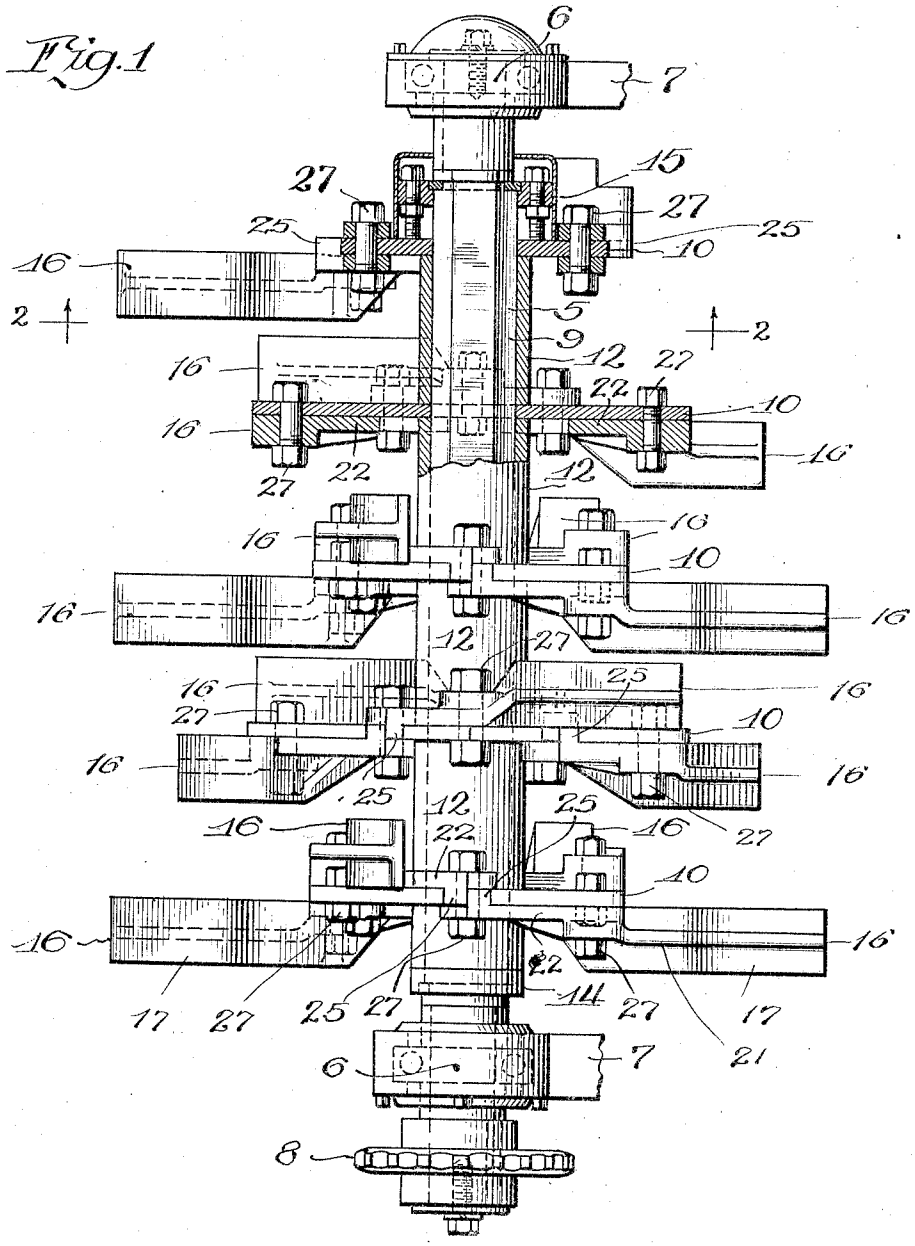
Oct. 22, 1929. L. E. FAGAN 1,732,883

SOIL MILLING MACHINE

Original Filed Jan. 6, 1927 2 Sheets-Sheet 1

Fig. 1



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Fig. 2

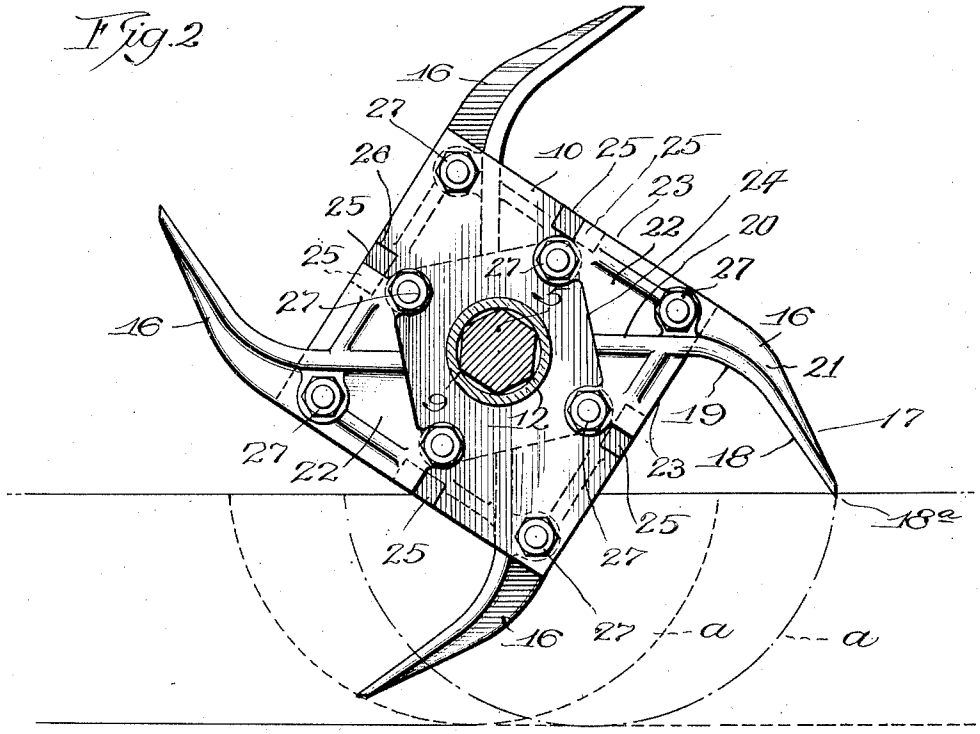
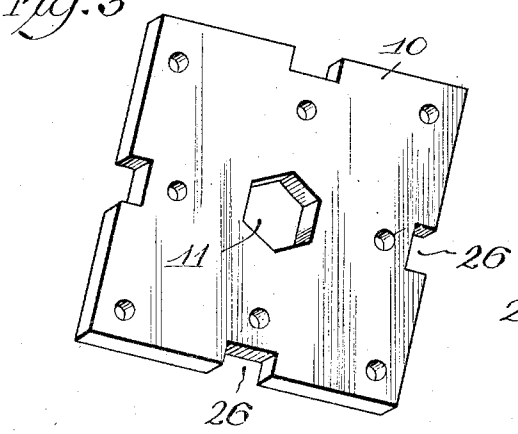


Fig. 3



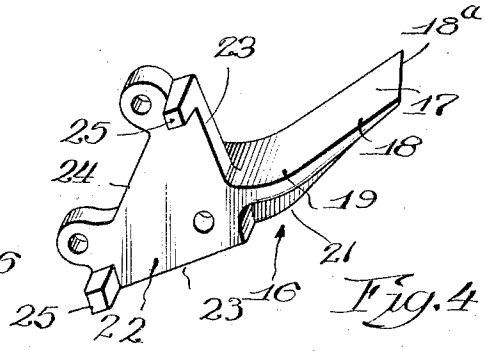


Fig. 4

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UNITED STATES PATENT OFFICE

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SOIL-MILLING MACHINE

Application filed January 6, 1927, Serial No. 159,293. Renewed March 30, 1929.

This invention relates to soil milling machines, and more particularly to the milling cylinder of such machines. Soil milling machines are usually drawn through the field by tractors, and in such cases the milling cylinder is driven from some power shaft of the tractor. Heretofore considerable difficulty has been encountered with the use of soil milling machines, due to the excessive wear on the parts, the noise and the power required to operate them. Moreover dirt, weeds, and stalks gather upon the spades of the milling cylinder and they soon become clogged with such material, with the result that they do not operate successfully. When parts thereof become broken or worn out, time is lost because of the difficulty in removing the broken or worn out part and replacing it with a new one.

The principal object of the present invention is to provide a soil milling cylinder which shall be simple, but rugged and of substantial construction, one in which any blade may be quickly and readily removed and replaced in case it becomes broken or useless from other causes. Another object is to provide a soil milling cylinder which shall be self cleaning, whereby the possibility of becoming clogged with dirt, weeds, stalks and so forth is reduced to a minimum.

With these ends in view, this invention consists in a soil milling cylinder having readily detachable and replaceable blades. It further consists in a soil milling cylinder in which the strain on the blades is borne by elements of the blades and their supports, whereby the fastening means, such as bolts and nuts, may be substantially free from such strains. It further consists in a soil milling cylinder having blades of a form or shape designed to render the cylinder self cleaning. It further consists in a soil milling cylinder for which less power is required for its operation than heretofore, and one in which the soil is more thoroughly broken up and prepared for sowing than heretofore. The invention further consists in the several novel features hereinafter fully set forth and claimed.

The invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a plan, partly broken out, of a soil milling cylinder, embodying a simple form of the present invention; Fig. 2 is a vertical cross section thereof taken on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of a blade supporting plate used for connecting the blades with the cylinder shaft, and Fig. 4 is a perspective view of one of the blades.

Referring to said drawings, which illustrate one embodiment of the present invention, the reference character 5 designates the cylinder shaft, which is journaled in bearings 6 carried upon frame member 7. The frame members comprise part of a supporting frame for the cylinder, and said frame is connected to the tractor (not shown) or other means for drawing the cylinder along the ground. The cylinder shaft 5 is rotated by suitable drive mechanism, as for instance a sprocket wheel 8 mounted on the cylinder shaft and a sprocket chain (not shown) driven from some power shaft of the tractor, where one is employed to operate the cylinder. In some cases the cylinder may be supported on a wheeled frame, and the cylinder may then be driven from the traction wheels of the wheeled frame.

The cylinder occupies the space between the frame members 7 and is mounted on said cylinder shaft. Between the bearings 6 the cylinder shaft 5 may be made non-circular in form or otherwise arranged whereby the cylinder may be mounted therein against rotation relative thereto. In the drawings the cylinder shaft is shown at 9 as hexagonal in cross section, and mounted upon said hexagonal portion against rotation relative thereto are spaced, blade supporting plates 10. Said plates may be formed with hexagonal centrally located holes 11 into which the hexagonal part of the cylinder shaft fits fairly well. Interposed between the blade supporting plates 10 are spacing struts, here shown in the form of short sleeves 12 which fit around the cylinder shaft and abut against the sides of the blade supporting plates 10. Any suitable means may be provided beyond

the end plates 10, for clamping the plates and sleeves together, and for this purpose a collar 14 may be secured on the cylinder shaft at one end, and clamping means 15 may be secured to the shaft at the other end. The shape of the plates is immaterial and for convenience they may be made square. To obtain an efficient spacing of the blades the alternate and intermediate plates are disposed at an angle of forty-five degrees relative to each other. This may be accomplished by setting the holes 11 of the alternate plates at an angle of forty-five degrees to the holes of the intermediate plates.

The blades 16 are detachably secured to the plates 10, and as shown project from the corners thereof, the blades of the alternate plates being in alignment, as a preference, and the blades of the intermediate plates being in alignment but spaced approximately forty-five degrees apart from the alternate blades. With this arrangement of blades, the alternate ones enter the ground simultaneously and the intermediate ones enter the ground simultaneously but at places in advance of the alternate ones.

The blades are substantially similar in construction, although some are arranged for connection on one side of the plates and others for connection on the other side thereof. Fig. 4 illustrates the shape and construction of the blades. Each blade comprises a body or digging portion 17, which contains a flat part 18 that extends from the tip end 18^a towards the blade supporting plate in a directional tangential to an arc of a circle of substantially the same diameter as the blade supporting plate. Said flat part occupies approximately one-half the length of the body portion 17 and merges into a curved part 19 which merges into a straight part 20 extending in a direction approximately radial with respect to the shaft. One edge of the body portion 17 of the blade coincides with a side face of the blade supporting plate 10, with the body portion 17 lying wholly to one side of said plate. The blade is formed with a rib 21 on its rear side which runs from the tip end to plate, where it is widened and offset as at 22 and is given a shape conforming generally to the corner portion of the plate to which the blade is secured. In the present instance the plate being square in shape the two edges 23, 23 are made to extend at right angles to each other, thereby coinciding with the adjacent edges of the plate, and the edge 24 may form the third side of a triangle. The part 22 of the blade is flat on the side which is contiguous with the plate, and bears against said side of the plate, and projecting from said flat side of the part 22 are two lugs 25, which extend at right angles to the part 22 and engage the plate in notches 26, which are formed in the edge portion of the plate midway between the corners thereof. The blades are secured to the plate by bolts and nuts 27, which serve merely to hold the blades on the plate, but the bolts may fit loosely in the bolt holes in the blades inasmuch as none of the shearing strain is placed upon them. All of the strain on the blades, which results from the digging operation, is therefore transmitted to the plates through the lugs 25, which engage directly with the plates, and any danger of shearing off the bolts is therefore eliminated.

I find that excellent results are obtained by placing two of the blades at diametrically opposite places on one side of the plate, and placing two other blades on the other side of the plate, and spaced ninety degrees apart from the first mentioned blades. This arrangement spaces all of the blades on each plate ninety degrees apart, which is a very effective arrangement. The two oppositely disposed blades are wholly on one side of the plate and the two other blades are wholly on the other side of the plate, consequently they enter the ground at closely spaced staggered places. The blades are formed of hard material which cannot be machined and drilled readily, consequently the lug and notch connection between the blades and plates provides a connection which is substantial, rugged and not likely to become injured.

In use the soil milling machine is drawn along the ground as usual, and the cylinder revolved at a relatively high speed. The blades enter the ground and their tip ends take the paths indicated by the dotted lines *a*, in Fig. 2, thus cutting and digging up the soil and discharging the broken up pieces toward the rear. Obviously the exact cutting line taken by the blades depends upon the forward speed of the machine relative to the rotatorial speed of the cylinder and the dotted lines shown are therefore only schematic. Some of the dirt falls from the sides of the blades, but that which is carried back with them is thrown backwards and scattered. Likewise any weeds, stalks, and the like are discharged from the blades on account of the centrifugal action thereon. Practically none lodges on the blades or plates, and the cylinder is therefore kept practically free from weeds, stalks, and the like.

I claim as new, and desire to secure by Letters Patent:

1. In a soil milling machine cylinder, the combination of a power driven shaft, spaced, flat, blade supporting plates mounted thereon against rotation relative thereto, and blades bolted to the flat sides of said plates, said blades having laterally projecting strain transmitting connections engaging in the edge portions of the plates for relieving the bolts of strains.

2. In a soil milling machine cylinder, the combination of a power driven shaft, spaced blade supporting plates mounted thereon

against rotation relative thereto, and blades bolted to said plates, said blades having laterally projecting strain transmitting lugs engaging in the edges of notches in said plates, and relieving the bolts of strains.

3. In a soil milling machine cylinder, the combination of a power driven shaft, spaced blade supporting plates mounted thereon against rotation relative thereto, and formed with equidistant notches in their edges, blades, one set for each plate, some of which are disposed wholly at one side of the plate and others disposed wholly at the other side thereof, all of said blades having strain transmitting lugs engaging in said notches in the plate, and connecting means for securing the blades on the plates.

4. In a soil milling machine cylinder, the combination of a shaft having a non-circular portion, intermediate its ends, a plurality of blade supporting plates having central openings through which said noncircular portion of the shaft extends in driving contact therewith, sleeves interposed between said plates and spacing them apart and blades having laterally projecting strain transmitting lugs engaging in notches in the plates, bolted to said plates.

5. In a soil milling machine cylinder, the combination of a shaft, spaced blade supporting plates mounted thereon against rotation relative thereto, and blades interlockingly secured to said plates, said blades having relatively wide digging faces extending laterally of the plates and the tip ends of said blades extending at an angle of approximately sixty degrees to the vertical, at their points of entrance into the soil.

6. In a soil milling machine cylinder, the combination of a power driven shaft, spaced flat blade supporting plates mounted thereon against rotation relative thereto, and having notches in their edges, and blades bolted to the flat sides of the plates, the alternate blades of a plate being located on one side thereof and the intermediate ones on the other side thereof, and all of the blades having laterally projecting lugs entering said notches and engaging the edges thereof to relieve the bolts of strains, each notch being arranged to receive a lug of a blade on one side of the plate and lug of an adjacent blade on the other side of the plate.

7. In a soil milling machine cylinder, the combination of a power driven shaft, spaced flat blade supporting plates mounted thereon against rotation relative thereto, and having notches in their edges, and blades bolted to the flat sides of the plates, the alternate blades being located on one side thereof and the intermediate ones on the other side thereof, and all of the blades having laterally projecting lugs entering said notches and engaging the edges thereof to relieve the bolts of strains, the bolt receiving portions of the blades on one side of each plate overlapping those on the other side thereof, whereby one and the same bolt may secure the adjacent bolt receiving portions of two blades to the plate.

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