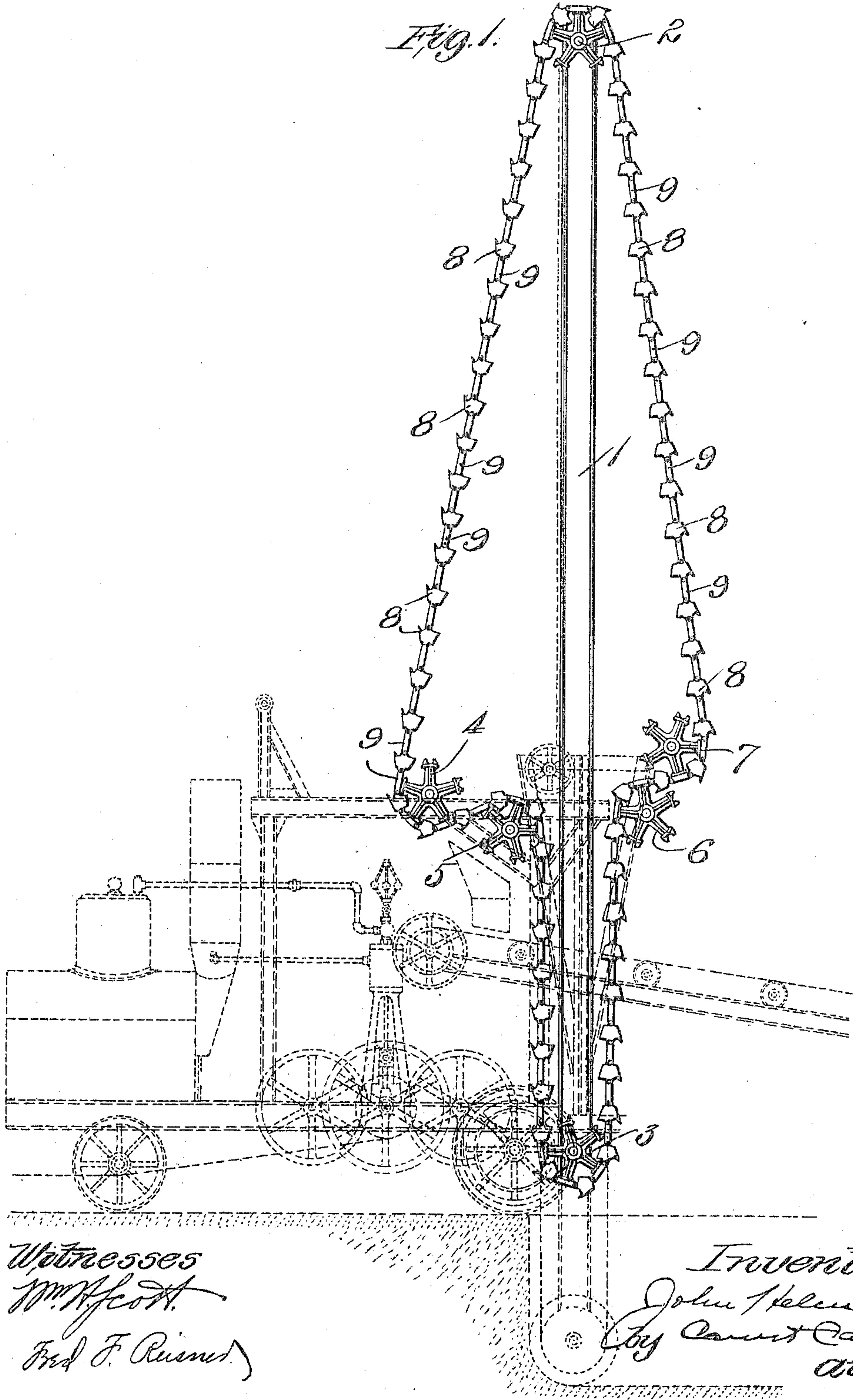


No. 821,413.

PATENTED MAY 22, 1906.

J. HELM.
EXCAVATING MACHINE.
APPLICATION FILED APR. 10, 1905.

5 SHEETS—SHEET 1.



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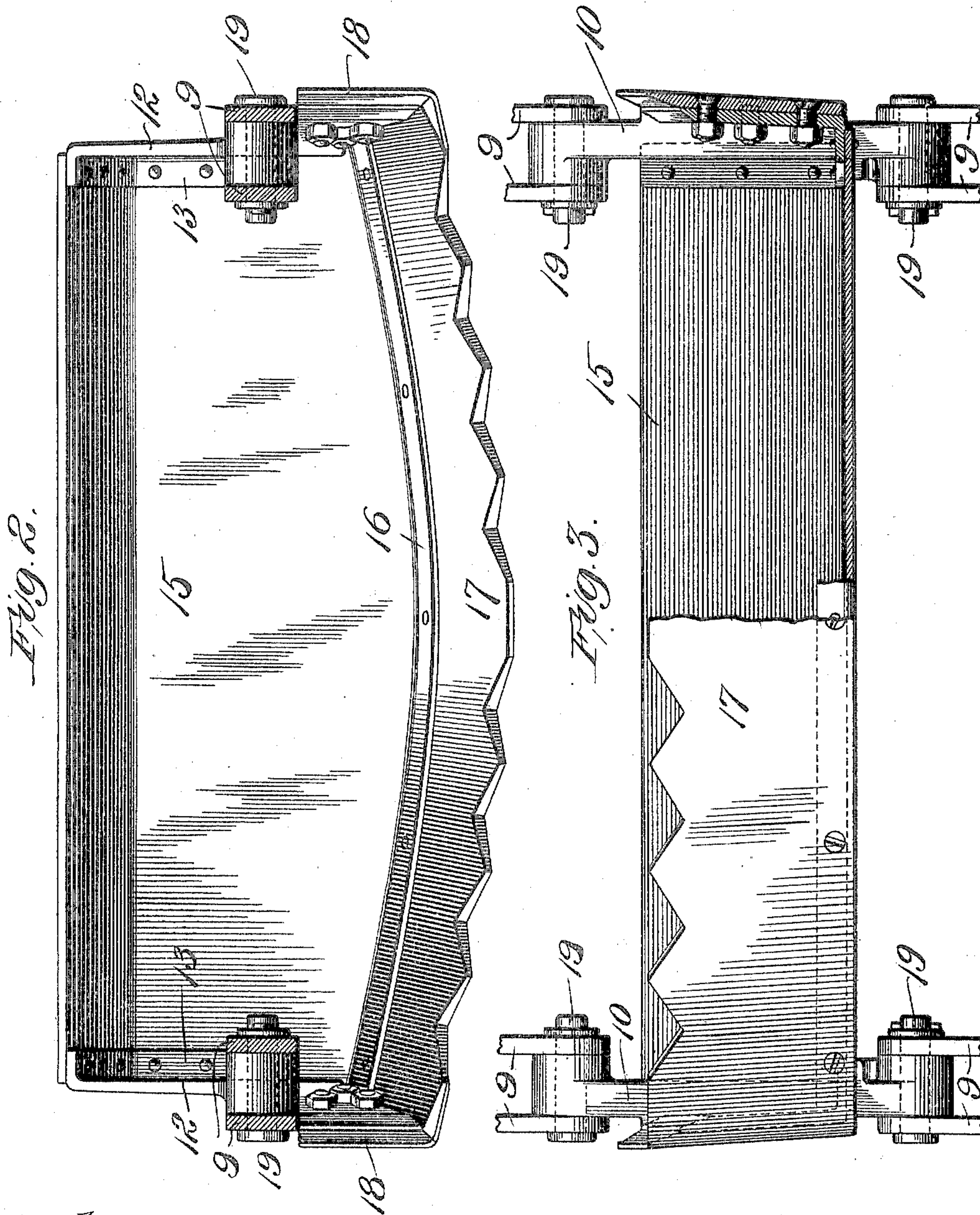
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

Fig. 4.

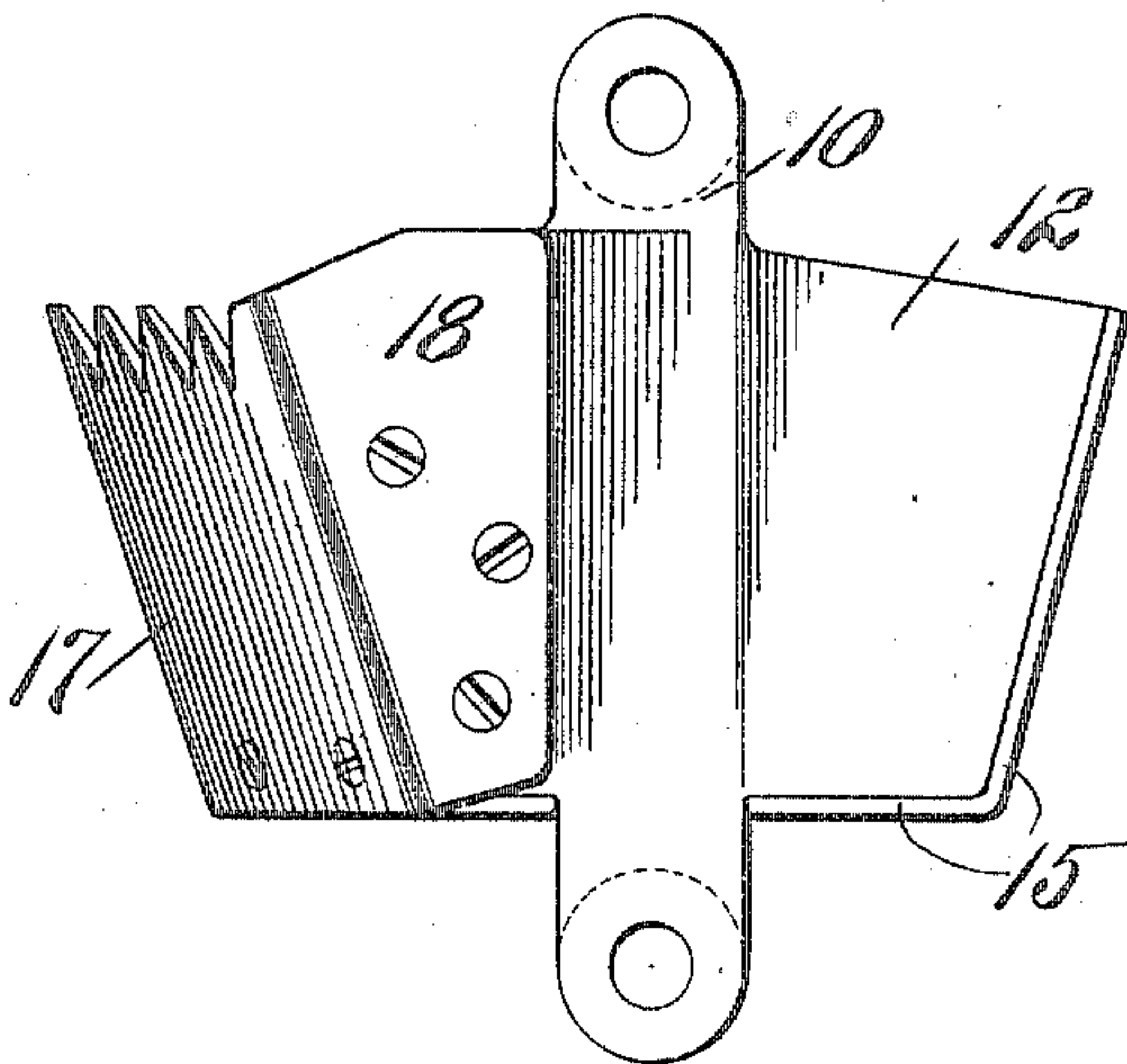


Fig. 5.

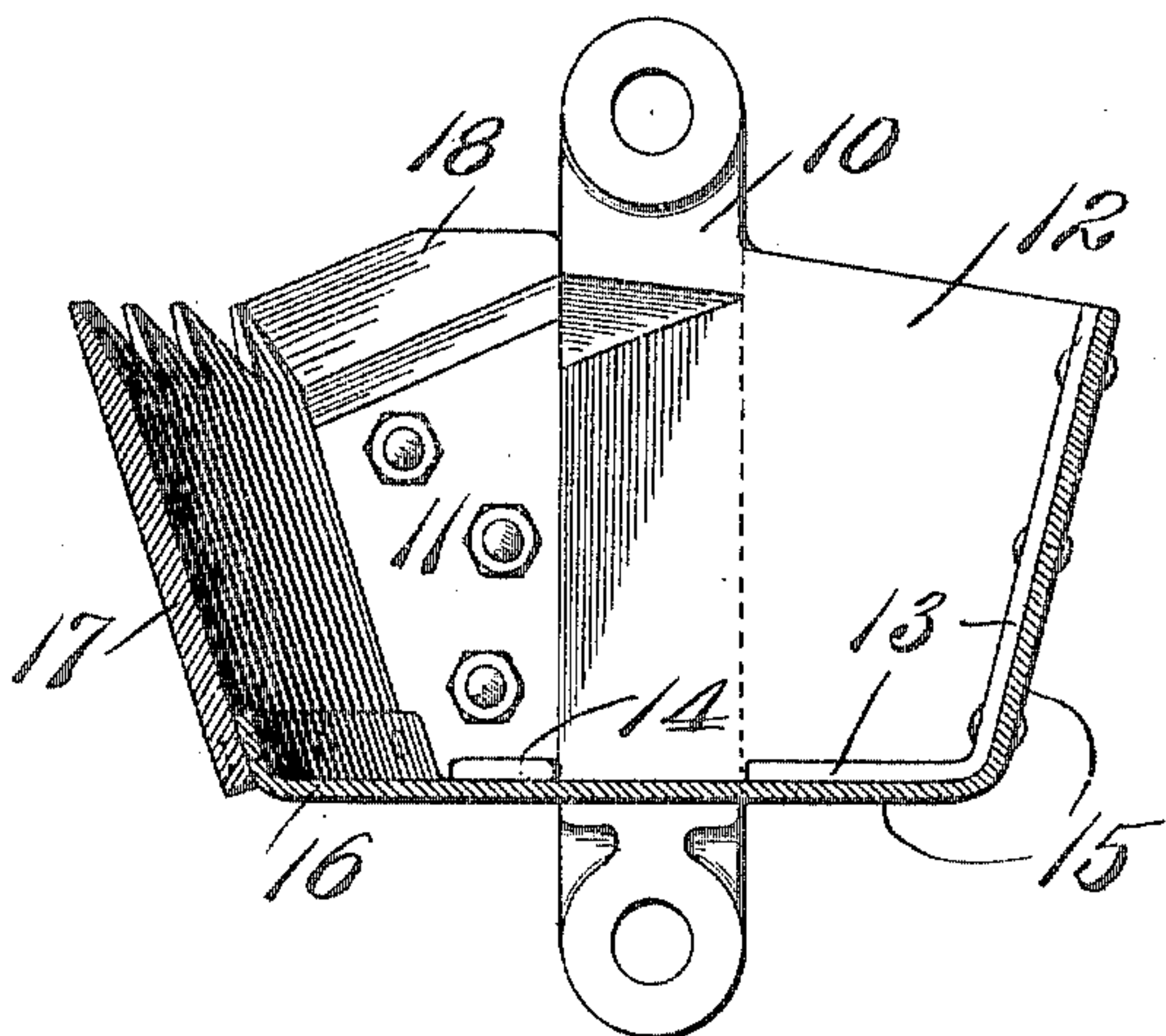


Fig. 6.

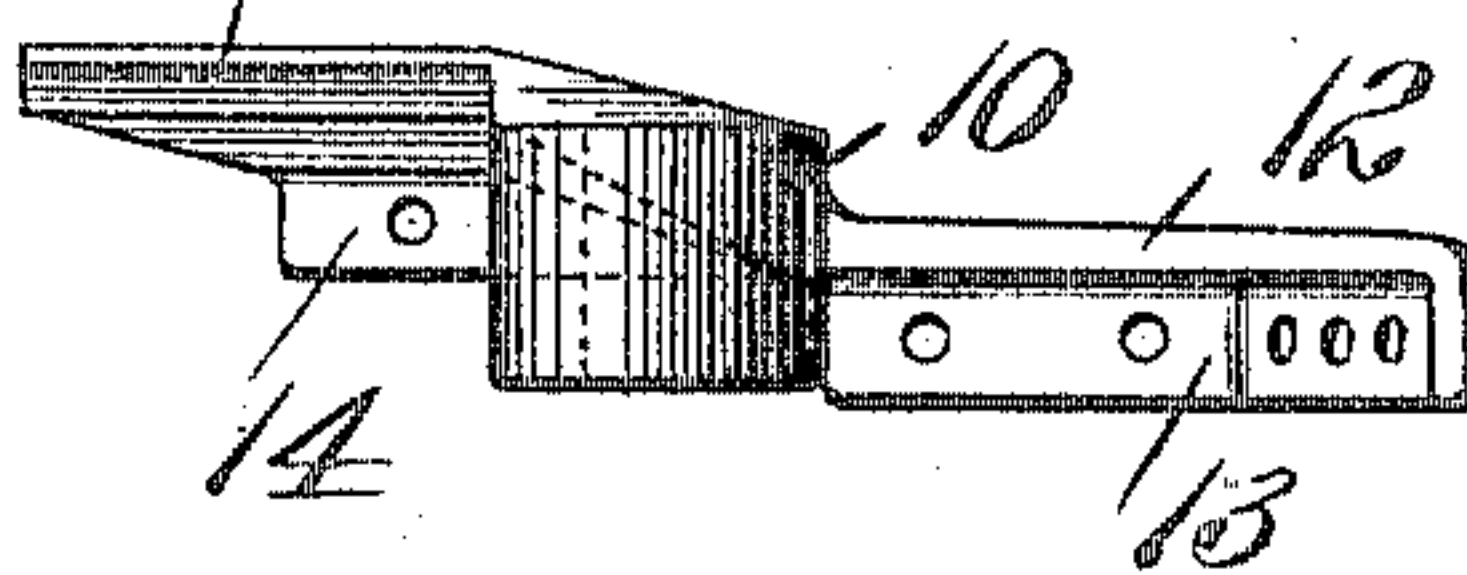


Fig. 7.

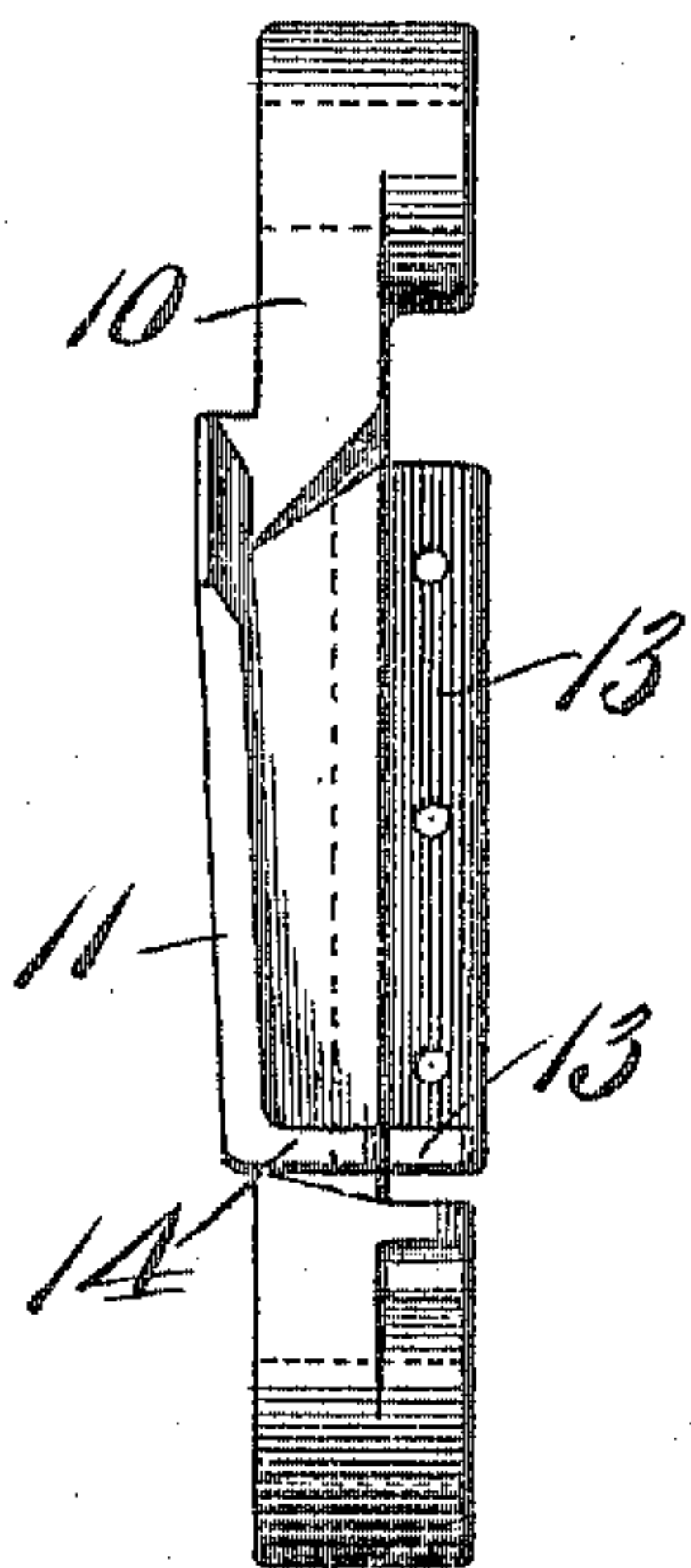


Fig. 8.

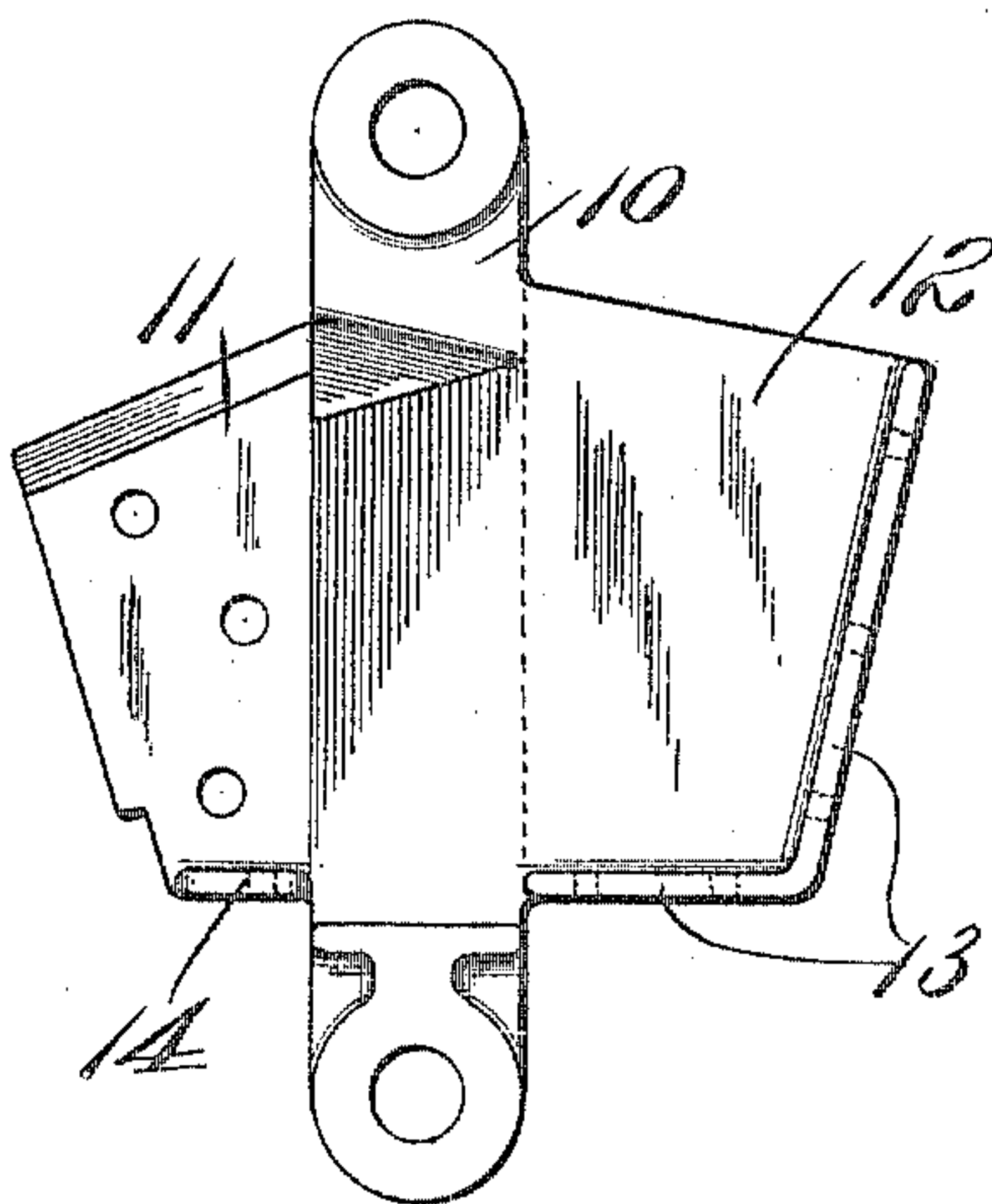
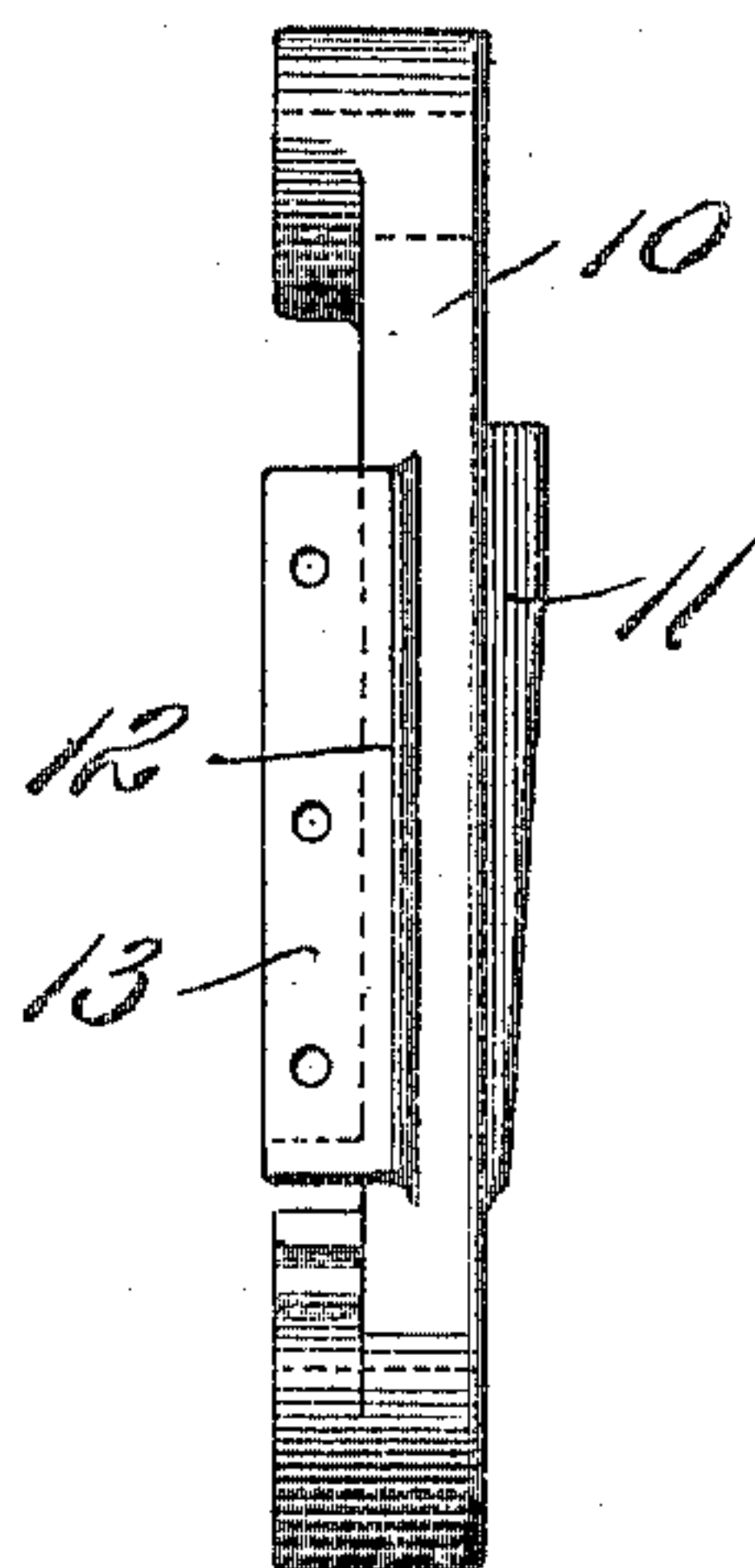


Fig. 9.



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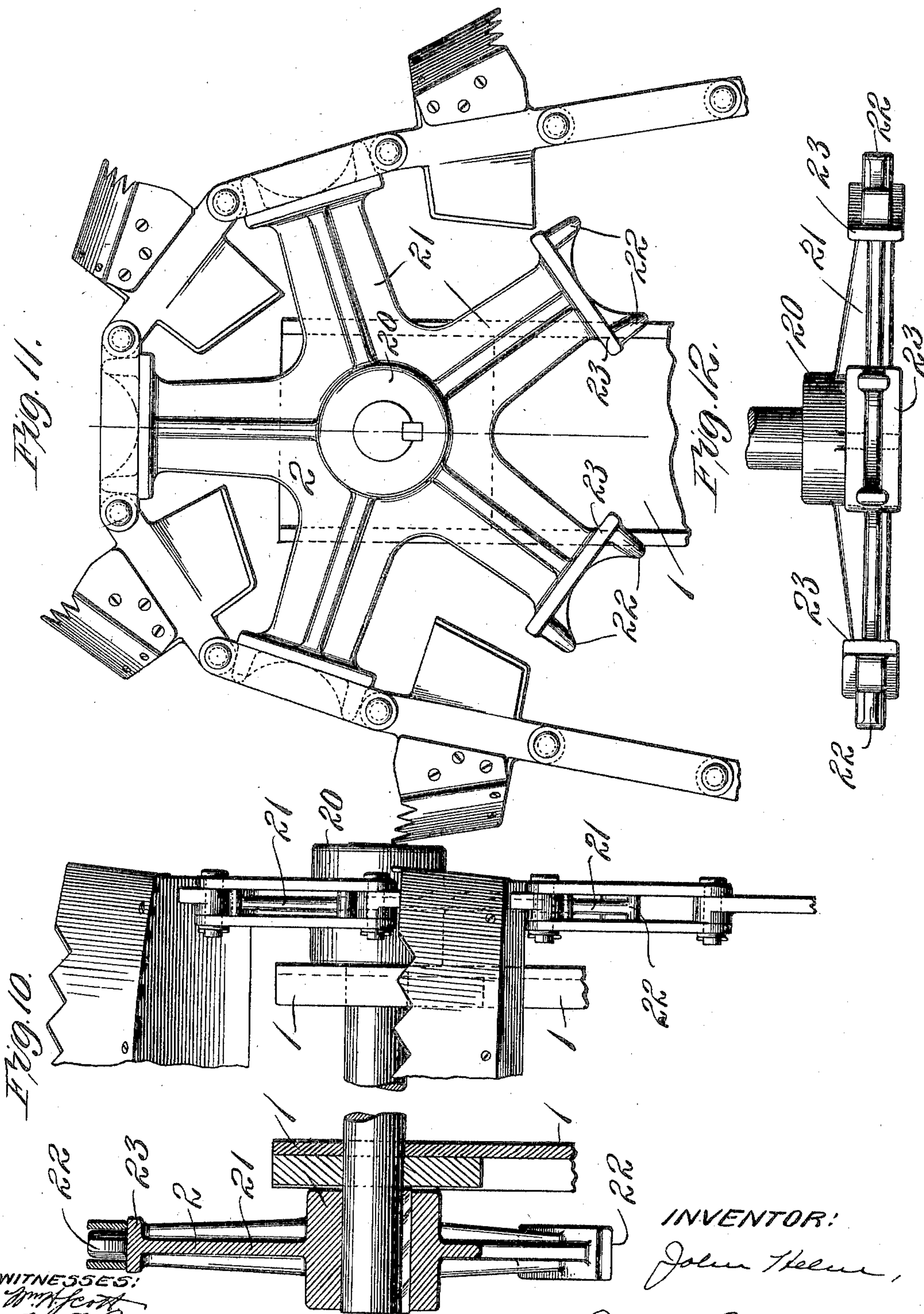
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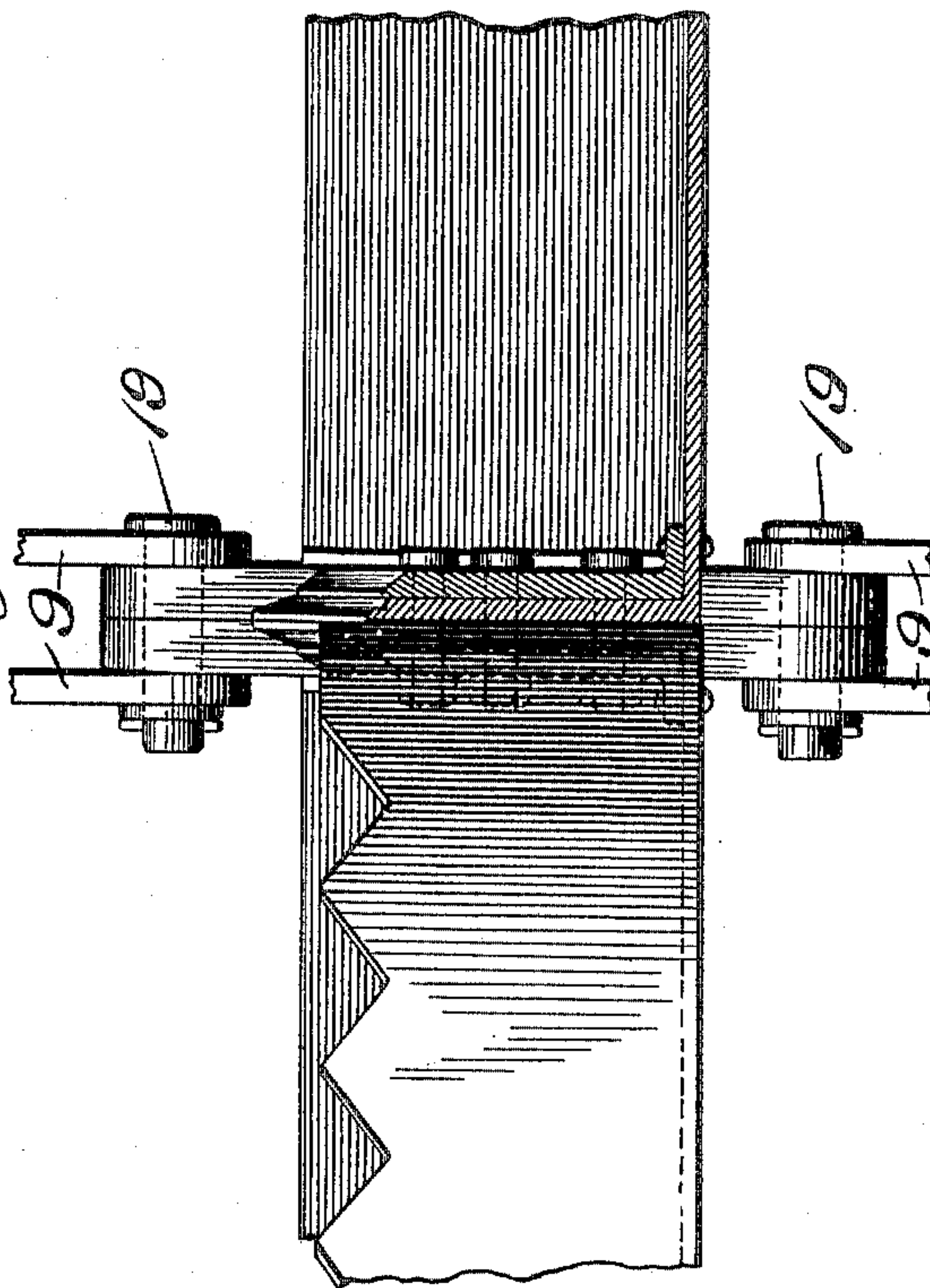
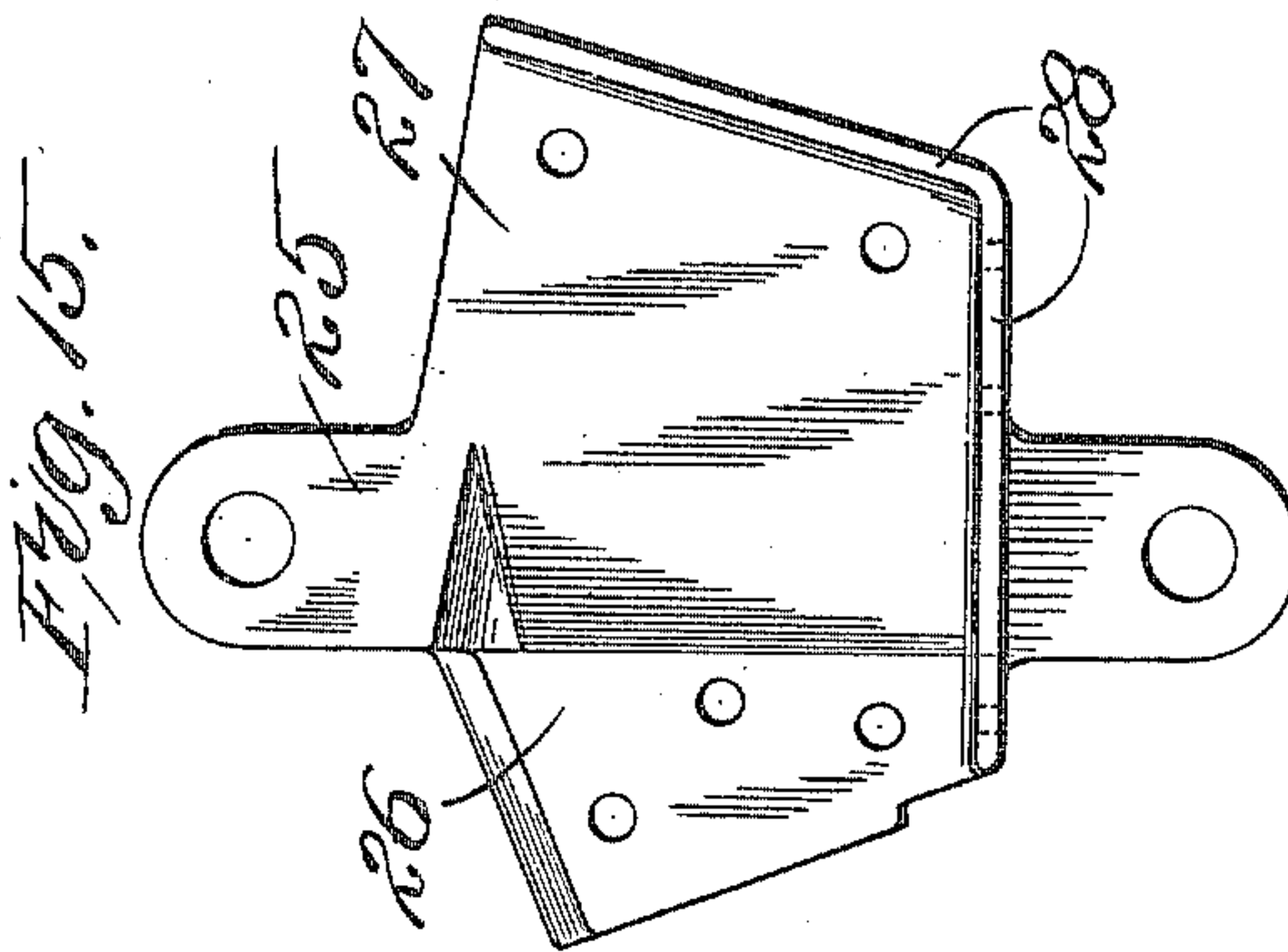
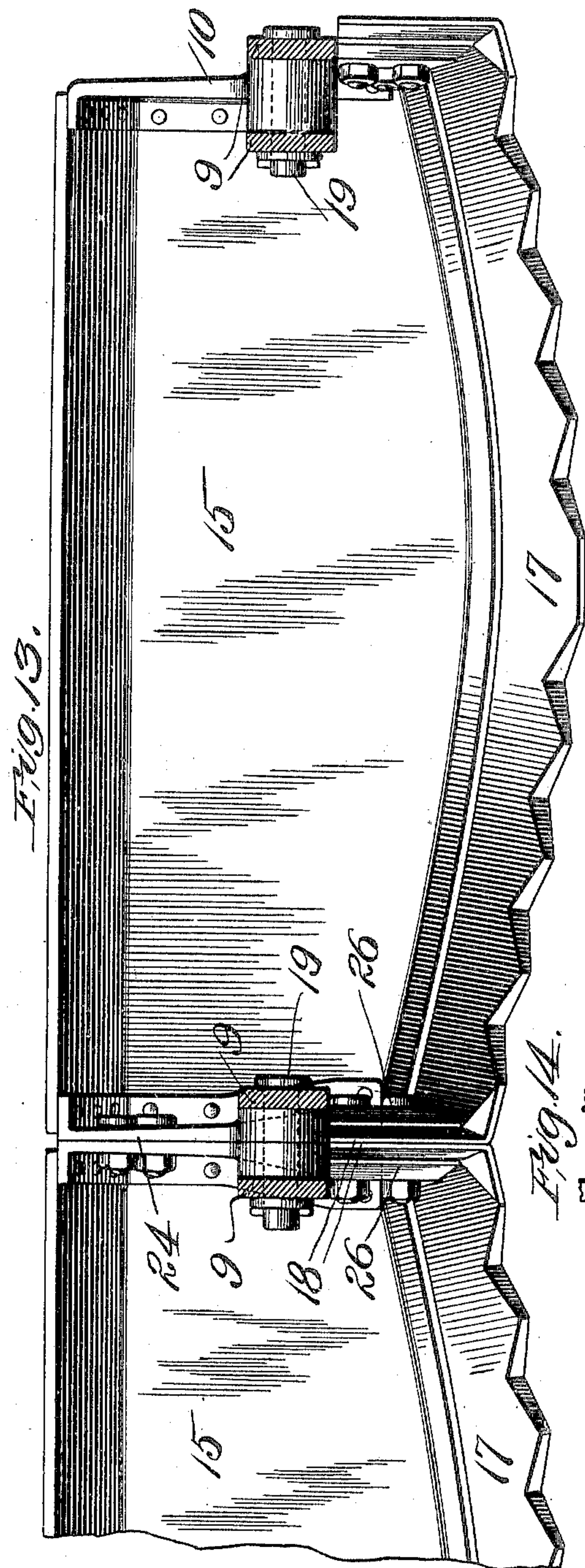
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UNITED STATES PATENT OFFICE.

JOHN HELM, OF ST. LOUIS, MISSOURI.

EXCAVATING-MACHINE.

No. 821,413.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed April 10, 1905. Serial No. 254,631.

To all whom it may concern:

Be it known that I, JOHN HELM, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have
5 invented a new and useful Improvement in Excavating-Machines, of which the following is a specification.

My invention relates to excavating-machines, and especially to the dislodging endless carrier and spur sprocket-wheels there-
10 for.

It has for its principal objects to simplify the construction of bucket-chains for excavating-machines, to reduce the weight of the
15 buckets without weakening the parts subjected to strains, to produce a spur sprocket-wheel permitting the use of buckets of large capacity substantially symmetrically mounted with respect to the center line of the chain,
20 and other objects hereinafter more fully appearing.

My invention consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

25 In the accompanying drawings, forming a part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a general elevational view, partly in dotted lines, of an excavating-machine of the type described and claimed in
30 my copending application, Serial No. 227,189, filed October 5, 1904, equipped with my improved sprocket and bucket-chain or dislodging endless carrier. Fig. 2 is a plan view of one of the buckets, the chain-links being shown in section. Fig. 3 is a front
35 view of one of the buckets and a fragment of the chain, a part of the front wall of the bucket being broken away. Fig. 4 is a side view, and Fig. 5 a transverse sectional view, of one of the buckets. Fig. 6 is a top view,
40 Fig. 7 is a front view, Fig. 8 is a side view, and Fig. 9 is a rear view, of a casting for the right side of one of the buckets. Fig. 10 is a front view, partly in section, of one end of the chain-frame, showing the bucket-chain and
45 spur sprocket-wheels. Fig. 11 is a side view of one of the sprocket-wheels and a fragment of the bucket-chain. Fig. 12 is a plan view of a spur sprocket-wheel for the end of the chain-frame entering the trench being cut.
50 Fig. 13 is a plan view of a double bucket. Fig. 14 is a fragmentary front view of a double bucket, the front wall of one side being
55 broken away; and Fig. 15 is a side view of

one of the middle castings for a double bucket.

The parts of the machine are described and claimed in my copending application mentioned above. Hence the description here-
60 inafter will be confined to the features not described in said application.

A vertically and angularly adjustable chain-frame is provided at its upper end with sprockets 2 and at its lower end with sprock-
65 ets 3. Sprockets 4 5 6 7, mounted on the frame of the machine, are similar to the sprockets 2 at the upper end of the chain-frame. Over the sprockets mentioned above runs an excavating-chain carrying buckets
70 8, adapted to both dislodge and carry away the earth excavated. This chain may be either a two-strand or a three-strand chain or a chain of more strands. In any case each strand will comprise ordinary chain-links 9,
75 preferably in pairs, and parts of the bucket hereinafter called "bucket-links." In the chain illustrated the pairs of chain-links and bucket-links alternate; but it is obvious that more chain-links than bucket-links may be
80 used.

The buckets for a two-strand chain comprise bucket-links 10 at each end. Each bucket-link is an integral casting and may be
85 said to consist of a link provided with a front wing 11 and a rear wing 12. The wings are offset with respect to each other, the front wing being offset laterally, so as to carry the cutting edge of the bucket laterally beyond
90 the side of the chain. The upper edge of this front wing is sharpened. The rear and lower edges of the rear wing 12 are provided with a flange 13, and the lower edge of the front wing 11 is provided with a flange 14.
95 To these flanges is riveted a sheet-iron or pressed-steel member 15, constituting the rear and bottom walls of the bucket. The member 15 terminates in front in a curved edge provided with a flange 16. A front wall
100 17, having flanges 18 at its ends, is secured to the bucket-links and to said flange 16 of the member 15. The front wall is curved and flares forwardly from bottom to top, the top edge being serrated. It is made strong
105 enough to sustain the strain put upon it as it digs into the earth and dislodges the same. The earth dislodged falls into the bucket and is carried away.

The bucket-links terminate at their upper and lower ends in eyes. Upon opposite sides
110

of each end of the bucket-links two chain-links 9 are connected by a pivot-pin 19.

The spur sprocket-wheels each comprise a hub 20, from which arms 21 radiate. Each of said arms terminates in two teeth 22, which are narrow enough to pass between the links 9 of the bucket-chain, and the outer faces of the teeth are separated from each other by substantially the distance between adjacent ends of successive bucket-links. A flange 23 surrounds the end of each arm at the base of the teeth 22. The arms are arranged at such a distance apart as to permit the buckets to project between them. As the chain passes around the sprocket the links 9 embrace the teeth 22 and rest upon the flanges 23, the buckets being suspended between the arms. As many spur sprocket-wheels are provided on each shaft as there are strands in the chain to be driven or guided thereby.

The spur sprocket-wheel for the end of the chain-frame entering the trench being cut differs from the others in one particular. The hub is not permitted to project outwardly beyond the plane, which will be described by the lateral cutting edges of the buckets. By this means it is insured that the trench cut shall be wide enough to receive the frame and sprockets guiding the bucket-chain.

The spur sprocket-wheel gives a great advantage over sprocket-wheels with continuous rims, for it permits the use of buckets substantially symmetrically mounted on the bucket-chain.

The bucket described above is preferred for trenches of widths up to twenty-four inches. For wider trenches it will probably be desirable to use a three-strand chain and support the buckets in the center. Such a bucket is illustrated in Figs. 10 to 12. It consists, substantially, of two of the single buckets connected end to end. The double buckets comprise end bucket-links 10, sheet-iron or pressed-steel members 15, and front walls 17. At the center a compound bucket-link is used. It consists of two similar parts 24, one being merely the reverse of the other. Like the bucket-links 10, they comprise, in effect, a link 25, having a front wing 26 and a rear wing 27. A flange 28 is formed on the rear and bottom edges of the rear wing 27 and on the bottom edge of the front wing 26. The front wing 26 is offset laterally with respect to the rear wing 27. The two parts 24 are bolted together, and the two adjacent flanges 18 of the front walls 17 are clamped between the front wings 26.

The buckets described are light and yet strong. They contribute to the chain-strands their alternate links or incorporate alternate chain-links in their construction. Thus the construction of the bucket-chain is simplified. The buckets are arranged substantially symmetrically with respect to the chain-strands,

or their centers of gravity lie substantially in the plane determined by the strands of the chain. Hence the loaded buckets put less strain upon the chain-strands, and they need not be so strong.

Obviously my device is capable of considerable modification within the scope of my invention, and therefore I do not wish to be limited to the specific construction shown and described.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an excavating-machine, a bucket-chain having a plurality of strands and comprising chain-links arranged in pairs and buckets the end walls of which are connected to said pairs of chain-links and respectively constitute links of said strands of the chain, the bodies of said buckets being arranged substantially symmetrically with respect to a plane passing through said strands.

2. In an excavating-machine, a chain comprising a plurality of strands, each strand comprising chain-links and bucket-links having forwardly and rearwardly extending wings, and plates connecting said bucket-links of adjacent strands and forming buckets of which said bucket-links constitute the end walls, said buckets having their centers of gravity substantially in the plane passing through said strands.

3. In an excavating-machine, a bucket-chain comprising a plurality of strands, each strand comprising chain-links arranged in pairs and bucket-links connected at each end to pairs of said chain-links, and plates connecting said bucket-links of adjacent strands and forming buckets of which said bucket-links constitute the end walls, said buckets being arranged substantially symmetrically with respect to a plane passing through said strands.

4. In an excavating-machine, a bucket-chain comprising a plurality of strands each of which comprises chain-links and bucket-links having forwardly and rearwardly extending wings, plates connecting said bucket-links of adjacent strands in pairs, respectively, and forming buckets of which the bucket-links of the outside strands form the end walls and the bucket-links of the intermediate strand or strands form partition-walls.

5. A bucket-chain comprising a plurality of strands comprising chain-links and bucket-links having forwardly and rearwardly extending wings, plates connecting the bucket-links of said strands in pairs and forming the rear and bottom walls of buckets of which said bucket-links constitute the end walls, and plates forming the front walls of said buckets and secured to said first-mentioned plates and said bucket-links.

6. In an excavating-machine, a bucket-chain comprising a plurality of strands each

of which comprises chain-links and bucket-links having forwardly and rearwardly extending wings, thin plates connecting said bucket-links of adjacent strands in pairs, respectively, and forming the rear and bottom walls of buckets of which said bucket-links constitute the end walls, and heavy plates provided with serrated edges forming the front walls of said buckets, respectively, and secured to said bucket-links and said thin plates.

7. In an excavating-machine, a frame, a shaft mounted in said frame, sprockets mounted on said shaft and each having separated arms, said arms being provided with laterally-extending means to support the links of a chain and radially-extending means, and a bucket-chain having a plurality of strands each comprising parallel links and buckets carried by said strands, said parallel links being arranged to embrace said radially-extending means and rest upon said laterally-extending means as said chain passes around said sprockets and said buckets being arranged to enter the space between said arms.

8. In an excavating-machine, a frame, a shaft mounted in said frame, sprockets mounted on said shaft and each having separated arms, flanges near the ends of said arms, and a projection beyond each of said flanges to engage a chain, and a bucket-chain having parallel links arranged to embrace said projection.

9. In a machine, a bucket-chain comprising a plurality of strands each of which comprises chain-links arranged in pairs and bucket-links, plates connecting said bucket-

links of adjacent strands in pairs and forming buckets of which said bucket-links constitute the end walls, said buckets projecting upon both sides of the plane passing through said strands, a frame, a plurality of sprockets corresponding in number to the number of said strands mounted in said frame and provided with recesses to receive said buckets and projections to enter the space between said pairs of chain-links.

10. In an excavating-machine, a bucket-chain comprising a plurality of strands each of which comprises chain-links arranged in pairs and bucket-links having forwardly and rearwardly extending wings and connected at each end to pairs of said chain-links, plates connecting said bucket-links of adjacent strands in pairs and forming buckets of which said bucket-links constitute the end walls, a frame, a shaft mounted in said frame, and a plurality of sprocket-wheels mounted on said shaft, the number of said sprocket-wheels corresponding to the number of said strands, said sprocket-wheels comprising divergent arms having projections on their ends arranged to pass between the links of said pairs of links, and flanges near their ends to support said links, and the ends of said arms being spaced apart far enough to receive said buckets therebetween.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 8th day of April, 1905

JOHN HELM.

Witnesses:

FRED F. REISNER,
JOHN SMITH.