

May 16, 1933.

P. BURKE

1,908,686

DRAGLINE BUCKET

Filed March 31, 1930

2 Sheets-Sheet 1

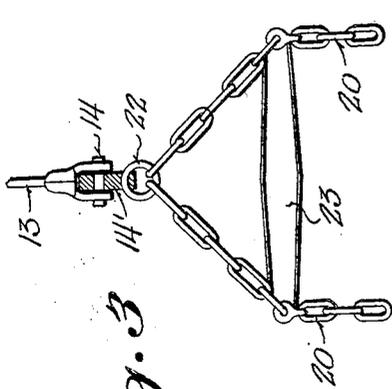


Fig. 3

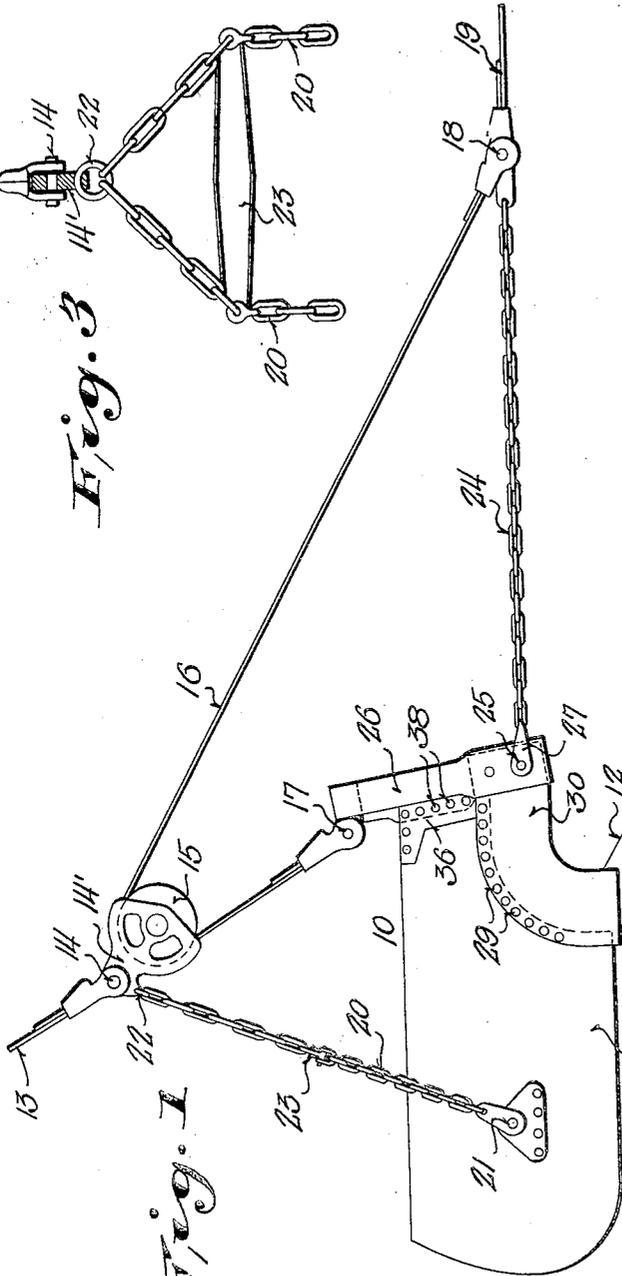
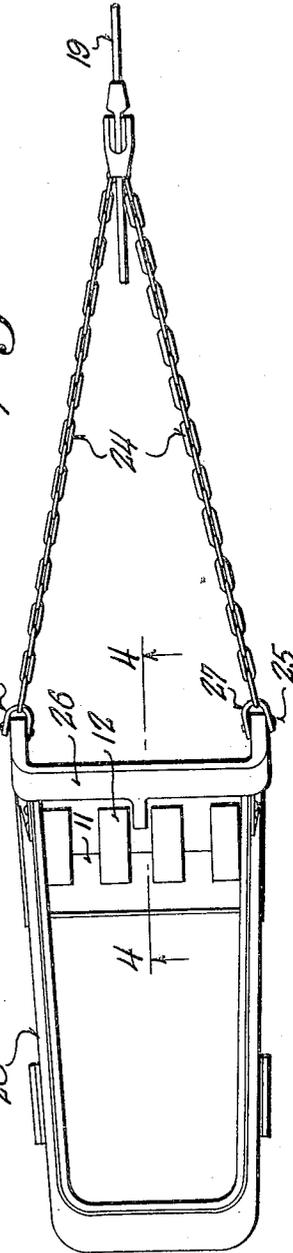


Fig. 1

Fig. 2



Inventor

Paul Burke

By

Louis C. French

Attorney

May 16, 1933.

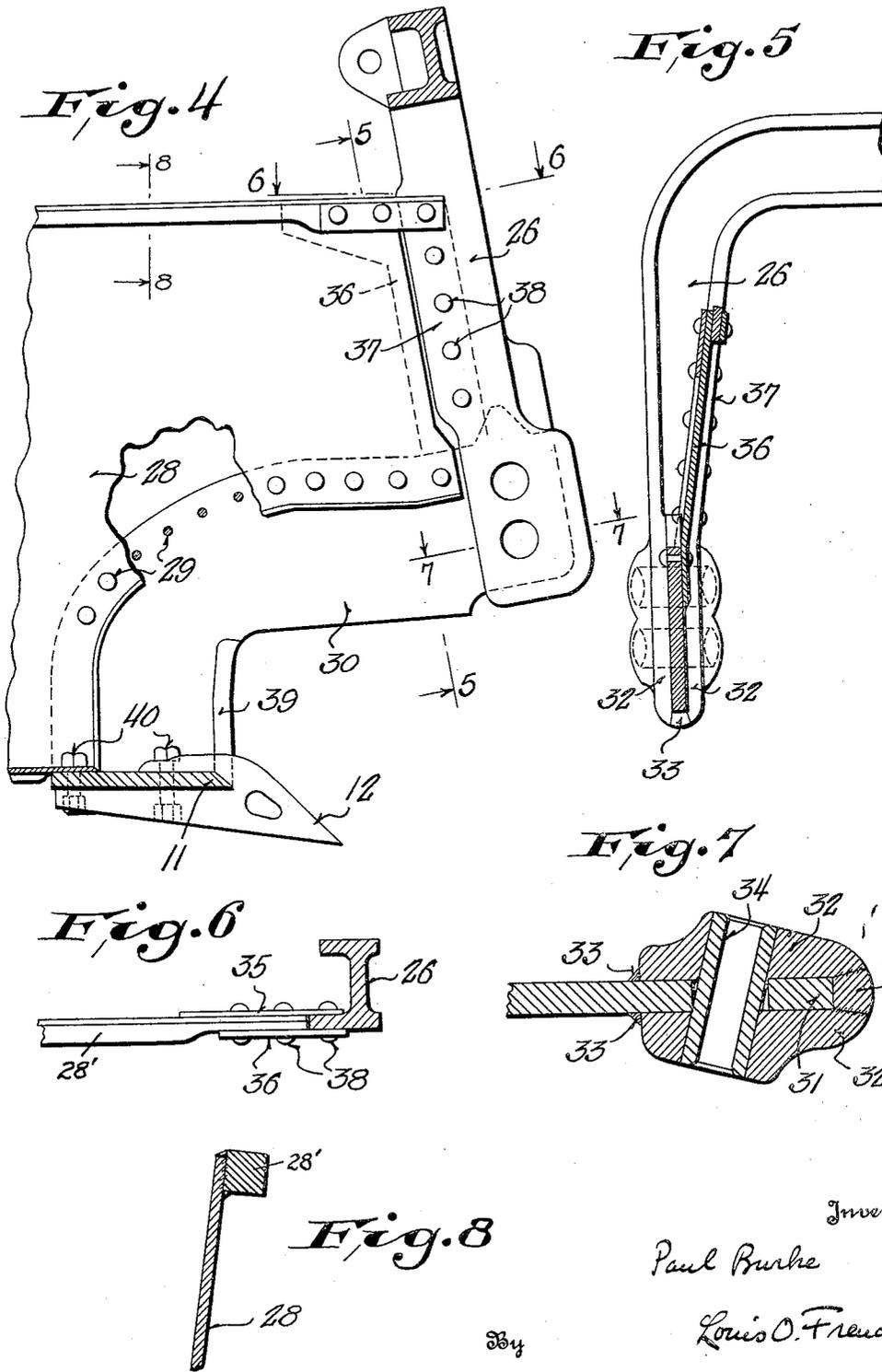
P. BURKE

1,908,686

DRAGLINE BUCKET

Filed March 31, 1930

2 Sheets-Sheet 2



Inventor

Paul Burke

Louis O. French

Attorney

34

UNITED STATES PATENT OFFICE

PAUL BURKE, OF GREEN BAY, WISCONSIN, ASSIGNOR TO NORTHWEST ENGINEERING CORPORATION, OF GREEN BAY, WISCONSIN, A CORPORATION OF WISCONSIN

DRAGLINE BUCKET

Application filed March 31, 1930. Serial No. 440,292.

The invention relates to dragline buckets.

Any given dragline machine can only operate a bucket having a certain maximum combined weight of bucket and load. Therefore any reduction in weight of the bucket without sacrificing strength and durability results in a corresponding greater dirt capacity. The earning power of a dragline machine is based on its digging capacity and the expense of operation, such as labor and fuel. Any bucket which gives greater yardage for the same amount of fuel and labor necessarily increases the operator's earning power from his machine. The novel features of the bucket hereinafter described are directed toward greater strength with a reduction in weight of the bucket, thus bringing about the great advantage of greater excavating capacity for a given size machine.

Further, it is customary in order to give the sides of the bucket adequate stiffness, to withstand the bending action of the sides, due to the pull on the bucket, to provide lateral reinforcement, such as T-irons. Placing these reinforcements on the inside of the bucket is impracticable on account of the obstruction they present toward either loading of the bucket or the discharge of its contents. On the outside, these reinforcements are a hindrance in digging trenches as the sides of the narrow trench engage these reinforcements and tend to prevent the proper settling of the bucket to its work. With the bucket of the present invention the use of T-irons and similar reinforcements is eliminated.

A further object of the invention is to provide a dragline bucket in which the digging lip and the strain-resisting arch may be readily taken off from the body of the bucket as a unit, in case it is necessary to replace or repair these parts.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings Fig. 1 is an elevational view of a dragline bucket embodying the invention;

Fig. 2 is a plan view of the bucket;

Fig. 3 is a detail end view of a portion of the hoisting connections, parts being shown in section;

Fig. 4 is a detail sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a detail sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a detail sectional view taken on the line 6—6 of Fig. 4;

Fig. 7 is a detail sectional view taken on the line 7—7 of Fig. 4;

Fig. 8 is a detail sectional view taken on the line 8—8 of Fig. 4.

Referring to Figs. 1 to 3, inclusive, of the drawings the numeral 10 designates the body of the bucket as a whole which, as usual, is open at one end and at the top and has at the bottom of its open end a lip 11 which may carry earth-entering teeth 12. A hoist line 13 is pivotally connected at 14 to the housing 14' for the dump sheave 15 pivotally mounted therein and over which the dump cable 16 passes, said cable being connected at one end to the forward end of the bucket at 17 and at its other end to the pin 18 to which the dragline 19 is also connected. Chains 20, forming parts of the hoisting bail, are respectively pivotally connected to each side of the bucket, as at 21, back of the center of gravity of the bucket and load, considered as a unit, and at their other ends to a ring connector 22 associated with the housing 14' adjacent the pivot 14, said chains usually being held apart by a spreader bar 23.

After the bucket is filled it may be carried by the hoisting line 13 until the spot has been reached at which it is desired to dump the contents, but so long as there is any substantial tension in the dragline 19 the dump cable 16, because of its connections with said dragline and the forward end of the bucket, prevents its being dumped. However, a complete release of tension of the dragline 19 will release dump cable 16, thus allowing the bucket to swing on the pivots 21 with the open end facing downward to dump the contents of the bucket.

The arrangement of the dump cable 16 and hoisting bail so as to dump the bucket as above described is known but the novel

subject-matter of my invention resides in the manner of connecting the flexible loading bail to the bucket and the construction of the bucket.

5 The dragline 19 is attached at 18 to a flexible loading bail 24, divided at the point of junction, each of these parts of the bail being of chain or cable shackled to the sides of the bucket at 25 within the plane of the arch of the bucket. Heretofore it has been customary to shackle the diverging ends of the loading bail to extensions from the sides of the bucket projecting beyond its open end. A very considerable tension is required to pull the bucket through materials ordinarily excavated, this tension being divided between the two parts of the loading bail and as these two parts are not parallel considerable inward pressure is exerted at the points of attachment of the bail to the bucket. With the usual bucket this inward pressure is primarily resisted by an arch at the open end of the body of the bucket, whose center of resistance, however, lies at a substantial distance from the points of attachment of the bail to the usual extensions that project beyond this arch. This lack of coincidence between the lines of action of the inward pressures and of the reacting force of the arch sets up a bending action upon the sides of the bucket and a twisting action on the arch. On account of these bending and twisting actions very heavy proportions of the sides of the bucket and the arch and heavy lateral reinforcements for the sides of the bucket are required in the usual constructions to provide a bucket that will give reasonable durability in actual service.

Bearing in mind the advantages previously pointed out, of saving bucket weight and eliminating projecting lateral reinforcements, the drawbacks of the usual constructions have been removed by providing a relatively narrow arch 26 of deep section, such as the I-beam section shown in Fig. 4, and instead of having the loading bail attached to extensions projecting from this arch the parts 27 of the bail are attached at 25 within the main section of stress of this arch and preferably substantially in line with the plane passing through the center of gravity and the central portion of the arch. By thus connecting the loading bail to the bucket the usual twisting of the arch is entirely obviated, as is also the bending of the sides of the bucket. Since there is, under the present construction, no danger of the buckling or bending of the sides of the bucket, the usual lateral reinforcements, such as T-irons, are eliminated and this allows the bucket to have a smooth, simple exterior, which is of advantage in digging trenches. Thus a considerable saving in weight in the body of the bucket is effected over the usual constructions.

The arch section having been changed from the usual broad, thin one to a relatively narrow, deep section will develop much greater bending strength. A further economy in weight arises from the fact that the relatively narrow, deep section, made possible by the present association of the loading bail with the bucket, lends itself to the I-beam, channel or other well-known forms of beam section having maximum resistance to bending with a minimum area of section.

From the foregoing description it will be noted that by connecting the diverging ends of the flexible loading bail preferably substantially in line with the plane passing through the center of gravity the central portion of the arch both the body and reinforcing arch of the bucket may be considerably lightened over the usual constructions. This means that for the same power plant of the machine the bucket may be made larger, thus increasing its capacity. In other words, all the saving in weight of the bucket that has been effected without sacrificing its strength and durability may be expressed in terms of increased yardage and hence greater income to the owner of the machine.

The bucket itself also has certain novel features of construction which will now be considered.

The main body 28 is formed in any suitable manner of metal plates suitably formed and welded together and at its forward end is connected by rivets 29 to a U-shaped member 30 which forms the digging lip 11 and also a portion of the sides of the bucket and which at its outer ends 31 of its sides extends between the forked ends 32 of the arch 26 to which it is firmly secured by welding 33 at the bottom and front portion of this fork and along its edges. This method of fastening the lip to the arch is of decided advantage as it provides a rigid and substantial fastening and at the same time reduces the total amount of metal required for an efficient, strong and secure fastening of the arch to the lip. The loading bail fasteners pass preferably through special metal bushings 34 that extend through the ends 31 and 32. The sides of the main body 28 have a reinforcing edge 28' and spaced plate extensions 35 and 36 riveted and welded thereto, said extensions 35 and 36 adapted to receive one of the flanges 37 of the arch 26 between them and be secured thereto by rivets 38.

With the above construction, knocking out the lines of rivets 29 and 38 separates the main body of the bucket from the rest of the structure for purposes of repair or replacement. Since, also, the bending of the sides of the bucket, through strain imposed by the loading bail, has been eliminated, the body 28 of the bucket need be no heavier than that required for its now simple duty as a

mere container or bucket for the excavated material. From this source, then, arises another decrease in weight of the bucket, with corresponding permissible increase in weight and volume of excavated material.

Furthermore, since the arrangement above described allows the application of the loads imposed by the pulling chains directly to the parts which carry the resultant reactions, the only highly stressed portions of the bucket are the arch 26 and side portions of the member 30. This restriction of the main stresses permits economical application of the use of high grade materials to these two parts and when such high grade materials are used a still further reduction in weight is effected.

The member 30 also has sharpened side edges 39 to facilitate cutting the sides of the trench and the digging teeth 12 are detachably secured to the bottom lip 11 by bolts 40.

It is to be understood that this invention is not to be limited to any particular form or arrangement of parts except insofar as such limitations are included in the claims.

What I claim as my invention is:

1. In a dragline bucket, the combination of a bucket having its digging mouth provided with cutting edges disposed below and rearwardly of its forward end which is bounded at its upper side by an arch, and diverging, flexible, loading bail connections connected to the bucket substantially in line with the plane passing through the center of gravity and central position of the arch.

2. In a dragline bucket, the combination of a bucket body provided with lower cutting edges, and an arched member secured to the body at the forward open end of the latter in advance of the cutting edges thereof and having bifurcated ends, said bifurcated ends overlapping and rigidly secured to the side portions of the bucket.

3. In a dragline bucket, the combination of a bucket body having a mouth provided with lower cutting edges, an arched member secured to the body at the forward open end of the latter in advance of the cutting edges thereof, said member being of relatively deep and narrow section, and means for connecting the flexible loading bail to the bucket in a plane of the strongest section of the arch.

4. In a dragline bucket, the combination of a bucket body having a mouth provided with lower cutting edges, an arched I-beam of relatively narrow and deep section secured to the body at the forward end of the latter in advance of the cutting edges of the bucket, and connections for the flexible loading bail of the bucket passing through the lower ends of said I-beam.

5. In a dragline bucket, the combination of a main bucket body, an arched member, and a lip member rigidly secured to said arched member, said arched member and

said lip member being removable as a unit from said bucket body.

6. In a dragline bucket, the combination of an arched member at the upper open end of the bucket, a lip member forming the bottom lip and side portions for the mouth of the bucket and integrally connected at the ends of its side portions to the legs of the arched member, a bucket body secured to said arched member and lip member, and means for connecting the flexible loading bail to the sides of the bucket through the connection between said arched member and lip member.

7. In a dragline bucket, the combination of a main bucket body, an arched member having bifurcated ends, a lip member forming the bottom lip and side portions for the mouth of the bucket and rigidly secured to said arched member within its bifurcated ends, said bucket body being removably fastened to said arched member and to side portions of said lip member.

8. In a dragline bucket, the combination of an arched member at the upper open end of the bucket, a lip member forming the bottom lip and side portions for the mouth of the bucket and rigidly secured to said arched member to form a separable unit therewith, and a bucket body secured to said arched member and said lip member.

In testimony whereof, I affix my signature.
PAUL BURKE.

70

75

80

85

90

95

100

105

110

115

120

125

130

CERTIFICATE OF CORRECTION.

Patent No. 1,908,686.

May 16, 1933.

PAUL BURKE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 35, claim 1, for "position" read "portion"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of July, A. D. 1933.

M. J. Moore.

Acting Commissioner of Patents.

(Seal)