March 20, 1928. 1,663,239

F. A. BUCKNAM

DISK FOR TILLAGE IMPLEMENTS

Filed Aug. 31, 1922

Fig. 3.

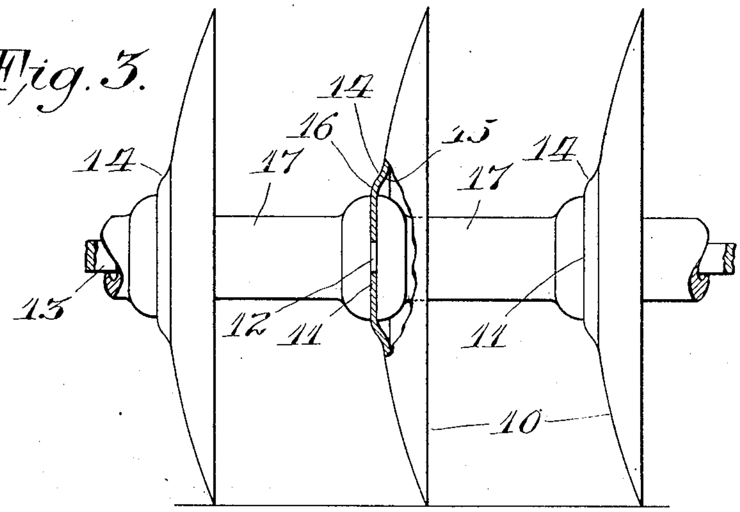
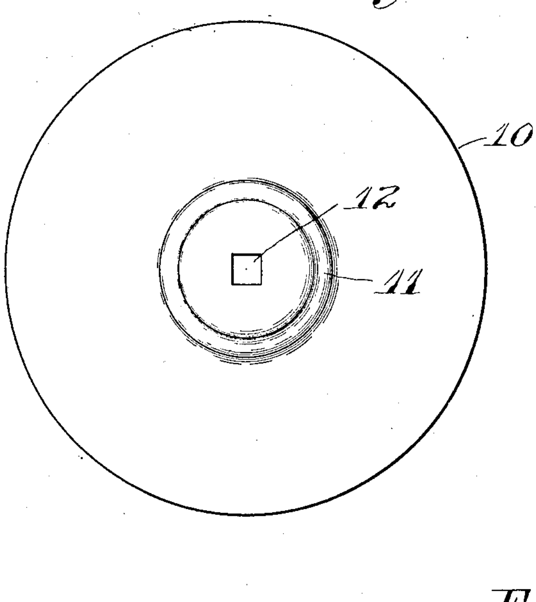


Fig. 1.



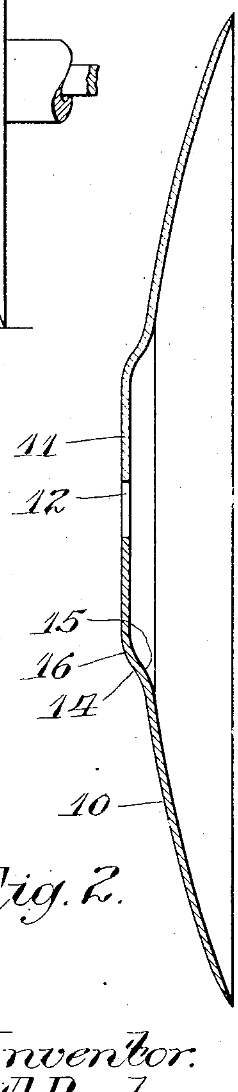


Fig. 2.

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UNITED STATES PATENT OFFICE.

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DISK FOR TILLAGE IMPLEMENTS.

Application filed August 31, 1922. Serial No. 585,364.

My invention relates to improvements in the construction of earth working disks such as used on tillage machines and the objects of the invention are to provide a form of disk that will sustain the strain to which they are subjected in action without breaking and that will permit assembly of several disks in a gang in a simple and economical manner, thus improving the efficiency of such implements as disk harrows, cultivators, etc.

It is well known to those skilled in the art that the disks of tillage implements tend, after a certain period of use, to break out at the center, the lateral thrust of the soil on the outer portion of the disks acting to gradually weaken the metal at the point where the disks meet the flanges of the spacing spools between which they are held, breakage being no doubt due to crystallization of the metal at the point of greatest strain. Heretofore this tendency could only be overcome either by increasing the thickness of each disk towards its center or by bracing or backing up the disk as by enlarging the flange on the spacing spools, either method adding materially to the cost of construction and the weight of the implement.

I have found that by shaping the center of an ordinary concavo-convex disk in a special way while leaving the greater part of its radial extent unaltered and mounting it between spacing spools, the working strains will be so distributed in the metal that the tendency of the disk to break at or near its point of contact with the spool head will be obviated, fatigue, tests showing that whereas an ordinary disk, when subjected to test, will break at the center after a certain time, a similar disk constructed according to my invention will stand up about three times as long and will finally break near its periphery and never at its center.

My invention accordingly resides in the disk construction and manner of mounting hereinafter described and claimed or the equivalents of what I here disclose.

Having reference to the drawings:

Fig. 1 is a plan or face view of a disk constructed according to my invention.

Figure 2 is a diametrical section through the disk.

Figure 3 is a view of the disks as assembled in a gang, a portion of the central disk being broken away to show the relation of the spool heads to the disk center.

The disk of my invention is formed from plate steel of uniform thickness and of any gage ordinarily employed in disk manufacturing. The main body 10 of the disk does not differ in shape from that of ordinary disks, but the central portion is formed with a pressed out or offset hub portion 11 formed by forcing metal of the disk outwardly at the back, thus forming a saucer-shaped depression in the face of the disk. This depression has a plane or flat floor corresponding in area to that of the spool heads between which the disks are to be clamped and has a diameter approximately one-fourth that of the disk. This flat portion is perforated at its center, which is the axis of the disk, as at 12, for the reception of a supporting shaft 13. This perforation may be either polygonal or round according as the disks are to turn with the shaft or on it. Between the central or hub portion and the main body of the disk, the metal is crimped or corrugated to describe a gradual reverse or ogee curve, as at 14 (Fig. 2), thus presenting on the face of the disk a rounded shoulder 15 having a comparatively long radius of curvature, and on the back of the disk a second rounded shoulder 16 having a shorter radius of curvature. As the flat bottom of the depression 11 is to be of the same diameter as the supporting element or flange of the spacing spools to be used, the supporting elements or flanges in engagement with the disk will extend to the margin of the flat portion and preferably will engage its entire area and reach to the edge of the zone occupied by the curved portion 14. In the species of my invention here described it is important that the metal forming the sides of the depression 11 be given the proper curve and that the reverse curvature of the portions or shoulders 15, 16 shall be neither too abrupt nor too flat. It is also important that the metal of the disk in the zone immediately surrounding the spool heads of the assembled disk gang shall have a certain degree of resiliency in order that the highest resistance to center breakage of the disk may be obtained. I have discovered that the correct degree of resiliency to secure this result in a 16 inch disk of standard curvature is produced by such a reversely curved or substantially corrugated circular portion as that shown in the drawings. This corrugated portion may be considered as having the face shoulder 15 and the back shoulder 16. For example, in the ordinary harrow disk of approximately 16 inches in diameter, the curve of the shoulder 15 should be on a radius of close to $1\frac{5}{32}$ inches and that of the shoulder 16 on a radius of approximately $\frac{25}{32}$ of an inch, while the flat center to be occupied by the clamping elements should be about four inches in diameter. The zone of deformation within which these curves lie is, therefore, narrow, the total diameter of the pressed out portion on the convex side of the disk being only approximately one-third the diameter of the entire disk which, therefore, retains the shape and soil turning characteristics of the ordinary earth working disk throughout its effective area.

Disks constructed according to my invention are mounted in gangs in the usual manner on a shaft or axle 13 between spacing spools 17, the spools and disks being drawn up and tightly clamped, but, owing to the fact that the bottom of the hub portion or depression 11 on the disks is preferably flat, the spool ends or heads are also made flat and the necessity for grinding the spool ends to fit a concavo-convex disk, as has heretofore been done, is eliminated, thereby further lessening the cost of manufacture and giving an improved gang construction.

With the construction and arrangement of disks described, the working thrusts acting on the face of the disk near its periphery are not concentrated in the metal immediately surrounding the edges of the spool ends, thereby causing crystallization at this point and parting of the metal, as has heretofore happened, the bent portion adjacent the edge of the spool head in my improved construction acting to change the direction of thrust and diffuse the strain throughout a greater area of the metal in the disk immediately surrounding the hub thus greatly increasing its endurance and making it possible for the disk to withstand working strains indefinitely.

While I have described one embodiment of my invention, modifications therefrom are possible within the scope of the following claims.

I claim as my invention:

1. As an article of manufacture, an earth working disk with the greater part of its radial extent of ordinary concavo-convex form and having a smaller central hub portion, corresponding in shape and size to conventional supporting spool heads, pressed out and forming a protrusion on its convex side, said central hub portion being delimited by a narrow zone within which the metal of the disk is crimped.

2. As an article of manufacture, an earth working disk having a main or body portion of ordinary concavo-convex form and formed with a hub portion pressed out to form a protrusion on its convex side delimited by a zone within which the metal of the disk is crimped, the diameter of said hub portion and crimped zone together being approximately one-third the diameter of the disk.

3. As an article of manufacture, a disk for earth working implements having a main or body portion of ordinary concavo-convex form and provided with a hub portion delimited by a zone in which the metal of the disk is bent on a reverse curve, said hub forming a protrusion on the convex side of the disk, the width of the area within said zone being approximately one fourth that of the disk and corresponding to that of disk supporting heads of standard type.

4. As an article of manufacture, a disk for earth working implements having a main portion or body of ordinary concavo-convex form and provided with a hub portion of the same thickness as the disk and consisting of a flattened area delimited by a zone in which the metal of the disk is bent on a reverse curve, said hub portion forming a protrusion on the convex side of the disk, the width of said flattened area being approximately one fourth that of the disk and corresponding to that of disk supporting heads of standard type.

5. A disk implement comprising an ordinary concavo-convex disk having an integral flat hub portion approximately one fourth the width of the disk pressed out at the back of the disk, the metal surrounding said flat portion merging with the body of the disk on a reverse curve, whereby a saucer shaped depression is formed in the face of the disk, and supporting means for the disk comprising clamping elements engaging the opposite faces of said flat portion and occupying the entire area thereof.

6. In a disk implement, an ordinary concavo-convex disk having an integral flat hub portion offset rearwardly from the convex side of the disk with the metal around the margin of said flat portion reversely curved to provide a resilient zone surrounding it, said flat portion being approximately one fourth the width of the disk, and supporting means for the disk comprising spools engaging the opposite surfaces of said flat portion and having portions extending to the margin thereof.

7. In a disk implement, a metallic earth working disk having an outer annular portion constituting the greater part of its radial extent of standard curvature, the

metal of the disk in a narrow annular zone inwardly of said circumferential portion being shaped on a reverse curve producing substantially a circular corrugation and constituting means for promoting the maximum resistance to center breakage by the strains of ordinary service, the portion of the disk surrounded by the circular corrugation being flat, the diameter of this flat portion being approximately one-fourth of the diameter of the whole disk, and supporting means for the disk comprising spacing spools having heads with flat ends engaging the opposite sides of the flat portion of the disk and occupying all of the flat portion.

8. In a disk implement, the combination of a concavo-convex earth working disk having a central hub portion pressed out to form a protrusion on its convex side delimited by a narrow zone within which the metal of the disk is crimped, a shaft engaging said hub portion, and a supporting spool on the shaft in clamping engagement with a face of said protruding hub portion, said spool having a head the periphery of which lies at the inner margin of said crimped zone.

9. In a disk implement, the combination of an earth working disk having its greater part of ordinary concavo-convex form and a relatively small central hub portion pressed out to form a protrusion on its convex side delimited by a narrow zone within which the metal of the disk is crimped, a shaft engaging said hub portion, and a supporting spool on the shaft in clamping engagement with a face of said protruding hub portion, said spool having a head the periphery of which lies at the inner margin of said crimped zone.

10. In a disk implement, the combination of an earth working disk with the greater part of its radial extent of ordinary concavo-convex form and having a relatively small central hub portion pressed out and forming a protrusion on its convex side, said central hub portion being delimited by a narrow zone within which an annular band of the metal of the disk lies in obtuse angular relation to the disk surfaces adjacent said zone, and disk supporting means occupying all that portion of the hub within said zone.

11. In a disk implement, the combination of a concavo-convex earth working disk having the greater part of its radial extent of standard curvature, a supporting spool head engaging a surface of the disk in a zone surrounding the disk axis, and means for reenforcing the disk against rupture by working stresses in the circumferential zone surrounding the spool head, comprising a curvilinear deformation in the metal of the disk formed within a narrow zone immediately surrounding the margin of the spool head.

In testimony whereof I affix my signature.

FREDERICK A. BUCKNAM.