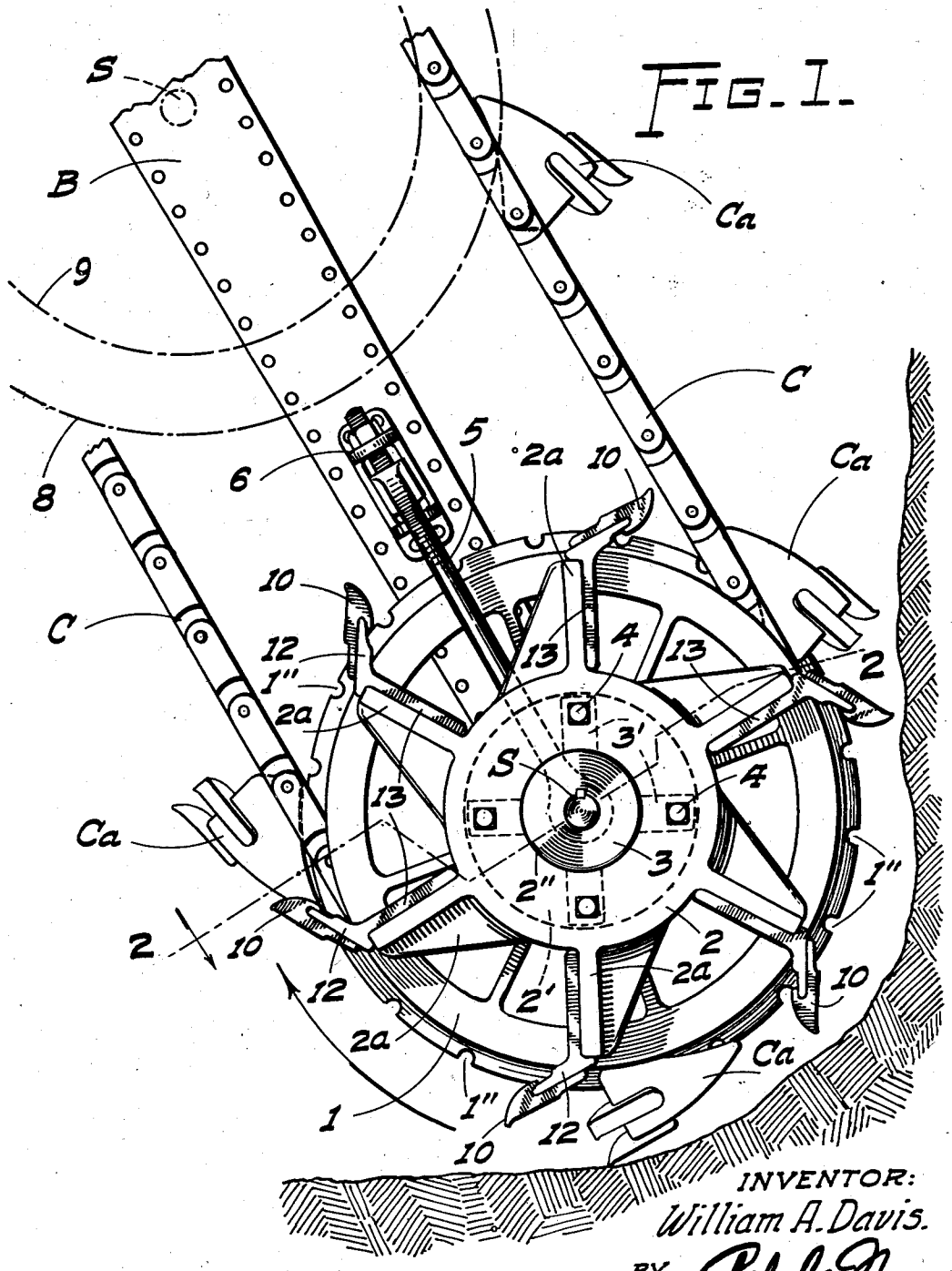
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TRENCH EXCAVATOR

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FIG. 1.



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TRENCH EXCAVATOR

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FIG. 2.

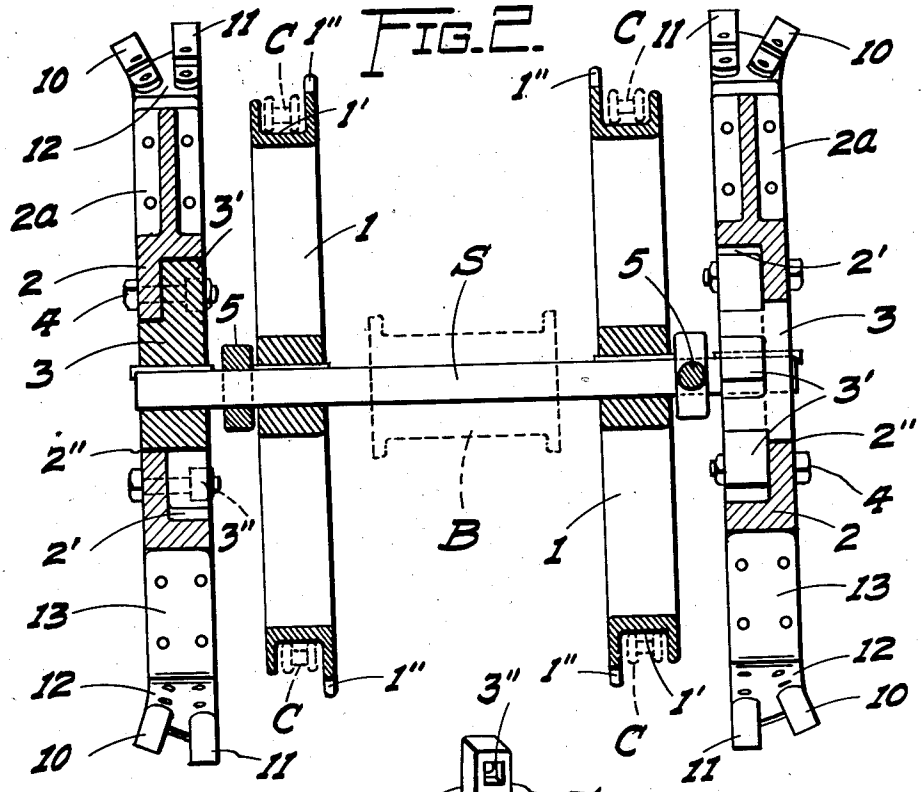
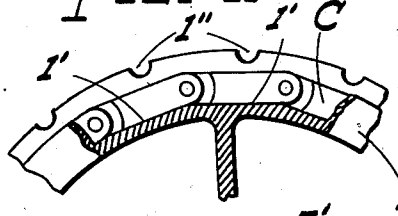


FIG. 4.



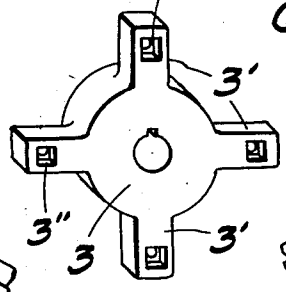
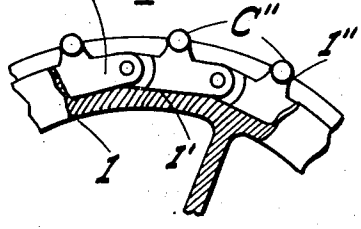


FIG. 3.

FIG. 5.



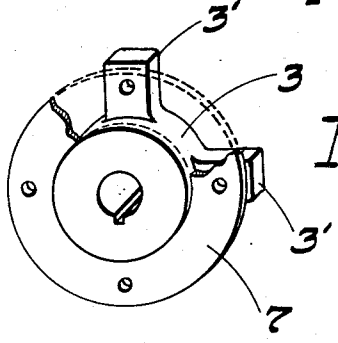


FIG. 6.

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2,002,239

TRENCH EXCAVATOR

William A. Davis, Milwaukee, Wis.

Application October 6, 1932, Serial No. 636,451

4 Claims. (Cl. 37—87)

This invention relates to digging machinery and means applicable thereto for varying the widths of trenches dug by the concerned mechanisms.

The objects of the invention are:—

The providing of attachable instrumentalities which co-operate with the general assemblies employed in excavating trenches as supplementary means operating in unison with the conventional digging or bucket chain at the boom point or intermediate said point and the boom foot.

The providing of attachable elements whose relationships can be changed about to gain a variety in trench widths without adding to or substracting from the number of elements for attaining the several widths possible.

The providing of excavating appurtenances which rotate beyond the principal digging means and its supporting structure in a manner that allows of bracing the outboard additions for stabilizing rotating members revolving in unison about a common pivotal shaft.

The providing of individual and relatively weaker fixtures, attachable to heavier and stronger rotatable members whereby such unknown exigencies, always probable in the digging of trenches, will not interfere to disable the major assembly, through the permitting of possible fractures to preferably occur in a readily replaceable attachment of minor value.

Other advantages will be noticed throughout the following specification, the particular points of novelty in structure being set forth in the appended claims. The entire text refers to the accompanying drawings illustrating a present preferred form of design. It is remarked, however, that certain departures therefrom may later on obtain without abandoning the spirit of the invention here involved.

The several views are indexed as follows:—

Fig. 1 is a side elevation of the boom-point portion of a conventional trench digger with this invention attached thereto.

Fig. 2 is a section on line 2—2 of Fig. 1, certain elements being indicated in dotted lines to avoid complicating this view.

Fig. 3 is a detached perspective view of a principal element of the invention.

Fig. 4 is a fragmentary view of a structural detail.

Fig. 5 is a modified form of the structure seen in Fig. 3.

Fig. 6 is a modified arrangement affecting the element seen in Fig. 3.

Similar characters refer to like parts throughout the several views.

Referring to the drawings, a boom B, frequently of box-section or equivalent structure, has, at its outer or boom point, an adjustable journal whereby the tension of a bucket-chain C may be regulated. This journal is also the bearing for the boom point tumbler shaft; the said journal is common to all machines of this class and is understood as standard equipment, for that reason the drawings do not disclose this means. In the present development the relationships at the said point do not change beyond the addition of novel elements, and a lengthier shaft S to accommodate the said elements. The present invention is devised with the view to adapting same to the numerous models of trench diggers now extant, and whose boom points are, in the characteristics noted, quite similar.

The shaft S as here employed will extend at either side of the boom B to receive opposed sets of revolvable elements that rotate in unison with the digging chain C. Each set will comprise, a digging tumbler 1, a digging spider 2, and a hub spider 3. A general reference to one set will be understood to include the opposite set. Both sets are identical and may be interchanged for trench widening purposes as will be set forth later on.

The tumblers 1 and the hub spiders 3 are keyed to rotate with the shaft S. The said digging spider 2 and the hub spider 3 are selectively attached to each other for permitting a variety of methods by which these elements may be mounted upon the said shaft for gaining the mentioned varying of trench widths. The chain C, being the motivating element, is actuated by any of the conventional assemblies conveniently functioning as the source of power, and need not appear in the present disclosure. The said chain is reeved about a digging tumbler 1 which revolves the shaft S thereby imparting rotation to the assembly 2 and 3 as per the arrow in Fig. 1. The hub spider 3 is of cross design to provide arms 3' wherein occur apertures that register with bores in the digging spider 2 for accommodating suitable bolts 4 that attach the two latter members together thus completing the sets which turn in unison with their common shaft.

Where the outboard relation of the said sets is relatively of minor importance, or, where the product dug is not difficult to excavate, the boom will furnish sufficient support for the point assembly's shaft. However, where the digging is difficult, or, where the outboard position of the sets is extreme, the shaft S will be appropriately

supported by a brace 5, provided with suitable adjusting means 6 to accord with such chain tensioning arrangements as may obtain in the machine concerned. The said brace will extend from the boom B around the tumbler 1 to embrace the shaft between the tumbler aforesaid and the assembly 2—3.

Fig. 3 illustrates the hub spider 3, showing the arms 3' recessed at 3'' for receiving the nuts of the bolts 4, thus eliminating any projecting of structure into the space where occurs the brace 5, especially at a time where the trench width is the minimum width when projections would interfere with the said brace. The spider 3 is designed to lie in a circular depression 2' formed in the spider 2, allowing a portion of itself to project through an axial opening 2'' to come flush with the face of the digging spider 2 for the width of trench being dug by the machine as here illustrated.

Fig. 4 illustrates the digging tumbler 1 provided with flats 1' formed about its periphery which, under normal conditions offers the necessary chain traction to insure rotation in the revolving parts. At times the severity of the excavating resistance is appreciative; at times like this another provision is provided whereby the digging chain links are equipped with dogs C'' that, in conjunction with the notches 1'', cut in the flanges of the tumbler 1, provide a positive gear drive which supplement the traction drive seen in the flats 1'. This is illustrated in the Fig. 5 where the said dogs are shown as integral elements of the drive chain links. The said notches appear in all the views here as a general provision for the reason that the drive of Fig. 5 may be preferred as standard in that it takes care of every condition whether the excavating be light or heavy. However, this improvement is intended to apply to the general designs of machines which are usually equipped with drive chains other than special, and the "dog" form of chain is an especial design.

Fig. 6 illustrates a further modification for gaining trench widths by the introduction of a ring plate 7. This ring positioned as shown will locate the digging spider 2 farther outboard the amount of its thickness. This amount is appreciable in instances of trench digging where a given pipe to be laid will have a bell end requiring that a slight increase in the trench width will be sufficient beyond the general and necessary width for the actual pipe itself.

Where the trench is of moderate depth the device as shown in full lines will meet conditions efficiently. Depths that are a trifle beyond the diameter of the tumblers will either cave-in, or, a shovel struck here and there along the proposed width line will quickly define the top portion of the trench in a fairly regular manner. However, where the depth is noticeably beyond the tumbler diameter resort is had to another set of tumbler elements similar to what has been described above. The dot-and-dash line 8 indicates the digging circle of an idler-set of the said tumblers mounted farther up on the boom B. This circle would be the range of the spider 2. The other circle, 9, would be the pitch diameter of another tumbler 1. In the latter case the positive drive seen in Fig. 5 may obtain to insure rotation at this location where the bucket chain passes over and under the said tumbler. In all other respects the sets would be identical.

Fig. 2 shows the arrangement of cutting-teeth 10 and 11. These teeth are suitably attached to lips 12 of plates 13 which latter, in turn, are carried by integral bracket arms 2a of the spider 2. The arrangement requiring bolts, disposing two holes drilled through the plate close to the lip 12, renders these elements relatively weak across the plate where same joins the aforesaid lip. The said plates, due to the weakening noted, offer their lips 12 as the vulnerable portions of the present mechanism that will fail, when encountering an obstruction, before a major part will give way, thereby leaving the possibility of replacement a relatively minor installation and the operative interruption a minimum delay. The said teeth are set so that the trench bottom is other than flat. This aids the loosened dirt to roll towards the bucket chain path where same is picked up and disposed of in the customary manner. In any event the trench bottom is contoured to agree with the laying of cylindrical pipe, or for the construction of cylindrical sewers.

It will be readily observed, that, if the digging spiders 2 are interchanged, without reversing same, to opposite hub spiders the trench width will be noticeably increased. If the hub spiders are reversed at their present positions and the spiders 2 again attached, another width will be provided. Further, by employing the means provided in Fig. 6 an appreciable widening of a trench may be attained. Where any of the excessive widths obtain over an appreciable length of work the digging chain and buckets can be widened proportionately. These details, chain buckets Ca, may be had in a large variety of sizes. Also, it will be obvious that the braces 5 can be varied to accommodate themselves to the said excess widths, the lengthening of the shaft S, or the spreading of the tumblers 1 which would require that these braces be moved out to conform with the said changes. The present shaft, however, allows for the several widths here recited.

Having described the invention what is claimed and desired to protect by United States Letters Patent, is:—

1. A trench digger having, a boom point shaft axially centering and rotative with bucket chain tumblers and reversible hub members, reversible digging spiders attached to said members, and means arranged by the attaching together of member and spider elements whereby the latter are rotatable in planes beyond the length of said shaft.

2. A trench digger having, bucket chain tumblers and digging spiders, integral bracket arms radially extending beyond the periphery of the spider element, T-shaped plates offering lip formations attached to said bracket arms, digging teeth attached to said formations beyond the support of said bracket arms, said teeth disposed to lie normal to the abutting plane of said plates and their respective bracket arms.

3. A trench digger having, an adjustable boom provided with a boom point trench cutting assembly as set forth in claim 1, and an auxiliary assembly of similar design rearwardly of said boom point assembly for maintaining variable trench width facilities above said boom point assembly.

4. A trench digger having, digging spiders and hub members, said members adapted to nest within said digging spiders, and annular means arranged to nest within said spiders for spacing the latter from their hub members to widen the overall excavating width of the aforesaid trench digger.

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