No. 717,530. PATENTED JAN. 6, 1903.

H. J. BENTSON.

TRENCHING MACHINE.

APPLICATION FILED JULY 3, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

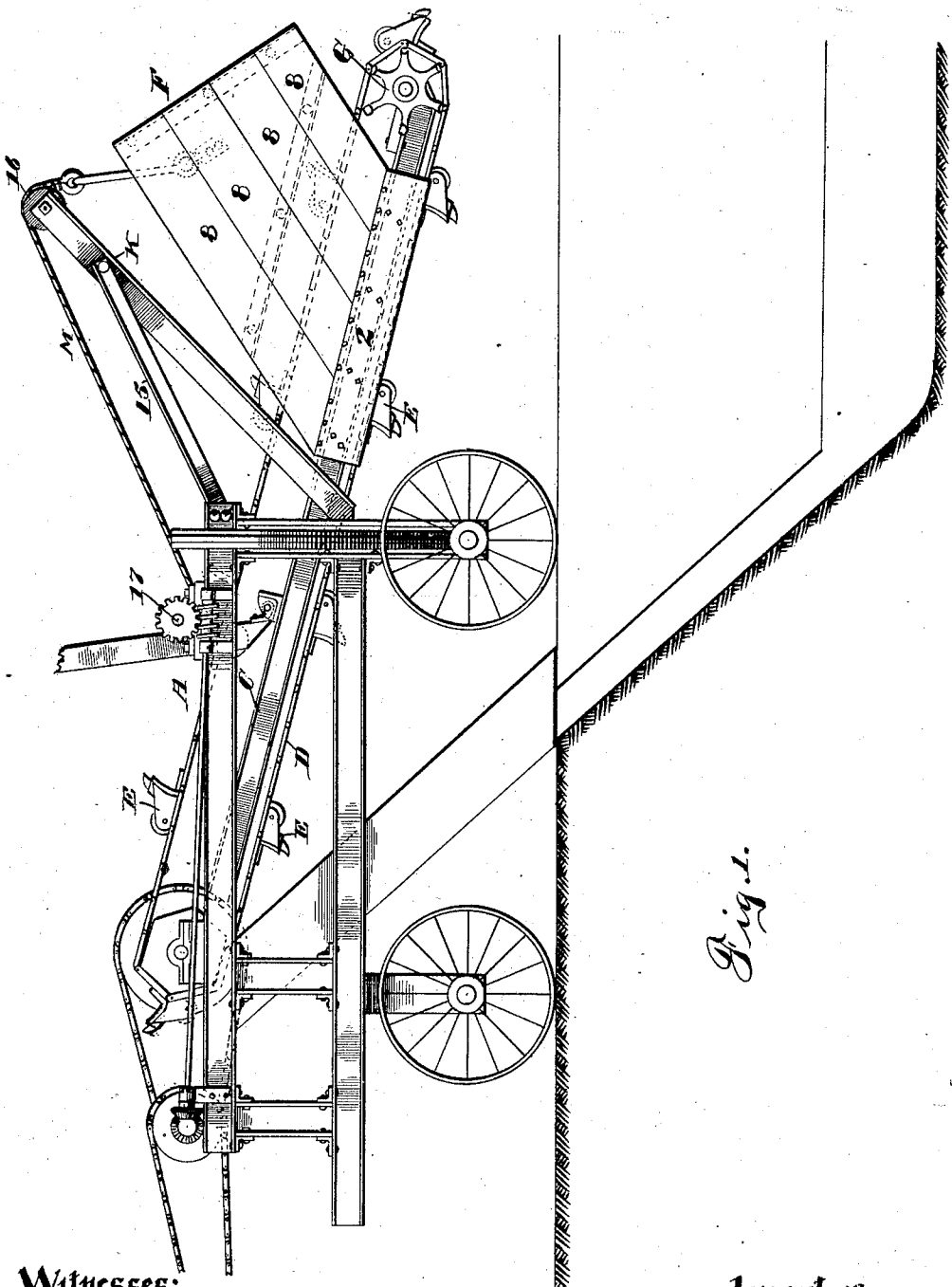

Fig. 1.

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NO MODEL. 4 SHEETS—SHEET 2.

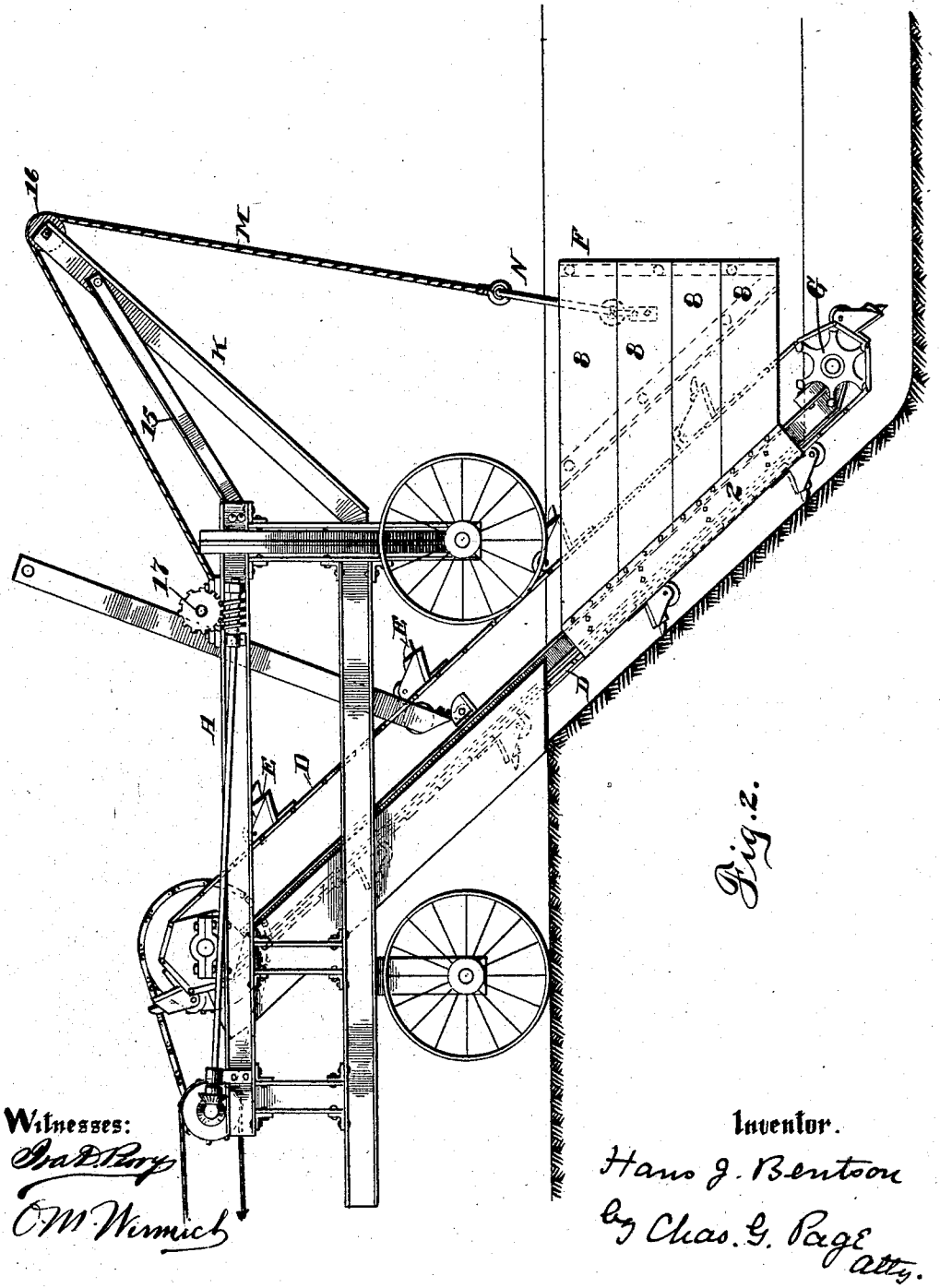

Fig. 2.

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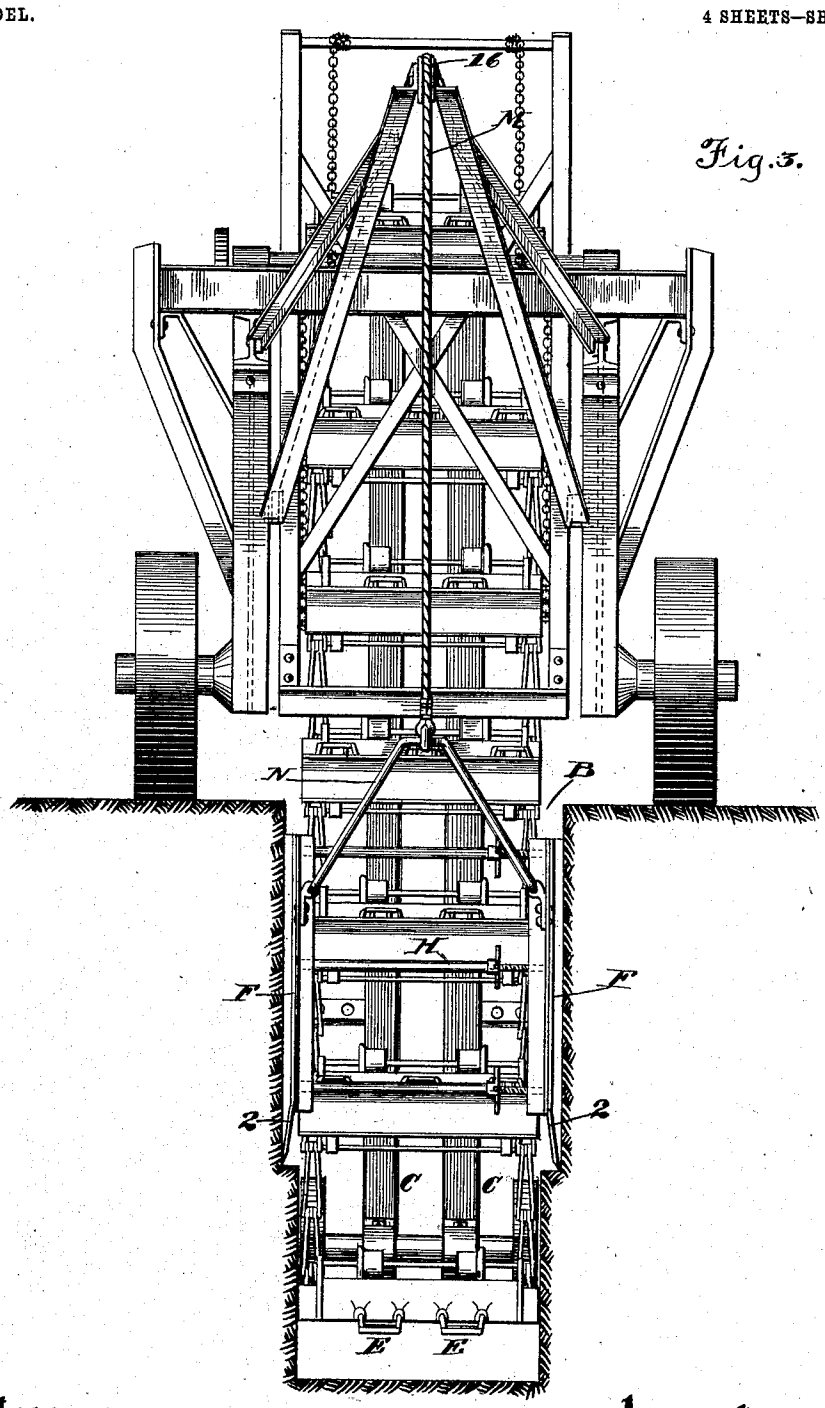
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 4.

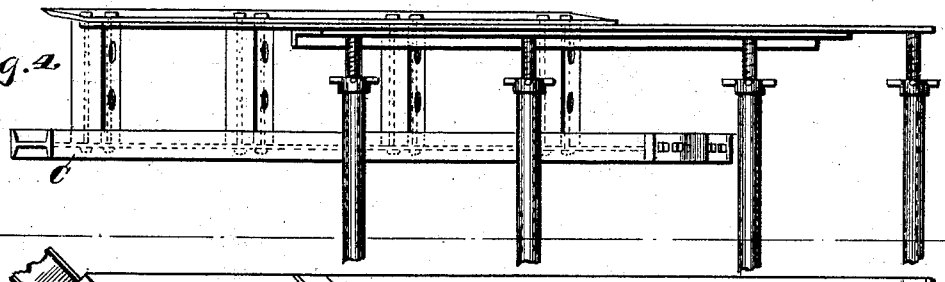


Fig. 5.

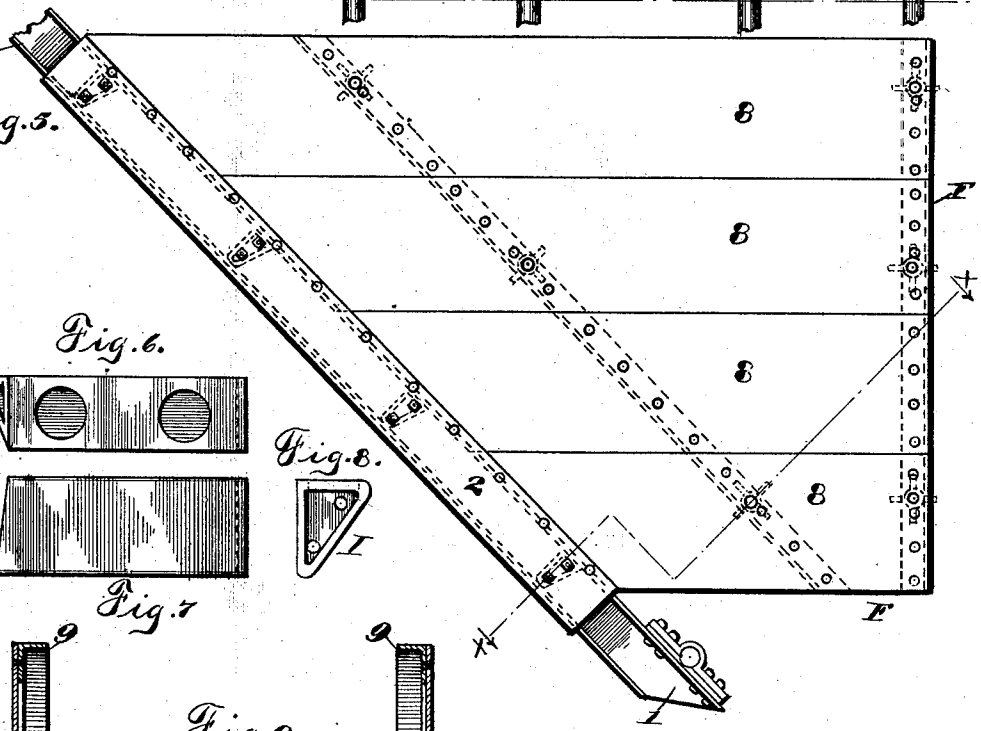


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9

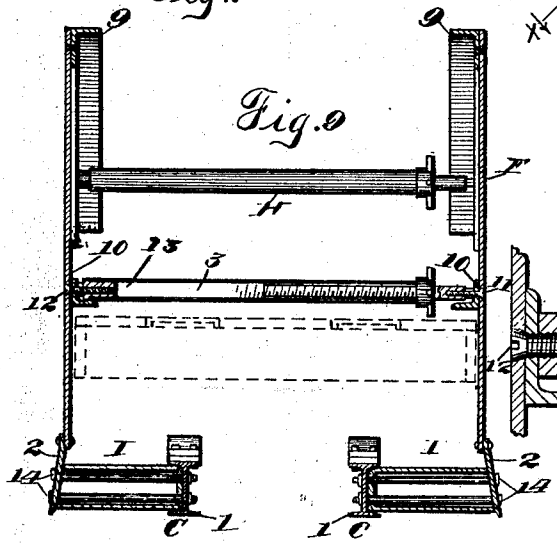
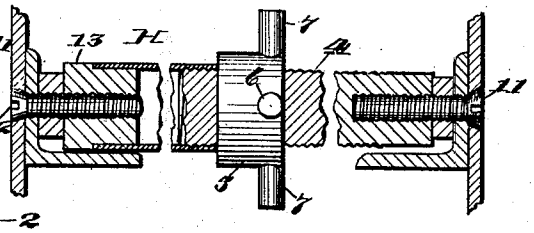


Fig. 10.



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UNITED STATES PATENT OFFICE.

HANS J. BENTSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

TRENCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 717,530, dated January 6, 1903.

Application filed July 3, 1902. Serial No. 114,225. (No model.)

To all whom it may concern:

Be it known that I, HANS J. BENTSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Trenching-Machines, of which the following is a specification.

My invention relates to excavating-machines particularly adapted for forming trenches in the earth and involving a main frame or carriage, which can be moved along as the work progresses, and a long swinging ladder or conveyer-frame hinged at one end upon the body-frame or carriage and provided with excavating means, such as an endless conveyer-belt having excavating devices, the conveyer-frame being arranged whereby its free end portion can be lowered into the trench which is being made, so as to permit the excavating devices to operate upon the wall of earth at one end of the trench, and thereby extend the latter. An excavating or trenching machine of such construction is shown and described in my application for Letters Patent of the United States filed March 15, 1901, and serially numbered 51,342, and in my present application I have illustrated my improvements as applied to the machine shown in my said former application.

Objects of my invention are to permit the successful formation of trenches, particularly where the soil is of such character that the side walls of the trench will be apt to cave in to a greater or less extent at the point where the work is being performed, to compact the soil forming opposite side walls of the trench, to insure a smooth even cut, to provide simple and sufficient means for preventing the side walls of the trench from caving in at points where the machine is at work, and to provide means for facilitating the raising and lowering of a long conveyer-frame.

In the accompanying drawings, Figure 1 is a side elevation of a trenching-machine embodying my invention, the conveyer-frame being shown in an elevated condition. Fig. 2 is a like view showing the conveyer-frame lowered into the trench. Fig. 3 is a rear end elevation of the trenching-machine, the trench being shown in cross-section. Fig. 4 is a detail plan view of a portion of the conveyer-frame on a larger scale than in preceding figures. Fig. 5 is a side elevation of the lower end portion of the conveyer-frame. Figs. 6, 7, and 8 are enlarged views of one of the castings employed as stays between the sides of the conveyer-frame and the side guards. Fig. 9 is a section on line $x\,x$ in Fig. 5. Fig. 10 is an enlarged longitudinal section through one of the adjustable stay connections between the side guards, portions of such adjustable stay connection being broken away for convenience of illustration.

A indicates a main or body frame, which is supported by side wheels and arranged to straddle the trench B, as best shown in Fig. 3. The long swinging conveyer-frame C is constructed with parallel side bars 1 and hinged at one end upon the body-frame, which is in turn constructed so that the conveyer-frame can be swung downwardly and rearwardly, as in Fig. 2, in order to permit the excavating devices to operate upon the earth at one end of the trench. The conveyer-frame is provided with an endless belt D, which is trained over suitable sprockets at opposite ends of the conveyer-frame and provided with suitable excavating devices E, adapted for loosening the soil at one end of the trench and carrying upwardly the soil thus loosened. The free end portion of the conveyer-frame is provided with a pair of oppositely-arranged side guards F, which will stand in planes parallel and in close proximity to opposite side walls of the trench when the free end portion of the conveyer-frame is lowered into the trench, as in Figs. 2 and 3. As best illustrated in Fig. 2, the area of each side guard F is sufficient to permit it to cover a considerable area of surface of the trench-wall, alongside of which it stands when the machine is in operation, and these side guards may also extend rearwardly beyond the belt-sprocket G at the lower or free end of the conveyer-frame. While each side guard F might be made in one piece, I prefer to construct them of several component parts for various mechanical reasons. Each side guard is desirably formed or provided with a cutting edge portion 2, having its lower longitudinal cutting edge adjacent to the under side of the conveyer-frame, so that when the ma-

chine is in operation the inclined cutting edges of the guards (shown in Fig. 2) will scrape or pare off the opposite side walls of the trench, as in Fig. 3, and thereby slightly widen the trench above its bottom portion, where the excavating devices first take into the soil. The cutting edge portions 2 have a slight outward or lateral divergence, as in Figs. 3 and 9, whereby the foregoing results are attained, and by this arrangement the cutting edges provide a way for the passage of the main portions of the side guards. The side guards thus arranged prevent the side walls of the trench from caving in at the point where the machine is at work, and they also serve to render the side walls of the trench comparatively smooth or even and more compact. The side guards are tied together and braced by adjustable stay devices H. These stay devices are longitudinally adjustable in length and are best shown in Figs. 4, 9, and 10. As a matter of detail each adjustable stay device H comprises an internally-threaded hollow rod or tube 3 and an externally-threaded rod 4, arranged to screw into the hollow rod 3. The hollow rod 3 is connected with one side guard, and the rod 4 is connected with the opposite side guard and provided with a collar 5, which is bolted to the rod by a pin or bolt 6, Fig. 10, and provided with one or more laterally-extending lugs or projections 7, forming handles which can be taken hold of by an operator for the purpose of turning the rod 4, so as to lengthen or shorten the stay device as a whole. In the construction illustrated the side guards are mainly composed of oblong plates 8, and with this arrangement the plates are held in series by angle-irons 9, bolted to their rear ends, and angle-irons 10, bolted to the plates along lines between their rear and forward ends and arranged parallel with the side C of the conveyer-frame. These angle-irons 9 and 10 serve to brace and stiffen the side guards and also provide bearings for screw-bolts 11, arranged to engage the rods 4, and for screw-bolts 12, arranged to engage bearings 13, Figs. 9 and 10, at the outer ends of the hollow rods 3. The cutting edge portions 2 of the side guards are connected with the side bars 1 by stay devices consisting of hollow castings I, arranged between the side bars 1 and the said cutting edge portions 2, and bolts 14, provided with threaded ends and nuts and extending through the cutting edge portions 2, the castings I, and the side bars 1. When it is desired to vary the distance between the two side guards, the bolts 14 can be removed and the castings I replaced by other like castings of different length, the stay devices H being adjusted in length according to need.

The rear end of the main or body frame is provided with an upwardly and rearwardly extending frame K, which is steadied by inclined braces 15 and provided at its upper end with a pulley 16. A cable M is at one end attached to a bail N, which is in turn hinge-connected with the side guards. This cable extends from the bail upwardly to and over the pulley 16 and thence forwardly to a winding device, with which it is connected, and as a simple and desirable arrangement the winding-shaft 17, employed for raising and lowering the conveyer-frame, as in my said application, can also be adapted or provided with a winding-drum for operating the cable M, and in this way when the conveyer-frame is raised the lifting power will be applied at two points.

When the machine is at work, the conveyer-frame will extend below the body-frame into the trench, and the excavating devices of the endless belt or carrier will carry upwardly the loosened soil, and these excavating devices on the endless belt will also preferably serve to both cut or loosen and carry up the soil. Broadly considered, however, the excavating devices may be buckets or shovels employed for carrying up the soil, and the swinging ladder or conveyer-frame can be provided with other known or suitable means for digging or cutting into the soil, so as to suitably loosen the same.

The cutting edge portions 2 may be integral with other portions of the side guards, or they can be bolted or riveted thereto, as illustrated. These cutting edge portions 2 also form plates or cutters, which extend longitudinally along the side bars C of the conveyer-frame without reference to the side guards.

What I claim as my invention is—

1. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; an endless belt supported upon the conveyer-frame and provided with excavating devices; and oppositely-arranged side guards secured to opposite sides of the portion of the conveyer-frame which is hinged to extend downwardly into the trench or excavation, and adapted to stand in planes alongside opposite side walls of the trench.

2. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend downwardly below the body-frame into a trench or excavation; an endless belt supported upon the conveyer-frame and provided with excavating devices; oppositely-arranged side guards attached to opposite sides of the portion of the conveyer-frame which is adapted to extend into the trench or excavation, and arranged to stand in planes alongside opposite side walls of the trench; and one or more stay devices adjustable in length and arranged as connections between the side guards.

3. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; an endless belt supported upon the conveyer-frame and provided with excavating devices; oppositely-arranged side guards attached to

opposite sides of the portion of the conveyer-frame which is adapted to extend into the trench or excavation, and arranged to stand in planes alongside opposite side walls of the trench; and one or more stay devices arranged between the side guards and comprising an internally-threaded hollow rod, and an externally-threaded rod arranged to screw into the hollow internally-threaded rod.

4. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; an endless belt supported upon the conveyer-frame and provided with excavating devices; and oppositely-arranged side guards attached to the portion of the conveyer-frame which is adapted to extend into the trench or excavation, and arranged to stand in planes alongside opposite side walls of the trench, and having cutting edges along their forward end portions.

5. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; an endless belt supported upon the body-frame and provided with excavating devices; oppositely-arranged guards attached to the portion of the conveyer-frame which is adapted to extend into the trench or excavation, and arranged to stand in planes alongside opposite side walls of the trench; and stay devices comprising hollow castings interposed between the side guards and the sides of the conveyer-frame, and bolts extending through the side guards, the hollow castings, and the sides of the conveyer-frame.

6. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; excavating devices supported upon the conveyer-frame; and cutters having longitudinally-arranged cutting edges and extending longitudinally along opposite sides of the portion of the conveyer-frame which is adapted to extend into the trench or excavation.

7. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; an endless belt supported upon the conveyer-frame and provided with excavating devices; and cutters having longitudinally-arranged cutting edges and extending longitudinally along opposite sides of the portion of the conveyer-frame which is adapted to extend into the trench or excavation.

8. In a trenching-machine, a body-frame; a conveyer-frame pivotally supported upon the body-frame and adapted to extend below the body-frame into a trench or excavation; excavating devices supported upon the conveyer-frame; and oppositely-arranged side guards secured to opposite sides of the portion of the conveyer-frame which extends into the trench during operation, and adapted to stand in planes opposite to and parallel with opposite side walls of the trench when the machine is thus at work.

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