To all whom it may concern:

Be it known that I, THOMAS BRENNAN, Jr., a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Single-Disk Furrow-Openers, of which the following is a specification.

In the construction of large disk drills, it is customary to attach a number of disk furrow openers side by side, at proper distances from each other, to a cross bar or beam, on which they are pivoted and by means of which they are drawn across the field. The number of disks thus placed in parallel and their spacings from each other depends upon requirements, but frequently as many as twenty or twenty-four are attached to one bar, with spacings of from four to six inches between them. When using such a drill in heavy or sticky ground, it is difficult to clean the mud from the disks in such way that it will not rise up and clog between them, thus making it hard to pull them, and at times absolutely locking them so that they cannot rotate. The tendency of the dirt to thus jam between the disks will be increased by bars or rods which extend out sidewise from the disks to any great extent. It is, therefore, desirable to form each furrow opener compactly, bringing all of its elements into as narrow a space as possible, and forming them in a way which will be least conducive to clogging with mud and dirt.

In order to secure the greatest stiffness and strength in the supporting elements of a disk furrow opener, the stresses should be transmitted from the cross bar in the most direct manner through the draw bar to the disk and scraper. Furthermore, when forces are directly transmitted, the parts may be of reduced size and, therefore, of reduced cost. This is important, especially when manufacturing in large quantities.

The objects of the present invention are, to construct a disk furrow opener, all of whose elements shall be contained within the narrowest possible space and placed in the most compact form, but providing necessary clearance to insure satisfactory operation; to so arrange the parts that the stresses will be transmitted through them in the most direct manner; to provide a furrow opener of the lightest construction; to provide means for adjusting the different parts with respect to each other, so that extreme accuracy in manufacturing will not be necessary, thus reducing the cost of manufacture; and in other ways and manners to generally improve the construction of furrow openers.

Other objects and uses will appear from a detailed description of the invention, which consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 shows a back elevation of one of my improved furrow openers, having attached thereto front and back scrapers of improved design, and showing the manner in which the boot arm is connected to the draw bar well forward with respect to the disk; Fig. 2 is a plan view of the furrow opener, the middle portion of the boot arm being cut away to show the shape of the draw bar beneath it and the manner in which the same is attached to the disk; Fig. 3 is a front detail elevation of the upper portion of the boot, showing my improved manner of attaching the same to the boot arm; and Fig. 4 is a plan view similar to Fig. 3.

Referring to the drawings, the disk 5 is attached to the rear end of a draw bar 6 in such way that the disk may easily rotate and adjust itself to irregularities in the ground and to uneven strains which come upon it. In this application I do not concern myself particularly with the hub construction, whereby the disk is attached to the draw bar, as this may be of any suitable type.

The grain boot 7 is carried immediately behind and adjacent to the convex side of the disk, as is well shown in Figs. 1 and 2, so that the grain will be deposited well down toward the bottom 8 of the furrow and immediately behind the disk. The improved construction which I employ for carrying the boot comprises an arm 9, rigidly attached to the boot near its upper portion 10, and to the draw bar well forward of the disk.

Referring to Fig. 2, the construction of the draw bar will be readily understood. In order to properly open the furrow, the disk must be drawn across the field against a certain angle; that is, the general plane of the disk must be twisted at that angle...
away from the direction of motion of the grain drill. The draw bar is preferably bent near its rear end as at 11, so that its main portion 12 may extend in the direction of movement while the rear portion 13 is approximately parallel to the disk. The draw bar may be attached to the frame work of the grain drill in any suitable manner, but one which permits vertical movement of the disks, as by means of a pair of bars 14 bent to form a yoke, although its exact construction does not affect the embodiment of my invention. In general, it is found best to use a hub construction for attaching the disk to the draw bar, which includes a casting 15, having a channel in its outer face for receiving the end of the draw bar, which is held to the hub as by means of a nut 16.

It will be understood that the boot must extend down behind the disk on its convex side, but an examination of Fig. 2 will show that the draw bar should be on the concave side of the disk; therefore, the boot arm must pass over the top of the disk, as will be evident from Fig. 2. I have found that in order to provide a very narrow furrow opener the boot arm should be carried well forward of the disk and then attached to the draw bar, as shown in Fig. 1. When this is done, it crosses over the top of the disk at some point 17, which is well forward and where the tilt of the disk throws its edge considerably in the direction of its convex face. Therefore, carrying the boot arm well forward enables me to get the necessary clearance between the disk and the frame portions while using a very narrow construction of furrow opener.

In the construction illustrated and previously described, the rear end 13 of the draw bar is bent over so that it lies practically parallel to the disk. I have done this so as to facilitate making the hub connection, although it is evident that the operation of the disk is in no wise affected thereby. Of course, if a straight draw bar were used, its end 13 would come in so near to the disk at the hub that considerable difficulty might be experienced in making the proper connection. The position it would assume in this case may be determined by projecting the line of the forward portion 12 of the draw bar straight back beyond the bend 11 until it intercepts the block 15.

It is customary, in the construction of furrow openers, to provide means for forcing and holding the disk down into the ground. In the construction illustrated, this comprises a spring 18 suitably attached to the frame and to the upper portion of the boot and tending to force the same down. This downward force is transmitted through the boot arm to the point 19, where the latter is attached to the draw bar. A downward force is thus exerted on the draw bar near its center. Since the forward end of the draw bar is attached to the frame work of the drill, it is evident that the downward force will be exerted through the rear end of the draw bar to depress the disk. The spring may be attached to the upper portion of the boot in any suitable manner, but the boot is preferably provided with a pair of ears 20, to which the connection may be made. Examination of Fig. 2 will show that this point of attachment is in line with the forward straight portion of the draw bar; therefore, the forces which must be transmitted from the spring through the boot arm to the draw bar and thence to the frame of the drill and to the disk will be transmitted in the most direct and effective manner possible. This will considerably reduce the stresses coming on the different parts, and particularly those on the draw bar.

In practice it is found that certain twisting forces exist which tend to twist the disk sidewise with respect to the frame, and to rotate it about the center of the draw bar, thus throwing heavy stresses upon the latter, which must transmit them to its forward end, where they are passed through the yoke 14 to the frame of the drill. In my construction, the boot arm serves to greatly stiffen the draw bar and to aid it in resisting all of these twisting forces. This is because the boot arm is attached to the draw bar well forward with respect to the disk, and because it projects upward a considerable distance above the draw bar. When a twisting force is exerted by the disk, it tends to rotate the draw bar, but such rotation cannot occur without throwing the boot arm to one side or the other. Such a throw would also carry the upper portion 10 of the boot, and, therefore, its connection to the frame of the grain drill sidewise, but such motions are properly resisted at these points.

In order to provide proper clearance between the boot and the disk, the former should be adjustable with respect to the latter. In the present construction, I provide means for effecting such adjustment, as shown in detail by Figs. 3 and 4. The upper portion 10 of the boot is provided near one side with a forwardly projecting lug 21 which is provided with a substantially vertical rib 22. This rib seats within a groove 23 near the end of the boot arm, and the boot is held rigidly by the boot arm by means of a pair of bolts 24 and 25. The rib 22 is of sufficient depth to provide a clearance 26 between the lug 21 and the boot arm, so that the lug can rotate about the rib for effecting sidewise adjustment of the boot with respect to the arm. In order to shift the boot in one direction or the other, it is only necessary to loosen the proper
bolt a slight amount and tighten the other bolt correspondingly. In any case, after both bolts have been tightened in the proper manner, the boot is held rigidly with respect to the boot arm. A number of important advantages arise from this adjustability of the boot. It is not necessary to use great accuracy in the manufacture of the parts, because in assembling them the boot can be properly adjusted with ease and accuracy. This is an important item in reducing the cost of manufacture. A further advantage is that the boot can be properly adjusted with respect to the disk, to bring the scraper 27, carried at its lower end, into proper engagement with the disk. By offsetting the lug 21 and placing it nearer one side of the boot than the other, the boot may be carried properly in line with the boot arm when desired. It would be difficult to do this if the lug were formed on the center of the boot.

I claim:

1. In a disk implement, the combination of a draw bar having its rear portion set sidewise at an angle, a disk rotatably mounted on said rear portion and extending substantially parallel thereto, an arched arm having its forward end secured to the forward portion of the draw bar adjacent the forward edge of the disk and arching up over the disk from one side of the same to the other, a boot carried by the rear end of the said arm, and a pressure device acting on the boot, the forward portion of the draw bar, arm, pressure device, and disk mounting lying in substantially the same vertical plane, substantially as described.

2. In a disk implement, the combination of a draw bar having its rear portion tilted sidewise to an angle, a disk rotatably carried by said rear portion with its concave side adjacent thereto, an arched arm having its forward portion secured to the forward portion of the draw bar adjacent to the forward edge of the disk, and arching upward and over the upper edge of the disk from the concave to the convex side thereof, a boot secured to the rear end of the arm, and downwardly depending therefrom adjacent the convex side of the rear portion of the disk, and a pressure device acting to force the disk in the ground, the forward portion of the draw bar, the arched arm, the pressure device, and the disk mounting all lying in substantially the same vertical plane, substantially as described.

THOMAS BRENNAN, JR.

Witnesses:

W. L. WARNER,
A. R. TARBOX.

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