Sept. 11, 1962 C. H. HEEREN Re. 25,237

MULCHER

Original Filed June 12, 1957 2 Sheets-Sheet 1

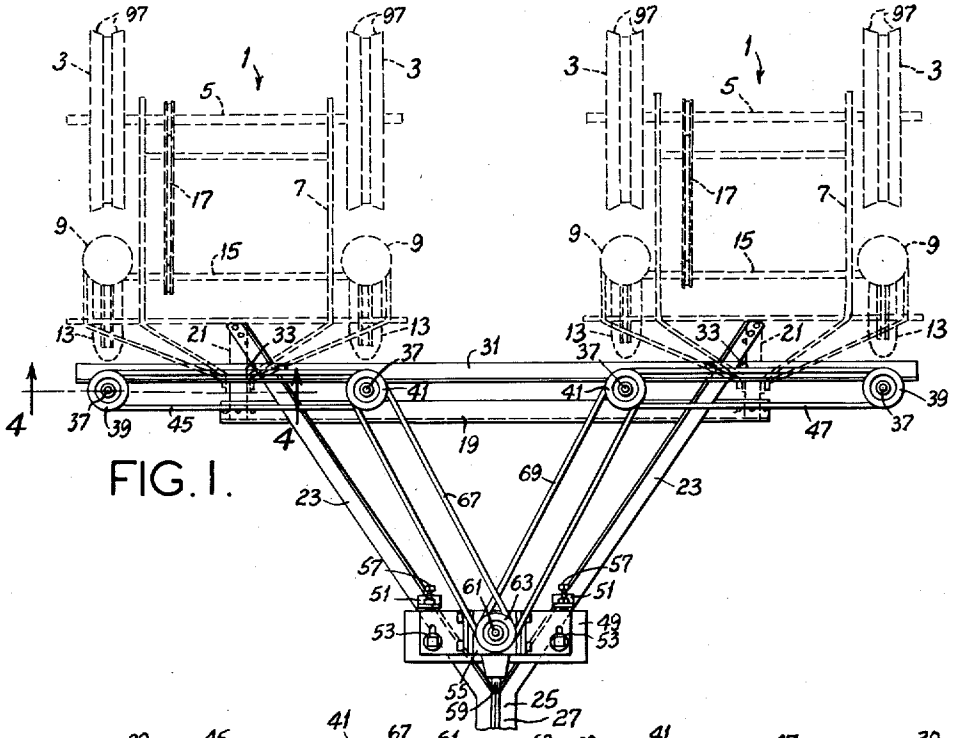


FIG. 1.

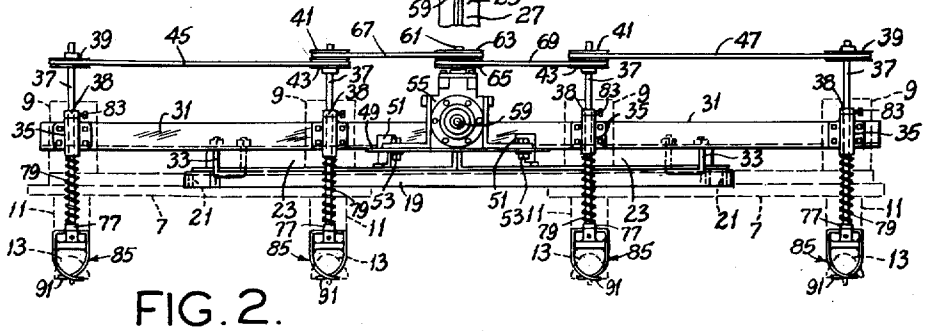


FIG. 2.

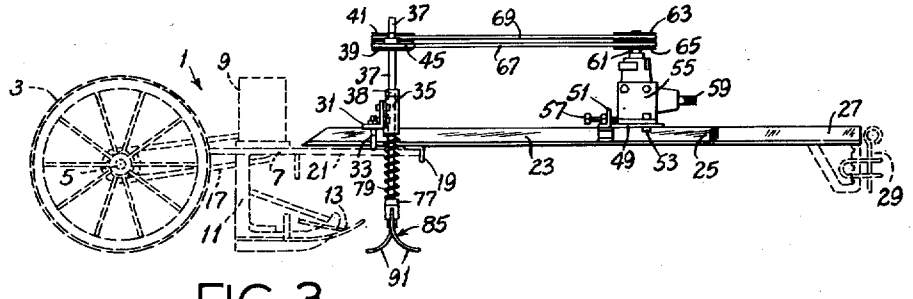


FIG. 3.

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2 Sheets-Sheet 2

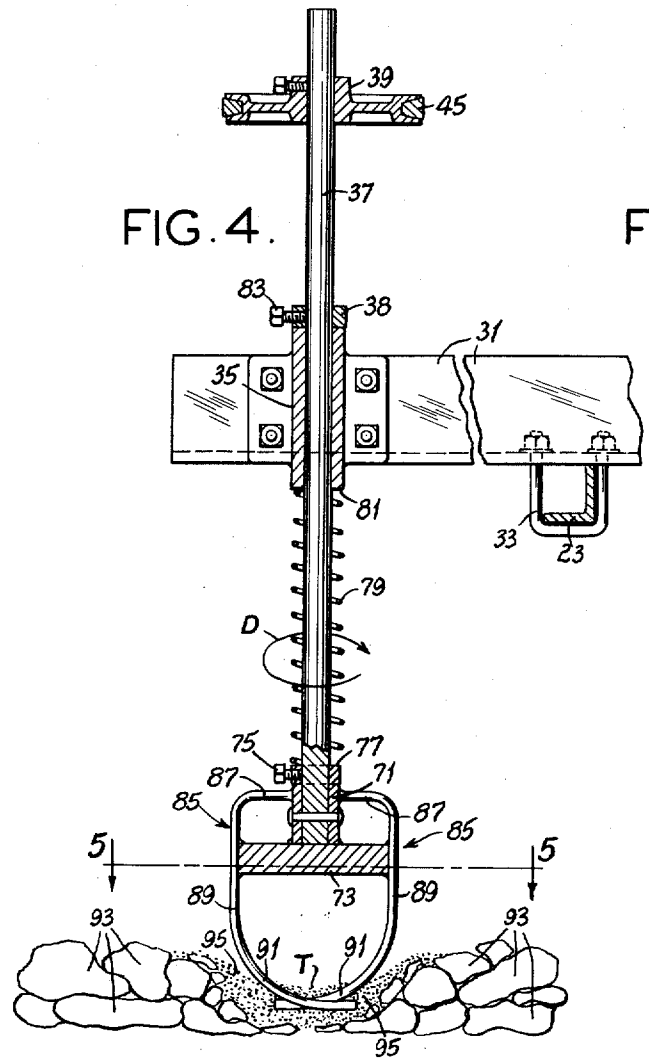


FIG. 4.

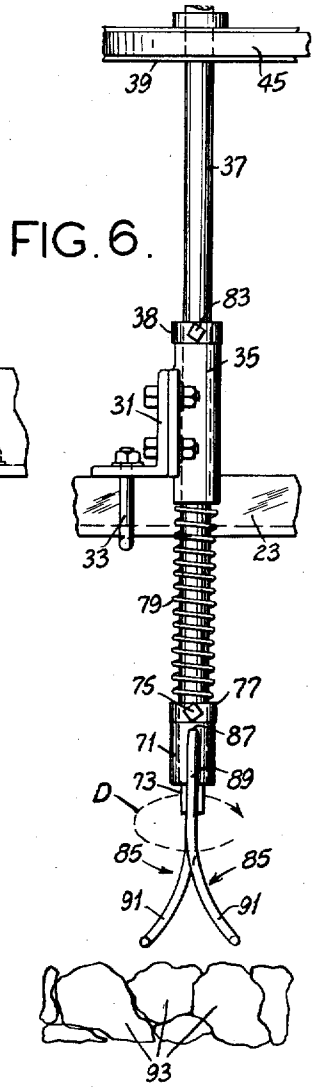


FIG. 6.

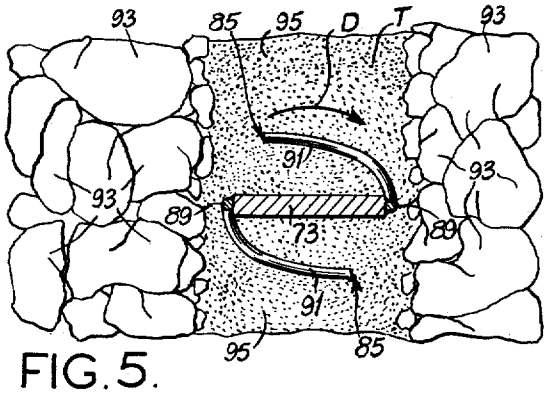


FIG. 5.

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25,237

MULCHER

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Original No. 2,983,322, dated May 9, 1961, Ser. No. 665,174, June 12, 1957. Application for reissue July 24, 1961, Ser. No. 128,622.
4 Claims. (Cl. 172—523)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to mulchers, and with regard to certain more specific features, to mulcher attachments for seed-planting equiment such as corn planters and the like.

Among the several objects of the invention may be noted the provision of a mulcher for seed-planting equipment which automatically prepares mulched seed bed strips in a plowed field as the equipment traverses the field; the provision of a mulcher of the class described which requires no preliminary preparation of the plowed field (such as disking, harrowing or the like) and which leaves the field in a superior loose, moisture-retaining condition for rapid seed germination and growth; the provision of an adjustable mulcher head in apparatus of the class described which may be adapted conveniently to various field conditions, and which will not be fouled by old vegetation to be mulched or by impediments such as stones and the like; and the provision of apparatus of the class described which is simple in form and operation and which may be conveniently employed as an agricultural machine attachment. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIGURE 1 is a top plan view showing the parts relating to the invention in solid lines and in dotted lines a typical double-unit corn-planting rig to which it may be attached;

FIGURE 2 is a front elevation of FIGURE 1;

FIGURE 3 is a left side elevation of FIGURES 1 and 2;

FIGURE 4 is an enlarged vertical section taken on the line 4—4 of FIGURE 1, showing one mulcher head and its drive shaft in operating position in a plowed field;

FIGURE 5 is a horizontal section taken on line 5—5 of FIGURE 4; and,

FIGURE 6 is a left end elevation of FIGURE 4 but illustrating an adjustment in which the mulcher head is in inoperative position.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

While the present invention has application to various seed-planting equipment, for purposes of disclosure it is shown as applied to a corn planter. Present-day planting procedures involve first plowing a field, then harrowing or disking it in two or three operations, and then towing the corn-planting equipment over it for spacedly dropping the seed in rows on the surface thus prepared. This process has the disadvantage that the plowed clods of the entire area of the field are more or less finely broken up by harrowing and disking. This leads ultimately to undue packing of the soil, so that it will not as well hold moisture during dry periods. I have found it preferable that a substantial area of the field be left in its original plowed condition; but seed cannot be dropped

and expected properly to grow well in a field that is merely plowed because of the coarseness of the clods.

By means of the present invention, disking, harrowing and like operations, *after plowing*, are eliminated, so that directly after a field has been plower the planting equipment may be towed over it with my mulching attachment, to provide a superior field in which are mulched seed bed strips, said strips being flanked by otherwise untreated plowed ground which is superior to harrowed and disked ground in moisture-holding and drainage characteristics.

Referring now more particularly to FIGURES 1–3, there is shown at numerals **1** conventional ganged (two) corn-planting machine rigs, each of which has a pair of wheels **3** of the usual form, adapted lightly to hill soil over the seeds that are dropped ahead of the wheels. The wheels **3** are attached to live axles **5** in frames **7**. Carried on the frames **7** are seed containers **9**, located above seed-dropping chutes **11**, leading to and through the usual sliding soil-grooving shoes **13**. Included in each assembly of parts **9**, **11** and **13** is a conventional mechanism adapted to drop seeds at intervals, this mechanism being driven by means of a chain drive **17** from a shaft **15** driven from the respective live axle **5**. Various adjusting means usually carried on conventional rigs such as **1** are understood to be included but are not shown, being unnecessary to the present disclosure.

An appropriate corn planter may be either of the so-called drill type or hill drop type, depending upon soil conditions, the former dropping one kernel at approximately equal intervals, the latter dropping several kernels at greater, more accurately spaced intervals. Rigs such as **1** may be employed individually or may be gang-operated, two being shown by way of example, it being understood that gangs of more than two may be used. In order to gang them, they are usually connected by means of a crossbar such as shown at **19**, fastened to the front tongues **21** of the rigs. Angle bars **23** are fastened to the members **19** and **21**, being forwardly jointed as shown at **25** to form a drawbar **27**. The angle bars **23** form the supporting frame for my attachment. At the forward end of the drawbar portion **27** is located the usual hitch **29** for attachment to a conventional farm tractor for towing purposes. Such tractors usually incorporate at their rear ends so-called take-off drives.

At numeral **31** is shown a crossbar supported on the rear portions of the angle bars **23**, being fastened thereto by means of U-bolts **33**. At spaced intervals on the crossbar **31**, corresponding to the spacing of seed bed strips to be formed, are bolted vertical sleeve bearings **35**. Each of the bearings supports a rotatable drive shaft or spindle **37**, held in proper elevation by means of an upper collar **38** thereon. The outer shafts **37** carry single V-sheaves **39** and each of the inner ones carries two V-sheaves **41** and **43**. Sheaves **39** and **43** on the left side of the machine are connected by means of a V-belt **45** and sheaves **39** and **41** on the right side are connected by means of a V-belt **47**.

Attached to the converging front ends of the angle bars **23** is a flat supporting plate **49** and angle irons **51**. Adjustably held to the plate **49** by means of an adjustable bolt and slot combination **53** is a speed step-up gear box **55**. Its position is adjusted by means of adjusting screws **57**, threaded through the angle irons **51**. The gear box **55** has a horizontal input shaft **59** and a vertical output shaft **61**. Its internal gear train is adapted to step up a speed of approximately 575 r.p.m. at shaft **59** to approximately 750 r.p.m. at shaft **61**. The end of shaft **59** is arranged for a conventional connection with the power take-off of the tractor used in towing the device.

Sheaves **63** and **65** are carried on the upper end of the shaft **61**. Upper sheave **63** is connected with sheave **41**

y means of a belt drive **67**. Lower sheave **65** is connected with the right-hand sheave **43** by means of a belt rive **69**. All of the sheaves **39**, **41**, **43**, **63** and **65** have ıe same pitch diameters, so that the speeds of shafts **7** are all equal to the stepped-up speed of shaft **61**.

A typical mulcher head associated with each shaft **37** shown in FIGURES 4–6. Theses figures illustrate the ɛft-hand shaft **37** of FIGURES 1 and 2. Since all ıulcher heads on the shafts **34** are the same, a description of one will be sufficient for all. Each shaft **37** has inned at its lower end a sleeve **71** to which is welded a ansverse crossbar **73**. The sleeve and crossbar conitute an inverted T-shape. Adjustably attached to the ıaft **37** by means of a set screw **75** is a collar **77**. A ɔmpression spring **79** reacts between the collar **77** and ıe lower end **81** of the bearing **35**. Thus the shaft **37** is ıased downward by action of the spring **79** on the collar **7** to the limit shown in FIGURE 4. This limit is ɜtablished by the position of collar **38** on shaft **37**. The ɔllar **38** limits the protrusion of the shaft **37** out of the ıwer end of the bearing **35**. If it is desired to increase ıe downward biasing force on the shaft **37**, this may be ɔne by loosening the set screw **75**, raising the collar **7** and again tightening the former. The amount of ɔwnward protrusion of the shaft **37** may thus be adɜsted by adjusting the position of collar **38** thereon. he set screw **83** is provided for the purpose of making ıis adjustment.

Mulching fingers **85**, composed of ⅜" circular rod-like ock, for example, are attached to sleeve **71** and bar **73**. ach mulching finger is constituted by a horizontal angled ɔrtion **87**, the end of which is welded to the sleeve **71**. ach finger is right-angularly bent to provide a downardly directed section **89** welded to one end of the crossar **73**. The vertical portions **89** are approximately 7" ɔart. Below the vertical portions **89** the fingers are vept rearward and anticlockwise, as shown at **91**. Thus ith respect to the clockwise direction of rotation shown y the dart D, the lower portions of these fingers conitute rearwardly sweeping springy spiral portions. These ɔrtions terminate in substantially horizontal trailing free ıds as shown in FIGURES 4–6. As shown in FIGURE the angle around the axis of shaft **37** subtended by ıch finger throughout its spiral sweep and horizontal ee end exceeds ninety degrees.

Operation is as follows, assuming that by means of dece **29** a hitch has been made to a tractor and that the actor take-off mechanism is connected with the shaft); also that the seed containers **9** have been filled.

The apparatus is towed in parallel adjacent paths across field that has merely been plowed in preparation for anting. The collars **38** are adjusted so that the mulcher ıgers enter the plowed soil at the desired depth and e collar **77** is adjusted for correct resilient action of the ıgers in the soil, as illustrated in FIGURE 4. The rger plowed clods of the field are illustrated at nuerals **93**. Then as the tractor tows the rigs **1** and ives the gear box **55**, the shafts **37** become rotated ockwise at, say, 750 r.p.m. As the rig advances over e field, the spinning spirally trailing springy fingers **85** oduce mulched seed bed strips, breaking up the clods) along each strip into finer particles and mulch **95**, e depth of which is dependent upon the adjustment of e collars **38** and **77**. The rotary centrifugal action of e fingers **[83]** *85* results not only in breaking up the ods but acts as a classifier, the finest particles appearg along the center of the trench thus formed, the ıarser particles being spun out more or less laterally, ith the coarser unbroken clods between the seed bed ɾips. It will be understood that in any plowed field ere exists fibrous organic material due to a former ɜar's growth including old roots, corn stalks, grass, eeds, et cetera. This is broken up and mulched into e fine earth particles in the trench T. Since the spiral veep of the fingers is downward and rearward with

respect to rotation, these fibrous materials are not caught on the ends of the mulching fingers, but are wiped off during the mulching action, keeping them bright and clean. Moreover, the downward spiral trailing form of the fingers assures that if any obstructions are met with in the soil, such as rocks, and the like, the fingers will have a spiraling upward skewing action against compression of springs **79**, causing them to ride over the obstruction without damage.

As the machine advances, the conventional shoes **13** of the planting rigs **1** follow the mulchers in the trenches, dropping or inserting seeds at timed intervals. The following wheels **3**, which have double concave flanges as illustrated at **97**, serve to push soil over the seeds without undue packing. All of the soil of the field, except that mulched in the trenches T, is left in the merely plowed clod form, which is ideal for holding moisture during dry periods for later absorption by the finer mulched materials in the trenches. This is also ideal in reducing wind erosion in drier regions.

As illustrated in FIGURE 6, when it is desired to tow the rig away from the field, the shafts **37** [may be raised by adjusting the collars **38** downward, thus raising the mulching fingers **85** into] *are raised. Thereupon, the adjusting collars 38 are moved downwardly on their respective shafts 37 into abutting engagement with the upper and adjacent ends of the vertical sleeve bearings 35, and their respective set or locking screws tightened or engaged with the shafts. Thus, the mulching fingers 85 will be retained in* idle position above the surface of the earth, *as is shown in FIGURE 6 of the drawings.* In this position they may be left to rotate during towing or, if desired, the connection between the tractor take-off and shaft **59** may be disconnected. In some cases, power take-offs have decoupled clutches, which can be used for the purpose of stopping rotation of fingers **91**.

In view of the above, it will be seen that the invention has the following advantages:

(1) The apparatus is simple in form and adaptable as an attachment to various planting rigs.

(2) The only preparation required for a field to be planted is plowing it, no harrowing, disking or the like being required.

(3) The mulching action of the relatively high-speed mulching fingers prepares a much better mulched surface into which to drop the seeds. This surface is restricted to narrow seed bed strips or trenches, leaving the remainder of the field in plowed form adapted better to retain moisture and to resist wind erosion.

(4) The spinning rearwardly spiraling fingers classify the soil along the trench with the finer particles centrally located and the coarser ones transversely located against the coarser sides of the trench.

(5) The rearwardly and downwardly spiraling form of the fingers avoids their picking up and becoming clogged with fibrous material during operation, and results also in their ability to skew up and ride over obstructions without damage.

(6) The depth and character of the mulch in the trenches T may be independently controlled as desired by adjustments of the respective collars **38** and **77** and thus independent bed preparations may be made in adjacent trenches for different types of seeds, if desired.

(7) The entire construction is rugged, low-cost and troubleproof.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A rotary soil mulcher comprising a shaft rotatable about a substantially vertical axis, a transverse head on the lower end of said shaft, a plurality of spring fingers each of which is constituted by spring metal rod of substantially constant cross section and having an upper portion affixed to said head, each finger extending from its affixed portion in a substantial spiral sweep down and around said axis in a rearward trailing direction relative to the direction of rotation, and terminating in a trailing substantially horizontal soil-wiping free end, the angle around said axis subtended by each finger throughout its spiral sweep starting at said upper portion and terminating at said free end being at least ninety degrees.

2. A rotary soil mulcher comprising a shaft rotatable about a substantially vertical axis, a single transverse bar on the lower end of said shaft, a single spring finger affixed to each end of said bar and constituted by a spring metal rod of substantially constant circular cross section, each finger extending from its affixed portion in a substanttial spiral sweep down and around said axis in a rearward trailing direction relative to the direction of rotation, and terminating in a trailing substantially horizontal soil-wiping free end, the angle around said axis subtended by each finger throughout its spiral sweep starting at said upper portion and terminating at said free end being at least ninety degrees.

3. A soil mulcher, comprising a shaft rotatable about a substantially vertical axis, a plurality of relatively spaced elongated curvilinear spring bodies, each of substantially constant cross-section throughout their respective lengths, fixedly connected at their respective upper end portions to the lower end of said shaft, each said bodies extending downwardly from the shaft in a spiral like sweep partially around said axis in a rearward trailing direction relative to the direction of rotation thereof, and the lower and trailing portions of said bodies terminating at least in ninety degrees relation to the upper portions thereof.

4. A soil mulcher, comprising a shaft rotatable about a substantially vertical axis, an elongated curvilinear spring body of substantially constant circular cross-section throughout its length fixedly connected at its upper end portion to said shaft, said body extending downwardly from the shaft in a substantially spiral sweep partially around said axis in a rearward trailing direction relative to the rotation thereof and terminating at least in ninety degree relation to the upper portion thereof.

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