(No Model.) 3 Sheets—Sheet 1.

W. C. HARRAH.

EXCAVATOR AND GRADER COMBINED.

No. 277,027. Patented May 8, 1883.

Fig. 1.

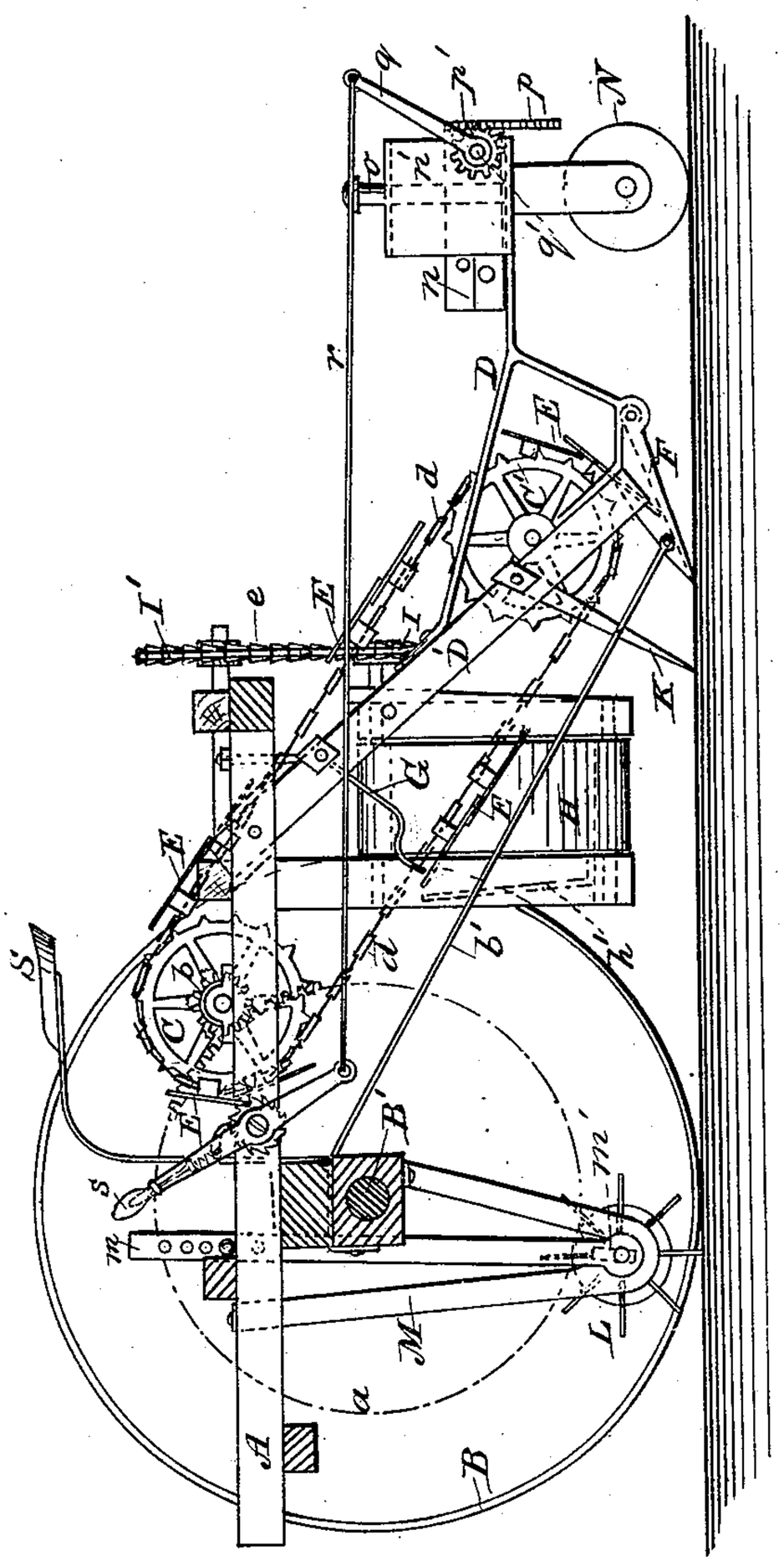
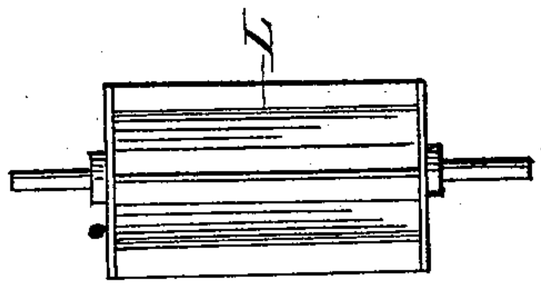


Fig. 6.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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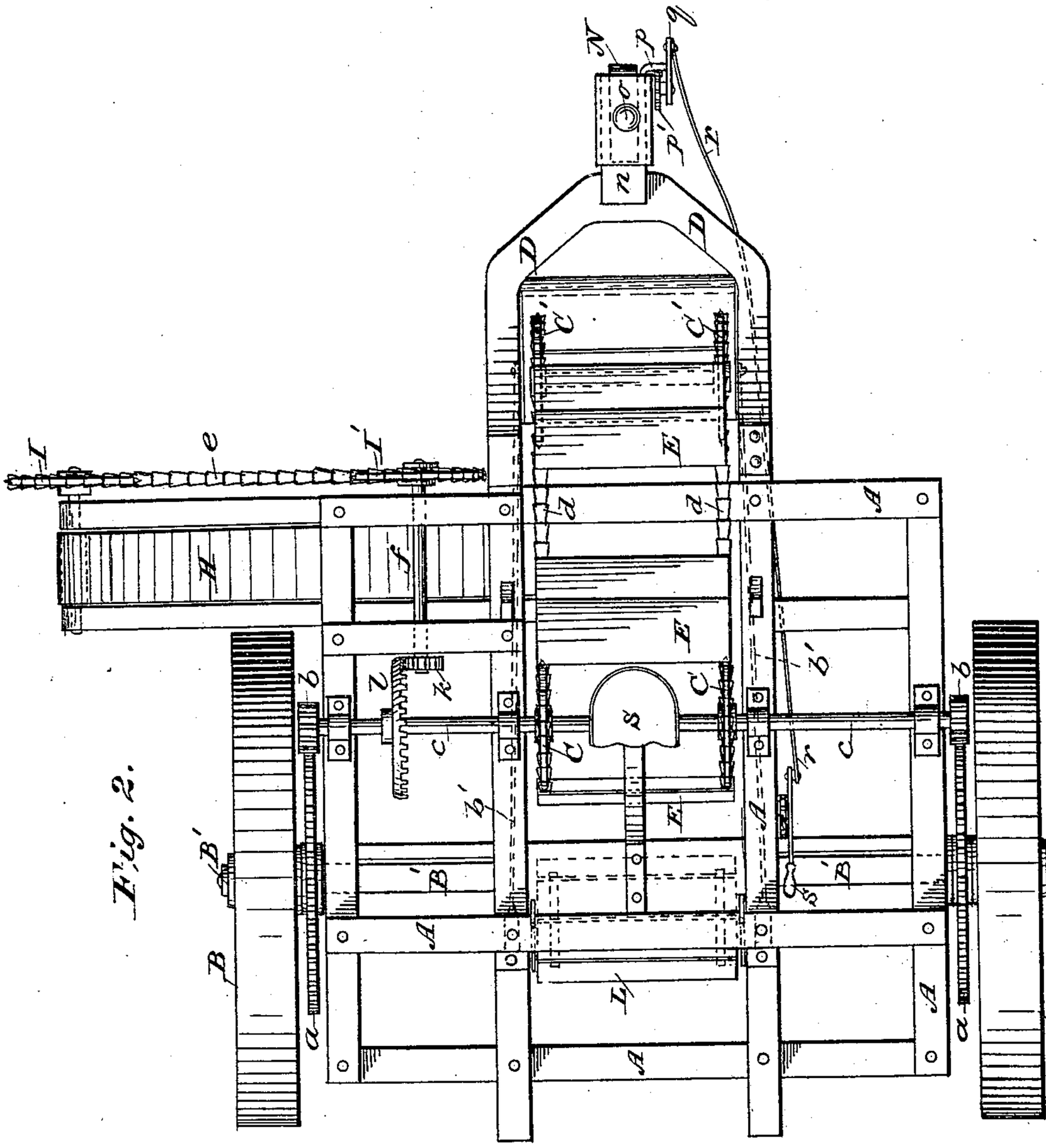

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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EXCAVATOR AND GRADER COMBINED.

No. 277,027. Patented May 8, 1883.

Fig. 3.

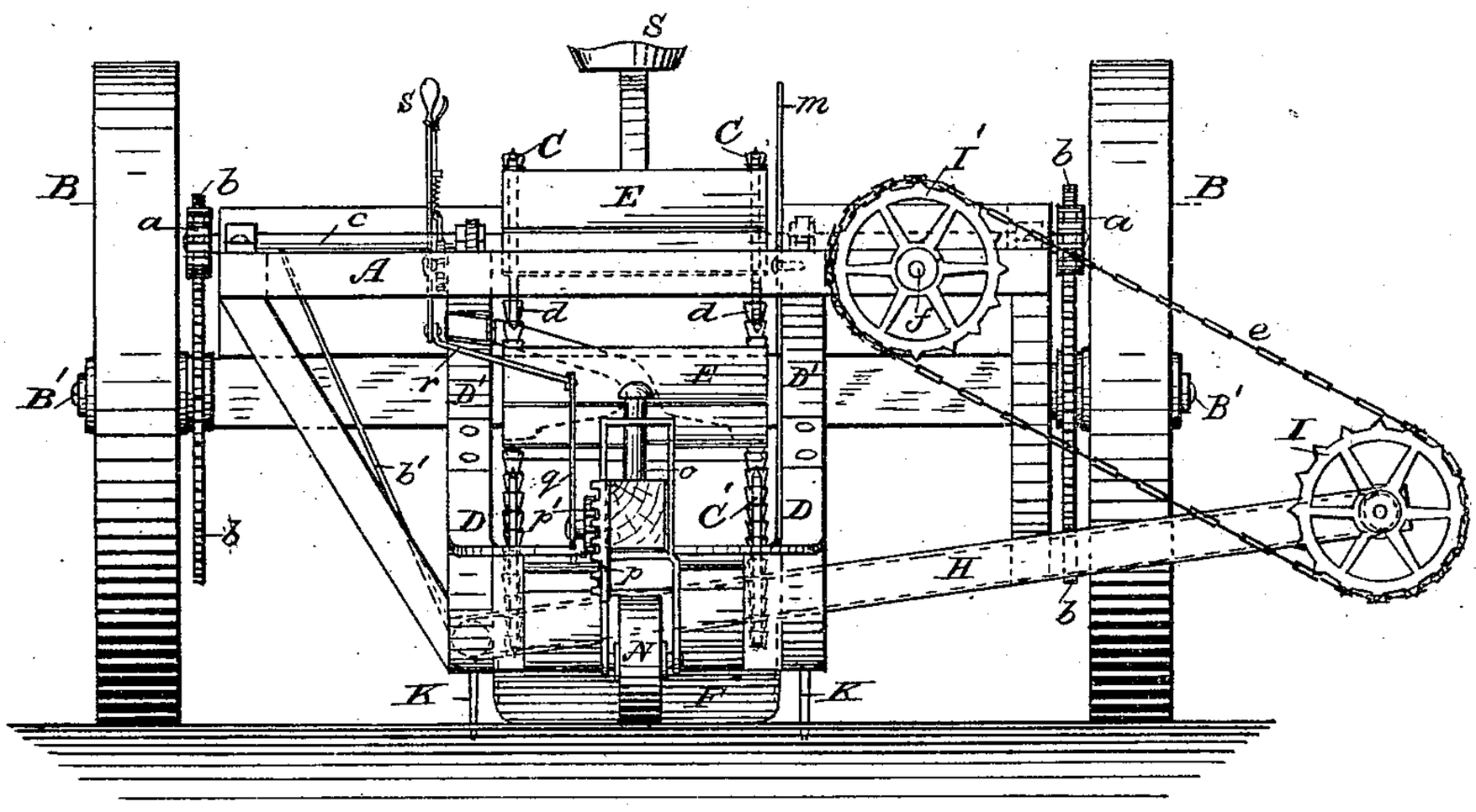


Fig. 4.

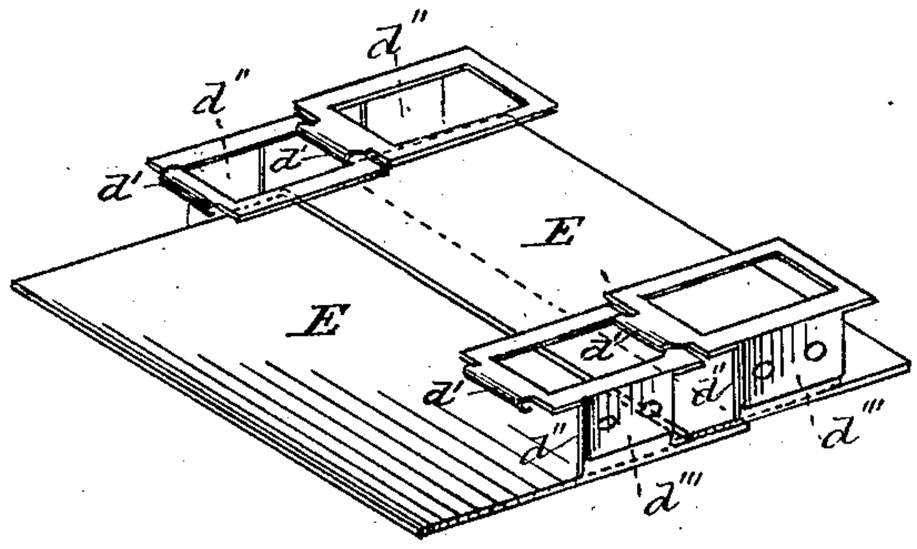
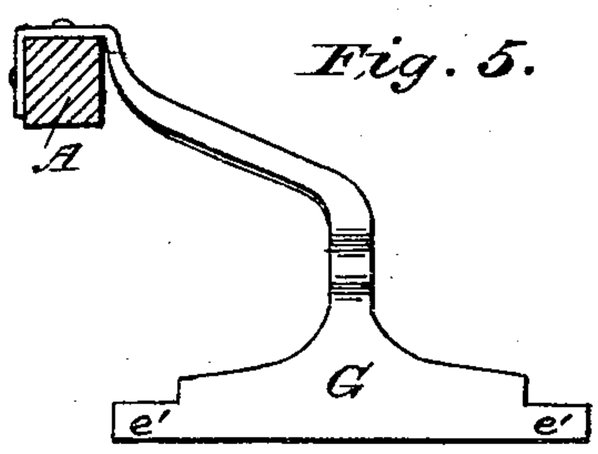


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM C. HARRAH, OF WEBSTER CITY, IOWA.

EXCAVATOR AND GRADER COMBINED.

SPECIFICATION forming part of Letters Patent No. 277,027, dated May 8, 1883.

Application filed July 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. HARRAH, a citizen of the United States, residing at Webster City, in the county of Hamilton and State of Iowa, have invented certain new and useful Improvements in an Excavating-Machine and Grader; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in combined excavating and grading machines; and the object is to construct such machines so that the earth is first plowed, spaded, or cut into pieces or strips, then severed by side-colters the desired width of the ditch or excavation, then plowed or raised out of the ditch sufficiently for buckets to get under it, then carried up by carriers, scraped off by a peculiar-shaped scraper onto an endless apron arranged transversely to the line of draft, and, finally, by it deposited alongside of the ditch or excavation to the desired place.

The invention consists in the construction of an excavating and grading machine having an elevating-chain provided with a peculiar construction of spring-scraper to keep the links, as well as the carriers, free from earth, in combination with a carrier.

It also consists of a pulverizer or sod-cutter made adjustable for raising and lowering it according to the depth of cut desired.

It also consist in the combination, with the above, of an endless carrier arranged transversely to the line of draft for depositing the earth on the side of the ditch or excavation; and it also consists in the construction and arrangement of certain parts, as will be more fully described hereinafter, reference being had to the accompanying drawings and the letters of reference marked thereon.

Like letters of reference refer to like parts in the different figures of the drawings, in which—

Figure 1 represents a side elevation of my machine with the one front wheel removed. Fig. 2 is a plan view of the same. Fig. 3 is a rear elevation of the same. Fig. 4 is a detail view of the bucket. Fig. 5 is a detail view of the spring-scraper. Fig. 6 is a plan view of the pulverizer.

In the drawings, A represents a suitable frame supported on wheel B, attached to an axle, B′. Upon this axle are secured the gear-wheels *a*, which mesh into pinions *b* on a shaft, *c*, journaled in bearings on the frame A. On the shaft *c* are secured the sprocket-wheels C, over which the chains *d* operate, passing over the lower sprocket-wheels, C, that are journaled in an auxiliary or extension frame, D, made preferably of metal, and bolted to inclined pieces D′ of the main frame. The chains *d* consist of square links connected together by hooked ends *d′*, Fig. 4, and to said links the carriers E are attached in any suitable manner. These carriers consist of two or more flat pieces of metal secured at intervals to the chain, and overlapping each other slightly at their adjoining edges, so as to permit them to curve or bend around the sprocket-wheels, and at the same time raise the earth or sods from the plow or scraper F and convey it upward until they come in contact with a spring scraper or cleaner, G. These plates are part of their width bent upward at each side and form lugs *d″*, by which they are at certain intervals secured to the lugs *d‴* on the links of the chains *d*. The earth or sods are prevented from falling off the plates sidewise by said lugs, and are scraped off by the scraper G. This scraper is secured to one of the inclined pieces D′, and serves to scrape the earth, &c., off from the carriers, as well as the chain-links, under which the ends *e′* project, and these scrape the earth from the lower sides of the chains, as the face of the scraper does from the carriers, and onto an endless apron or carrier, H, which is arranged transversely to the line of draft of the machine. It is slightly inclined upward, and conveys the earth, &c., to the side of the ditch or excavation. It may be made adjustable to suit different heights, and is operated by a sprocket-wheel, I, and chain *e*, that passes over another sprocket-wheel, I′, on the shaft *f*. This shaft has a pinion, *k*, on its opposite end, which meshes into a crown or bevel wheel, *l*, on the shaft *c* and imparts motion to the endless carrier H. At the front side of the carrier is secured a guard or shield, *h′*, (shown in dotted lines, Fig. 1,) to prevent the earth from passing beyond the carrier and falling over the same. Two braces, *b′*, extend from the main frame to the lower

end of the auxiliary frame and serve to steady and strengthen it. On each side, and quite near the scraper or plow F, are arranged two colters, K, by which the earth, sods, roots, &c., are cut into before the plow enters the earth. Forward of the axle, and nearly under it, is arranged a sod-cutter or pulverizer, L, consisting of a series of radial cutters secured to a plate or hub at each side. This pulverizer is supported in slotted brackets M, attached to the frame A, and can be adjusted to suit the depth by means of rods or bars *m*, having holes for pins or ratchet. It crushes the lumps by its own weight, as it is made quite heavy.

At the rear end of the machine is arranged a caster-wheel, N, by which the rear end of the machine is supported. An extension-piece, *n*, secured to the frame D, extends through the oblong part *h'*, and through both passes the pintle *o*, which is forked at its lower end, and has the caster-wheel N journaled between its jaws. To the end of the piece is attached a rack or toothed piece, *p*, into which a toothed wheel or ratchet-wheel, *p'*, meshes, and a lever, *q*, on the shaft *q'*, connects by a rod, *r'*, to the hand-lever *s*, arranged within easy reach of the driver, for whom a seat, S, is provided on the frame. By manipulating the hand-lever the driver can regulate the rear end of the machine and either raise or lower it, as desired.

The pulverizer L also serves to crush any lumps too large to be carried by the endless belt and carriers.

The operation is as follows: The pulverizer or spader at the front of the machine is first adjusted to the desired height or depth, as also the caster-wheel at the rear end, and then the horses are started. The earth will be first spaded or pulverized into transverse strips, and any roots or sods will be cut by the side colters near the rear end of the machine. The earth, &c., will then be taken up by the plow, and from it carried upward by the carriers until it comes in contact with the scraper, by which it will be guided onto the endless carrier, which conveys it transversely to the side of the canal, ditch, or excavation to be made, where it is deposited.

It will be readily seen that the whole operation is automatic and continuous until the horses are stopped. The different parts of the machine are simple in construction, and not liable to get out of order. The machine can be made very light, and yet a very large amount of work can be performed in a very short space of time, and only one man and one pair of horses are required to operate the machine, although more horses may be employed, if required.

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

1. In an excavating-machine, the endless chains *d*, consisting of square links provided at intervals with lugs *d'''*, to which the carrier-plates E, having lugs *d''*, are secured, substantially as and for the purpose herein specified.

2. In an excavating-machine, the combination of the carriers, constructed as shown, with the spring-scraper G, having side extensions, *e'*, projecting under the chains *d*, and serving to clean them with their upper edges, while the lower side of said scraper cleans the carrier-plates, substantially as set forth.

3. In an excavating-machine, the carriers E, consisting of two or more plates overlapping each other, and secured by lugs *d''* to the lugs *d'''* on the endless chain *d'* at intervals, in combination with the sprocket-wheels C, arranged substantially as shown and described.

4. In an excavating-machine, the carriers consisting of two or more plates overlapping each other, and secured by lugs *d''* to the lugs *d'''* on the endless-chain links, in combination with a spring-scraper, G, a guard or shield, *h'*, and transverse endless apron H, all arranged substantially as and for the purpose specified.

5. The combination of an endless chain having carriers consisting of two or more flat plates attached to said endless chain, arranged as shown, with a spring-scraper constructed as described, and a guard or shield, all substantially as and for the purpose specified.

6. The combination of an endless chain having carriers consisting of two or more flat plates secured to it, with a spring-scraper, a guard, and a transverse apron, all arranged substantially as shown and set forth.

7. The combination of an endless chain having carriers consisting of two or more flat plates secured to it, with a spring-scraper, a guard, a transverse apron, and a plow, arranged as shown, and for the purpose specified.

8. The combination of a rotary pulverizer, a pair of colters on the frames D', and an endless chain having carriers consisting of two or more overlapping flat plates secured to said chain, with a spring-scraper, a guard, and a transverse apron, and a plow, arranged substantially as set forth.

9. The combination of a frame, A, and wheels B, gear-wheels *a*, and pinions *b*, with the sprocket-wheels C C', chains *d*, having carriers consisting of two or more overlapping flat plates secured to said chains, the transverse apron and spring-scraper, arranged substantially as shown and described.

10. The combination of the frame A, rotary pulverizer L, side colters, K, plow F, endless chains provided with carriers E, and the spring-scraper G, with the transverse endless apron H, operated by sprocket-wheels I I', chain *e*, and suitable operating mechanism, all arranged substantially as specified.

In testimony whereof I hereby affix my signature in presence of two witnesses.

WILLIAM C. HARRAH.

Witnesses:

O. O. HALL,

W. H. HUBBARD, Jr.