(No Model.) 3 Sheets—Sheet 1.

W. H. NAUMAN.

DISK HARROW.

No. 413,539. Patented Oct. 22, 1889.

FIG. 1.

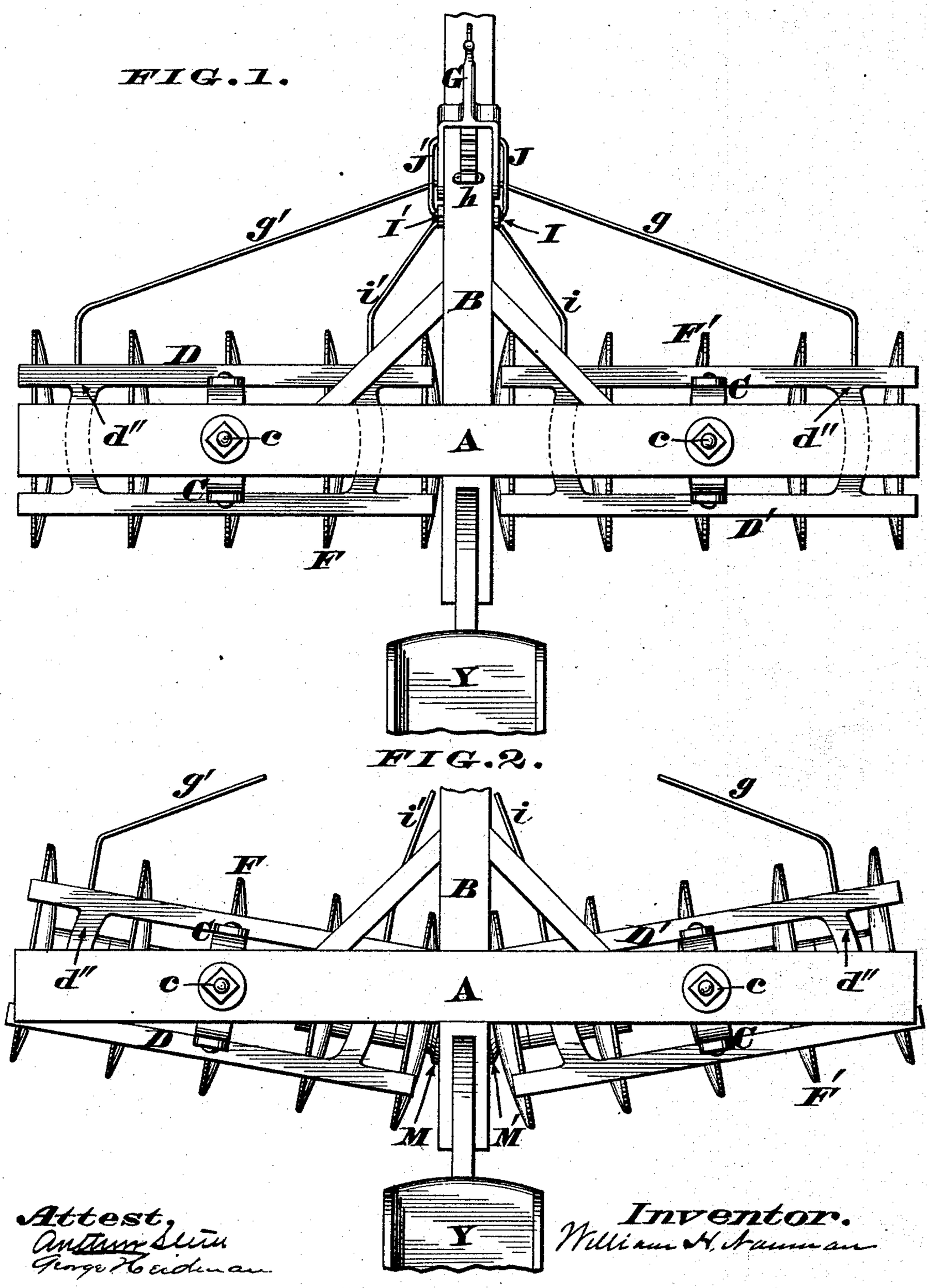


FIG. 2.

Attest,
Anthony Litton
George Heidman

Inventor.
William H. Nauman

(No Model.) 3 Sheets—Sheet 2.

W. H. NAUMAN.

DISK HARROW.

No. 413,539. Patented Oct. 22, 1889.

FIG. 3.

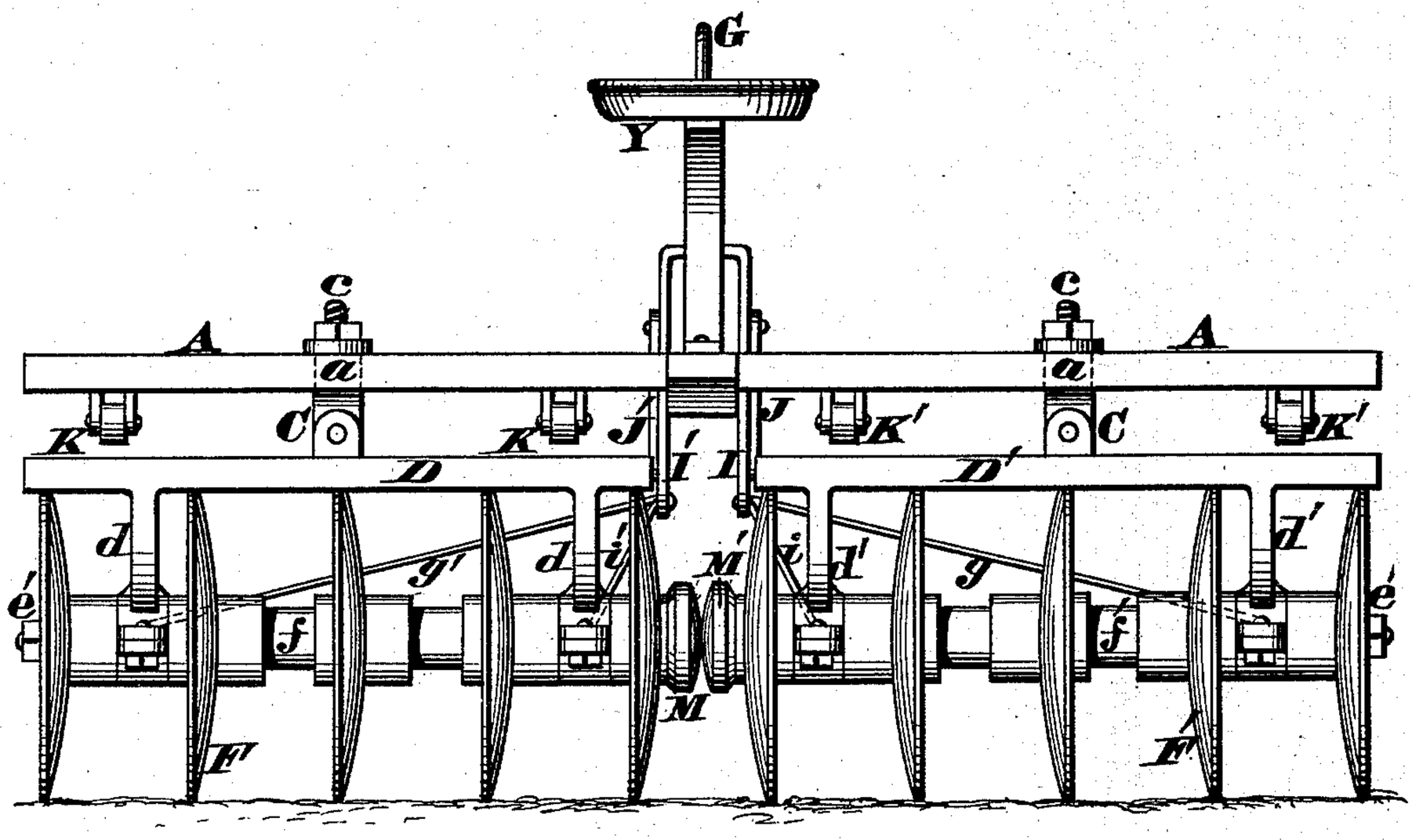
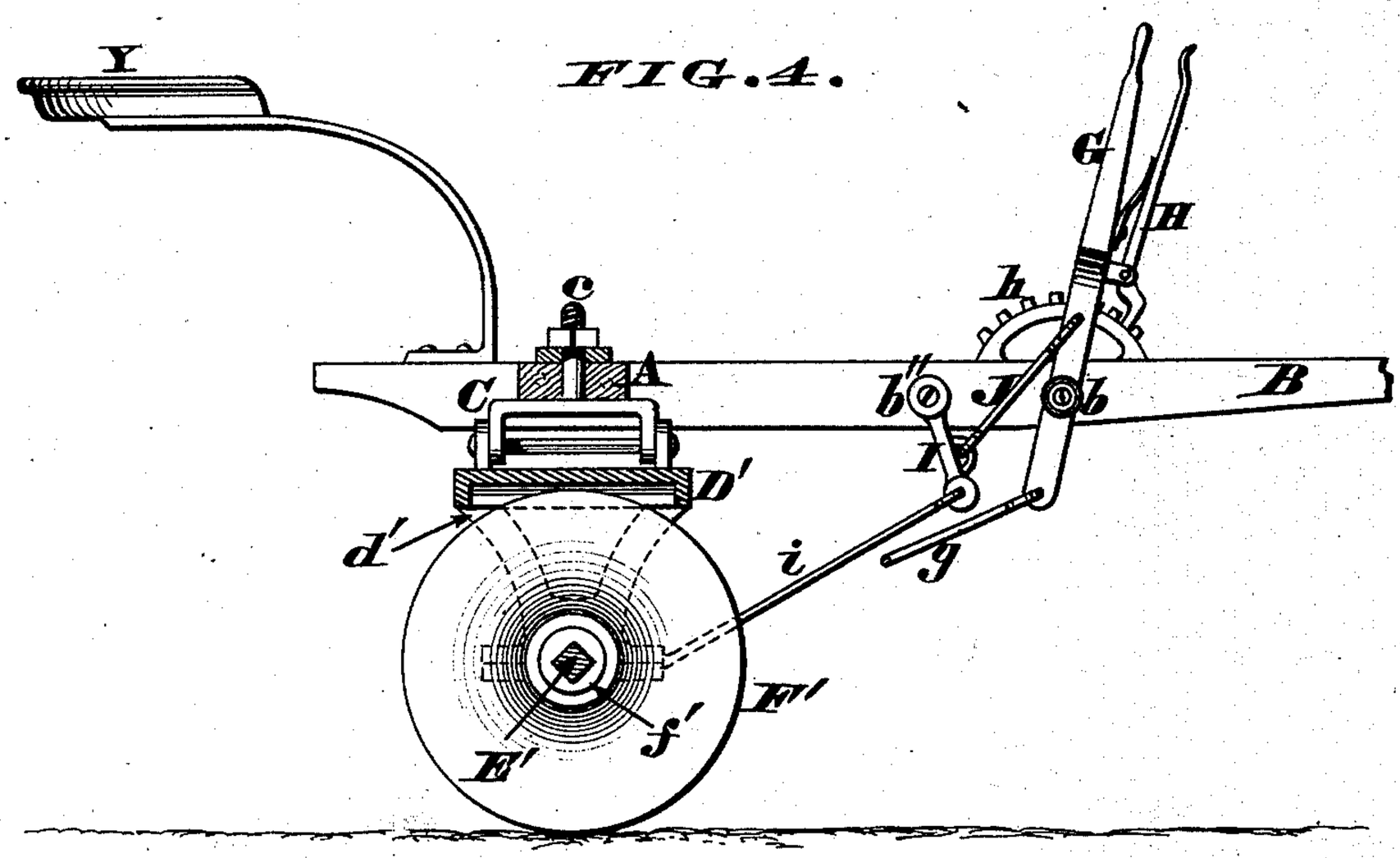


FIG. 4.



Attest,
Anthm Klein
Geo. E. Heidman

Inventor.
William H. Nauman

(No Model.) 3 Sheets—Sheet 3.

W. H. NAUMAN.

DISK HARROW.

No. 413,539. Patented Oct. 22, 1889.

FIG. 5.

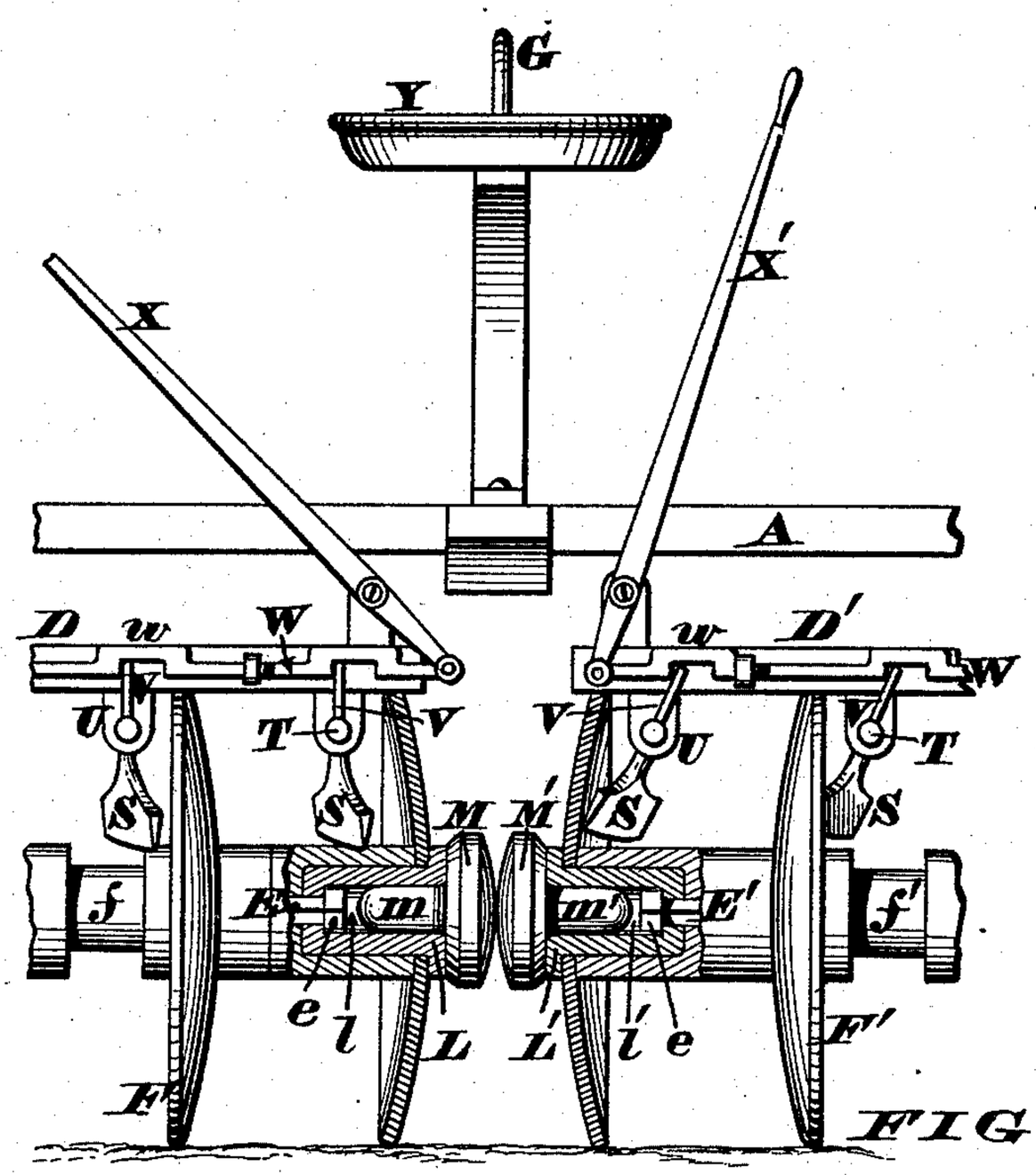
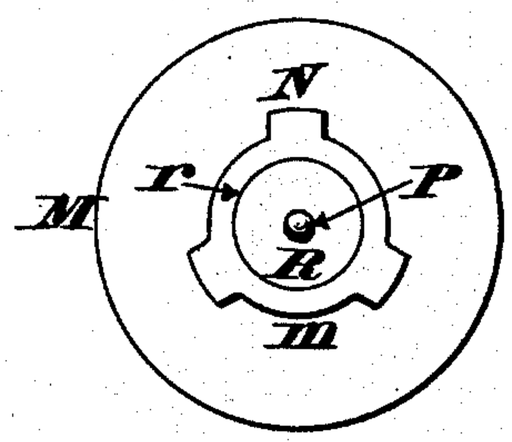


FIG. 7.



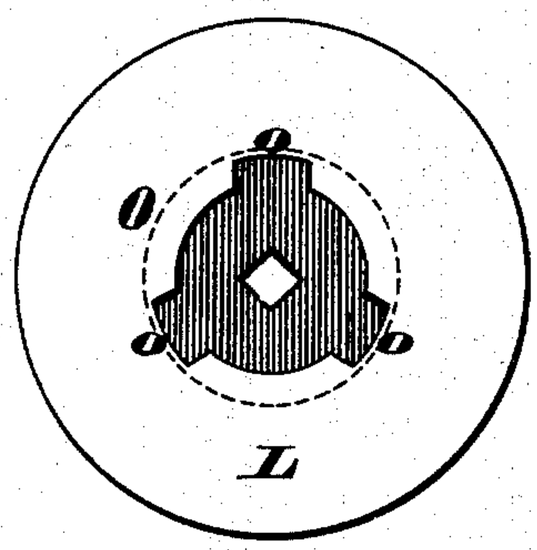
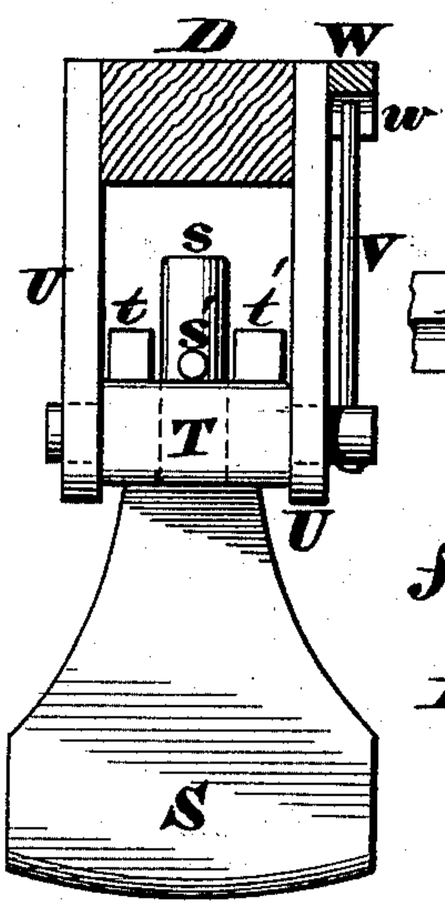


FIG. 8.

FIG. 6.



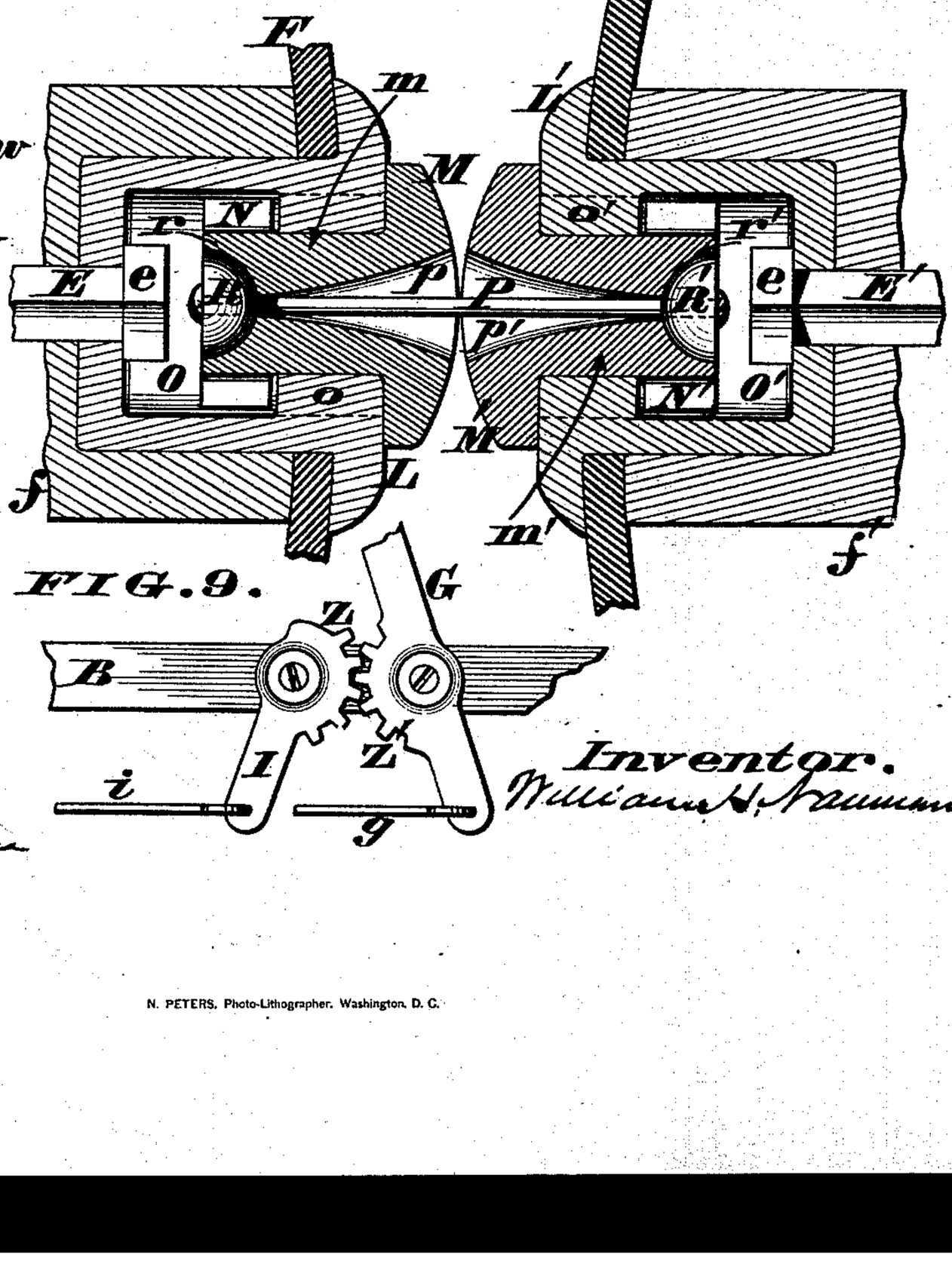


FIG. 9.

Attest.
Anthon Litti
Geo E Heidemann

Inventor.
William H. Nauman

UNITED STATES PATENT OFFICE.

WILLIAM H. NAUMAN, OF DAYTON, OHIO.

DISK HARROW.

SPECIFICATION forming part of Letters Patent No. 413,539, dated October 22, 1889.

Application filed December 26, 1888. Serial No. 294,574. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. NAUMAN, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented a certain new and useful Improvement in Disk Harrows, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of disk harrows or pulverizers which consist, essentially, of a pair of disk-gangs secured to independent shafts journaled in frames having swivel connections to the main or cross beam of the implement; and the first part of my improvement comprises a novel combination of devices that enables the simple shifting of a hand-lever to simultaneously adjust and lock said gangs in any desired position—that is to say, at right angles to the line of draft or at a suitable incline thereto—which adjustment may be effected either while the pulverizer is standing still or when the team is in motion, as hereinafter more fully described.

The second part of my improvement comprises a pair of independently-revolving anti-friction heads located at the inner ends of the disk-gangs, so as to receive the end-thrust of the latter. These heads reduce the friction and permit a sufficient horizontal and vertical play of the disk-gangs, while at the same time they effectually prevent either of said gangs being thrown up out of the ground, as is frequently the case when disk harrows having fixed heads are operated in rough or uneven ground, as hereinafter more fully described.

The third part of my improvement comprises a novel combination of devices for fitting these heads to the disk-gangs, and so coupling said heads together as to limit the vertical play of said gangs, as hereinafter more fully described.

The fourth part of my improvement comprises a novel combination of devices for bringing a set of scrapers in contact with the face of the disks or for rendering said scrapers inoperative when occasion requires, as hereinafter more fully described.

In the accompanying drawings, Figure 1 is a plan of an implement embodying my improvements, the front portion of the tongue being broken away, the scrapers being omitted, and the disk-gangs being locked at right angles to said tongue. Fig. 2 is a plan of a portion of the implement, the disk-gangs being set obliquely to the line of draft. Fig. 3 is a rear elevation of the implement. Fig. 4 is a vertical section of the same, taken in the plane of one of the swivel-connections of the frames. Fig. 5 is a rear elevation of the central portion of a disk harrow with scrapers applied thereto, the accessories of the anti-friction heads being sectioned. Fig. 6 is an enlarged sectional elevation of one of the scraper attachments. Fig. 7 is an enlarged elevation of one of the anti-friction heads and the socket to which it is to be applied. Fig. 8 is an enlarged axial section of the abutting members of the disk-gangs, the anti-friction heads of the same being coupled together. Fig. 9 is a modification of the gearing for adjusting the angles of the disk-gangs.

Like letters of reference indicate identical parts in all the figures.

A represents the main or cross beam of the implement, to which the pole or tongue B is rigidly secured, said beam being slotted, as indicated by the dotted lines *a a* in Fig. 3, to admit the bolts *c* of the swivel-connections C, which connections are of the ordinary kind, as represented in Fig. 4. These swivels couple to said beam a pair of frames D D′, each frame being provided with hangers *d d d′ d′*, within which are journaled in the usual manner a gang of concavo-convex disks or pulverizers F F′. These disks are fixed on square shafts E E′, between spools or sleeves *f f′*, in the usual manner. The disks and spools, being provided with square openings through the center to fit the shaft, are slipped onto the shaft alternately, each disk being embraced by two spools, or, as in the end disks, a spool and a nut or head.

e e are heads on the ends of these shafts E E′, and *e′ e′* are nuts. By screwing up the nuts *e′ e′* the disks are tightly clamped and held rigidly in place. Pivoted to the tongue at *b* is a hand-lever G, provided with a suitable

locking device H, adapted to engage with a segment-rack *h*, the upper end of said lever being convenient to the driver, while its lower end has a rod *g* attached thereto. This rod runs back at an angle, and is then connected to the outer hanger *d'* of frame D'. Pivoted to the tongue at *b''* is a counter-lever I, having one end of a rod *i* attached to it, the opposite or rear end of said rod being connected to the inner hanger *d'* of frame D'.

J is a link that communicates motion from the hand-lever G to the counter-lever I. These devices are exactly duplicated on the opposite sides of the tongue, as seen at *g'*, I', *i'*, and J', the rods *g'* and *i'* being coupled, respectively, to the outer and inner hangers *d d* of frame D, as seen in Figs. 1 and 3. Frames D D' are provided with transverse tracks *d'' d''* for rollers K K' to bear against when said frames are canted as far as may be desirable, said rollers being secured to the under side of beam A. When it is desired to maintain the disk-gangs at right angles to the line of draft, as seen in Fig. 1, the lever G is swung forward, as represented in Fig. 4, and locked in this position by engaging the detent H with the proper tooth of rack *h*. This swinging of the hand-lever causes a simultaneous but opposite swinging of the counter-lever I, and, as the rods *g i* are attached to said lever and to the opposite ends of frame D', said frame turns on its pivot C and stands at a right angle to the tongue B, the other frame D being similarly adjusted at the same time and locked in position. To simultaneously set both gangs at any angle to the line of draft, the lever G is pulled back until the desired oblique position is reached, as seen in Fig. 2, and then said lever is again locked to the segment-rack. From this description it is evident that by properly shifting and locking the lever the gangs can be maintained in any position or angle, and it is also apparent that this shifting of the gangs can be effected as readily when the implement is in motion as when it is at rest.

I have shown my shifting arrangement applied to two gangs. Of course, the number is not important. The frames D D' being pivoted at about their center, and the lever G acting upon each end of the frames at the same time in opposite directions, the resistance is largely balanced, so that very little power is required to adjust the angles of the disk-gangs at any time.

In Fig. 9 is shown a modification of the levers G and I, in which segment-gears *z z* are used to communicate motion from lever G to the counter-lever I, instead of the link J. (Shown in Fig. 4.)

Another obvious modification of the attachment of the opposite ends of the disk-gangs to the operating-lever G is that the counter-lever I and the link J as separate parts may be omitted and the rod *i* attached to the upper part of the lever G above the fulcrum *b*. In this modification the lever G becomes also the counter-lever, and the single operation of the lever G will shift one end of the disk-gang forward and the other end back. The inner disks of each gang are preferably fitted to bushings L L', as seen in Fig. 5, which bushings are traversed by longitudinal bores *l l'* to receive the cylindrical necks *m m'* of the independently-revolving anti-friction heads M M', whose meeting surfaces are crowning or convex and are at all times in contact with each other. The tendency of the two disk-gangs is always to press against one another, and thus keep the anti-friction heads M M' always in the bushings, as shown. It may be desired, however, to have them permanently fixed in place. This may be done in a variety of ways. In Figs. 7 and 8 I have shown a modification for this purpose. The necks *m m'* of the anti-friction heads M M' are furnished with outwardly-projecting lugs N N', adapted to traverse longitudinal grooves *o o* of the bushings until they enter the chambers O O' of said bushings. The lugs revolve freely in these chambers, but are prevented from moving longitudinally or coming out by the walls between the grooves *o o'*. Of course, the lugs can be brought exactly opposite the grooves and removed as they were put in; but in practice this is next to impossible and never occurs. However, they may be made more secure by making the bushing in two pieces divided longitudinally and provided with an interior annular groove or chamber to receive the lugs N N' or an annular rib, collar, or elevation. The stems of the anti-friction heads M M' being fitted between the two halves of the bushing, and the disks F F' fitted over them and put in place, as shown in Fig. 8, the parts are all firmly held together. The lugs N N' or annular collar or elevation revolve freely in the chambers O O', but cannot come out except by again taking the machine apart. With the longitudinal grooves *o o'*, the anti-friction heads M M' may be removed at any time by hand but never come out by accident.

If it is desired to attach the two gangs of disks together so that they cannot pull apart, they may be joined by a tie-rod P, as shown in Fig. 8. The anti-friction heads are then provided with flaring mouths *p p'* to permit sufficient vertical or lateral play of a rod or other tie P, the opposite ends of the latter being fastened to hemispherical plugs R R', seated in concave sockets *r r'* at the inner end of the necks *m m'*. The heads of the square shafts E E' are fitted either within the bores *l l'* of the bushings or in the chambers O O' of the same.

It is obvious other modes of attaching the anti-friction heads to the abutting ends of the disk-gangs may be used, so as to permit them to revolve in either direction independently of the gangs, and thereby obviate the

constant rubbing and grinding in consequence of the continually-varying speed of the opposing gangs on rough or uneven ground or in turning corners, as is the case in disk harrows having the opposing heads rigidly attached to the gang-axles. My anti-friction heads entirely overcome this difficulty, as either of the heads upon the slightest variation of the speed of the gangs will revolve independently in either direction, as occasion demands; but by making these heads M M′ separate from the disk-gangs and allowing said heads to revolve independently these difficulties are obviated and the implement runs with the least possible friction. When the tie P is employed, sufficient vertical or lateral play of the gangs is permitted without at the same time allowing said gangs to shift so far as to cause one head to ride up and get on top of the other head.

S are scrapers having shanks *s* that turn freely within vertical openings of rock-shafts T, the latter being journaled in hangers U, depending from the frames D D′, and having stops *t t′* for the rod *s′* to strike against. By this arrangement said stops limit the turning of the scrapers in either direction. Each rock-shaft has a lever V, the free end of which engages with a notch or bead *w* of a longitudinally-shiftable bar W, which bar is suitably applied to the frames D D′—that is to say, one bar for each of said frames. These bars are operated by levers X X′, convenient to the driver, who occupies the seat Y. The scrapers, which need not be used constantly, are brought into service by shifting the lever X′ to the position seen in Fig. 5, which position causes said scrapers S to fit snugly against the concave surface of the disks, to which surface they are held. If desirable, the lever V of the rock-shafts T and the longitudinally-shiftable bar W may be omitted, and the rock-shafts T attached to the frame D and D′ directly, so as to scrape the disks constantly. The flexible connection afforded by the shanks *s*, being loosely coupled to the rock-shafts T, enables the scrapers to automatically adjust themselves to any jolting of the implement or springing of the disks. When the scrapers are no longer needed, they are brought to an inoperative position by properly shifting the lever, as seen at X.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A disk harrow provided with two or more gangs of disks swiveled to a main frame or beam, having their opposite ends attached to a lever in the manner described, whereby a single motion of the lever forces one end of each gang backward and the other end forward, in the manner and for the purpose described.

2. A disk harrow provided with two or more gangs of disks swiveled to a main frame or beam, having their opposite ends attached to a lock-lever in the manner described, whereby by a single motion of the lever one end of each gang will be forced back and the other forward and locked at any desired angle to the line of draft, in the manner and for the purpose described.

3. In a disk harrow provided with several gangs of disks or pulverizers, a lock-lever attached to the tongue and arranged to operate the disk-gangs by rods attached to their opposite ends to throw and lock them at any desired angle to the line of draft, in the manner and for the purpose described.

4. In a disk harrow having several gangs of disks arranged as described, the combination of the main lever G, attached to one end of each gang, the counter-lever I, attached to the other end of each gang, and connecting link J, in the manner and for the purpose specified.

5. A disk harrow of the class specified provided with a pair of anti-friction heads revolving independently of the gangs, applied to the abutting ends of the disk-gangs, substantially as and for the purpose described.

6. A disk harrow of the class specified provided with a pair of anti-friction heads revolving independently of the gangs, applied to the abutting ends of the disk-gangs, said heads being united by a tie, substantially as and for the purpose described.

7. In a disk harrow having one or more pairs of disk-gangs with abutting ends, the revolving anti-friction heads M M′, provided with laterally-extending lugs fitting into bushings L L′, with the longitudinal slots *o o′*, and chambers O O′, substantially as described.

8. In a disk harrow having one or more pairs of disk-gangs whose ends abut, revolving anti-friction heads whose inner ends or stems are provided with laterally-extending annular ribs revolving in interior annular chambers or grooves within the bushing, substantially as and for the purpose described.

9. In a disk harrow, disk-scrapers swiveled in rock-shafts suspended from the frame, whereby they may be adjusted to the concave faces of the disks, substantially as and for the purpose described.

10. In a disk harrow, disk-scrapers swiveled in rock-shafts T, in combination with the levers V, and sliding bar W, whereby said scrapers may be thrown into or out of contact with the disks, substantially as and for the purpose described.

WILLIAM H. NAUMAN.

Witnesses:
WILLIAM H. MERRIAM,
CHAS. HEINZ.