon the axle, sprocket wheels and gear wheels supported for rotation by the uprights, said sprocket and gear wheels being provided with interengaging clutch members, internal gears upon the transporting wheels meshing with the gear wheels, a drag supported for vertical adjustment with reference to the frame and including a rotary cylinder having sprockets connected there-

with, chains connecting the cylinder sprockets
with the sprockets connected with the gear
wheels deriving motion from the transport-
ing wheels, links connected pivotally with
the drag and having chain-engaging idlers,
and toggles connecting said links with lugs
upon the axle.

In testimony whereof I affix my signa-
ture in presence of two witnesses.

DANIEL DUHL.

Witnesses:

H. L. BURDEN,
ARTHUR ANGEL.