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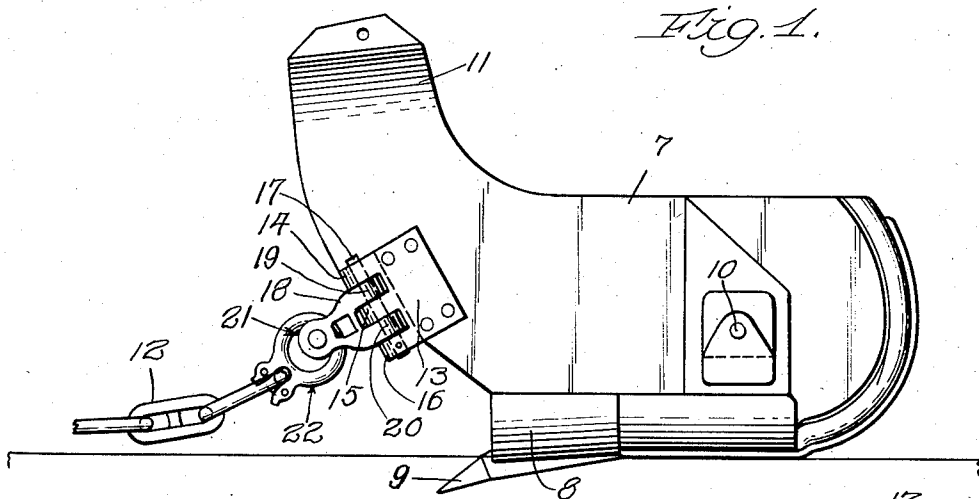
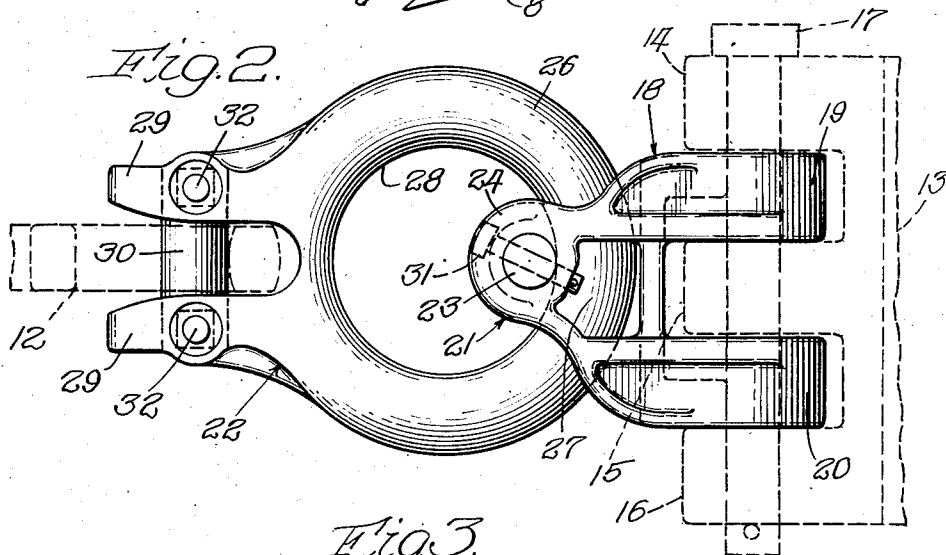
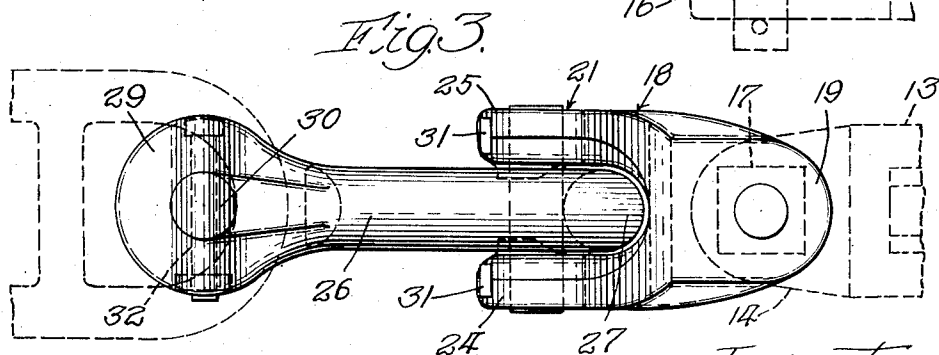
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CONNECTION FOR AN EXCAVATING BUCKET

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2 Sheets-Sheet 1



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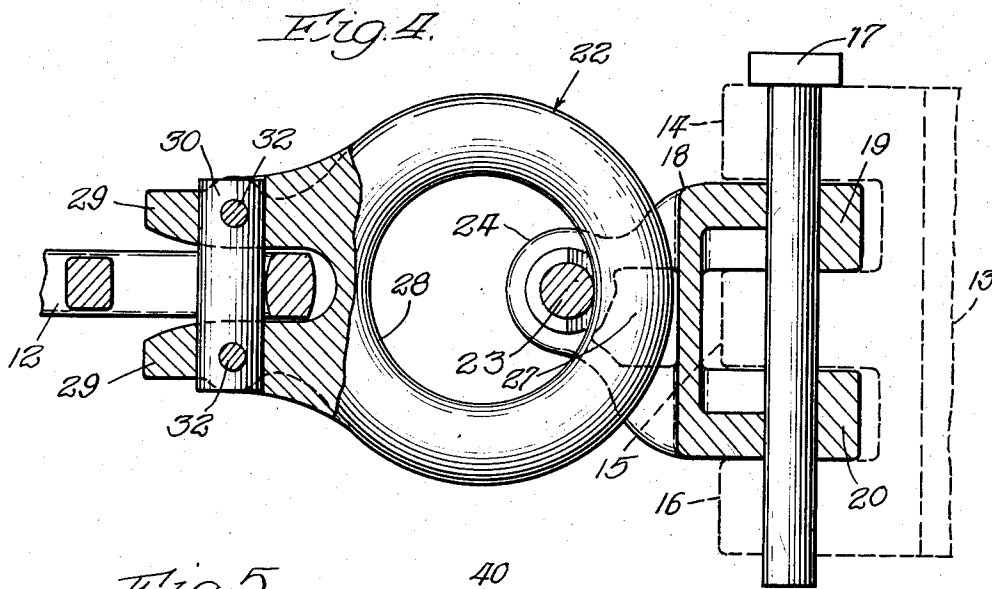
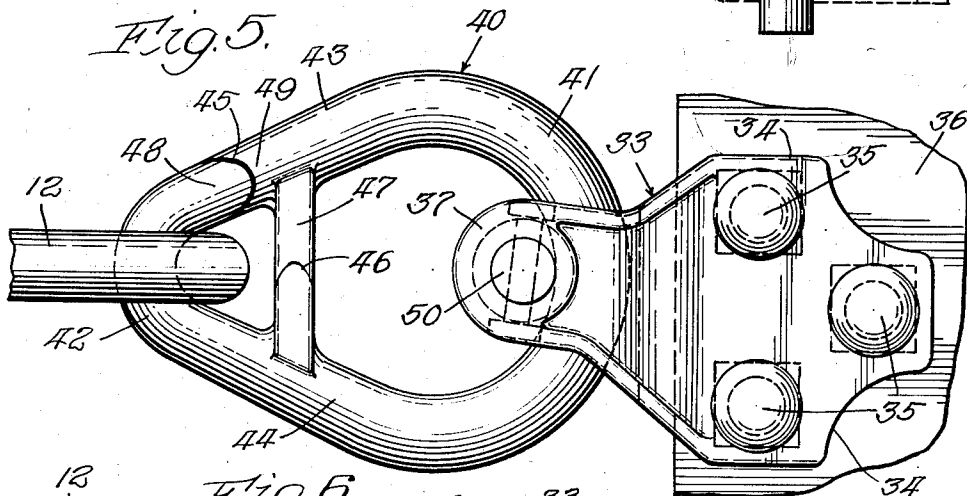
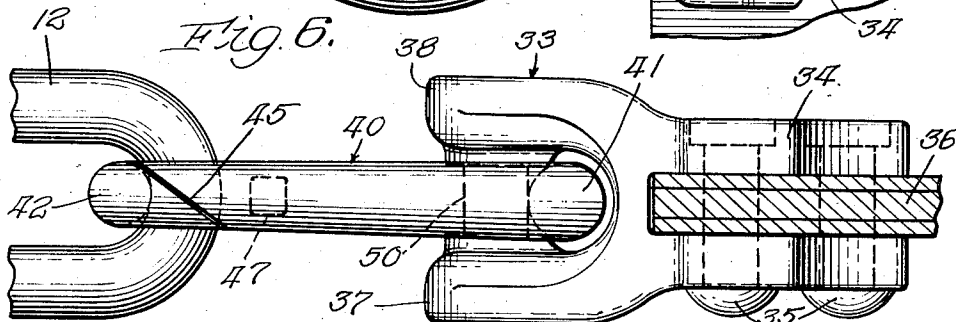
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CONNECTION FOR AN EXCAVATING BUCKET

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2 Sheets-Sheet 2



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CONNECTION FOR AN EXCAVATING BUCKET

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1 Claim. (Cl. 37—135)

This invention generally relates to equipment for connecting cable lines to excavating buckets of large earth moving machinery.

One particular earth moving machine is sometimes referred to as a "dragline" since it involves the use of a bucket supported on one cable passing over the end of a boom and a pull line cable which drags the bucket toward the cab after it has been dropped to the ground. The bucket is so balanced and hitched to the lines that it will cut into the ground and take a load during the pulling of the bucket toward the cab. The buckets may vary in size from relatively small ones of less than a yard capacity to as much as 35 cubic yards. The larger buckets are quite heavy weighing several tons and ordinarily as much as the load which they pick up. Difficulty has been present in the past particularly in breakage of the connections between the cable and the bucket. Since the bucket is dropped in its normal course of operation, these connections are subject to extreme impacts. Flexibility in the connections must be maintained as well as control of the point of attachment of the cable since the buckets are sensitive to the point of application of the pull utilized to load the bucket.

Accordingly, it is the principal object of this invention to provide a connection for excavating buckets and the like intended to minimize and substantially avoid breakage during the normal use and operation of the bucket.

Another object is to provide a connecting device of the character described which eliminates a number of parts previously needed to effect such a connection.

A further object is to provide a connection of the character described permitting adjustment at the point of application of pull on an excavating bucket.

Other features, advantages and objects of the invention will be apparent from the following description of preferred embodiments of the invention as illustrated in the accompanying drawings in which:

Figure 1 is a fragmentary side elevational view of an excavating bucket, pulling chain and connection embodying the present invention;

Figure 2 is a fragmentary enlarged side elevational view of the connection illustrated in Figure 1;

Figure 3 is a fragmentary top plan view of the connection illustrated in Figure 2;

Figure 4 is a view similar to Figure 2, partially broken away to illustrate the internal structure;

Figure 5 is a fragmentary side elevational view of a second form of the invention illustrating a portion of an excavating bucket and the connection thereto; and

Figure 6 is a fragmentary top plan view of the device illustrated in Figure 5.

In the accompanying drawings there are shown two forms of the present invention primarily because of the wide variety of sizes of excavating buckets and chains which are attached to them. The simplest form of connection is illustrated in Figures 5 and 6 and is preferred for buckets requiring chains having no greater than 1½"

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diameter parts. That is, the chains are usually designated in size by the diameter of any one side of the link and the 1½" diameter refers to this dimension.

The excavating buckets with which the present connection is utilized are oftentimes quite large, some being sufficiently large that an automobile may be driven into the bucket. As illustrated in Figure 1, an excavating bucket 7 has a cutting lip 8 equipped with spaced teeth 9 with which to dig into the ground and take a load. The bucket is ordinarily supported by a lifting or hoisting line connected to pivot pins 10 on either side of the bucket. A hood or arch structure 11 joins the sides at the front of the bucket and serves in part to balance and weight the bucket for its digging operation. Ordinarily, the buckets are upwardly open and also open to the front under the arch 11.

In order to load the excavating bucket in normal dragline operation, the bucket is first swung outwardly and dropped to the ground whereupon it lands upon the teeth 9 and arch 11 at the front of the bucket. Thereafter, the bucket is pulled toward the cab of the dragline crane by a pull line attached to either side of the bucket by bridle chains 12. The point of application of the force of the pull line to the bucket is important in order that the bucket assume the proper position to allow the teeth 9 to enter the ground and to fill the bucket proper. This invention is particularly concerned with the connection between the chains 12 and the bucket.

In the past, chains have been connected in various manners to the bucket. Ordinarily, there has been simply a clevis-type connection of a link of the chain to the bucket with the result that this connection has not been particularly flexible in a direction laterally of the bucket itself. Oftentimes these connections have been broken by the impact of dropping the heavy bucket to the ground. Repairs in the field, particularly during working hours, were costly in down time for the machine and also difficult to make since welding was generally required.

One form of the present invention, ordinarily used for chains of more than 1½" diameter, is illustrated in Figures 1 through 4. A hitch plate 13 is bolted to the sides of the bucket proper. In the larger size, the hitch plate is provided with a plurality of pintle bearings 14, 15 and 16 for the reception of a pintle pin 17 at the forward extent of the hitch plate. An extension piece 18 has rearwardly projecting pintle bearings 19 and 20 which fit between the pintle bearings on the hitch plate so that the pin 17 may support the extension swingably on the hitch plate. A clevis portion 21 extends forwardly from the extension piece 18 for the reception of the connecting ring, generally designated 22.

The particular form of the connecting ring is better illustrated in Figures 2 to 4. It will be noted that the swingable extension 18 is provided with a pin 23 extending between rounded ears or nose portions 24 and 25 of the clevis portion. As a matter of comparative size, the particular form of the invention illustrated in Figures 2 to 4 has a pin 23 of 1½" diameter. It is thus to be noted that the connecting ring 22 is quite large. Ordinarily, all of the parts described are of cast steel bearing a high percentage of manganese.

The rounded nose portions of the clevis member just described are so formed that the arcuate body 26 of the connecting ring may pass around the pin 23 quite freely between the ears and the main body of the clevis portion. The arcuate body 26 is of sufficiently large diameter that the portion 27 caught between the ears will not bind should the ring be turned laterally to swing over either of the ears. In such operation, the rounded nose portions merely pass through the opening 28 in the ring portion without interfering with the swinging movement.

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Thus, should a bucket be dropped upon its front in such a manner that the connecting ring be below the bucket, the clevis portion may pivot on the pin 17 and at the same time, the connecting ring 22 is free to move about the clevis member so as to avoid any lever arm which will tend to break the connecting ring. A link of the chain 12 is connected into the clevis portion 29 having a pin 30, the clevis portion being formed integrally with the arcuate body 26 of the connecting ring. Other forms of connection may be used, if desired, since there is not the particular need for flexibility between the chain link 12 and the connecting ring 22 as there is between the ring and the bucket.

It will be understood that suitable devices are used to insure the continued connection of the parts during normal use. In this respect, the pin 23 in the clevis member is equipped with keeper bolts 31 in either of the nose portions and the pin 30 is also retained in position by bolts 32.

The excavating bucket is particularly sensitive to the point at which the chains 12 apply the pulling force. Thus, it is important that the point at which this force is applied may be changed to suit the particular operations in the field. The clevis member 18 is thus cast so that the pin 23 is offset from the center line through the pintle 15 or middle of the clevis member, providing a convenient means for moving the position of the pin 23 relative to the bucket. It is thus only necessary to invert the clevis member 18 to move the pin 23 downwardly from the position illustrated in Figure 2.

The embodiment of the invention illustrated in Figures 5 and 6 employs the same principles as that just described for the connecting ring 22. In some of the smaller buckets, it is not particularly necessary to provide a clevis member pivotally connected to the hitch plate. In such instances, the hitch plate may be formed with the clevis member as an integral part. Such a structure is shown in Figures 5 and 6.

In buckets requiring a pulling chain of 1½" or less diameter, the hitch plate 33 may be formed with an attaching portion 34 having spaces for three bolts 35 used to secure the hitch plate to the side 36 of the bucket. A clevis portion extends forwardly and includes a pair of ears 37 and 38 similar to those described in connection with the pivoted clevis member of Figure 2. The chain 12 is provided with a connecting link 40 performing a similar function to that described for the connecting ring 22 but being of different shape.

The connecting link 40 is cast of high manganese steel in one piece. As cast, an enlarged end 41 of relatively large radius is connected to an opposite end 42 of smaller radius by integral straight portions 43 and 44. An opening to the interior of the link is provided between spaced apart portions at the weld lines 45, adjacent the smaller radius end of the link, and 46 in a cross brace member 47. After the chain 12 is inserted between spaced apart portions 48 and 49 on either side of the weld 45, the portions are pressed together and welded to complete the link.

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The connecting link 40 functions in a manner similar to the connecting ring 22. The enlarged portion of the link may readily pass over the round nose of the clevis member 33. The pin 50 in the clevis member holds the connecting link in place. The pin is offset from the center line through the hitching plate so that it may be removed from the bucket and inverted to change the location of the pin relative to the bucket.

In either form of the invention, breakage is avoided since the connecting ring may easily pivot or swing laterally of the clevis portion to which it is attached. Only one connecting ring is required to make a good connection between the pulling chain and the bucket, thus simplifying the structure while at the same time avoiding the breakage which has been prevalent in the past. Additionally, the point of application of pull to the bucket may be easily adjusted.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claim.

I claim:

A device for connecting a pull line to an excavating bucket, comprising: a hitch plate having a base portion secured directly to the front of the bucket and having a generally forwardly extending clevis portion including a pin and outwardly projecting spaced rounded nose portions supporting the pin, said clevis portion being in fixed position to be forced into the ground when the bucket is dropped on its front portion for digging; a pulling chain extending between the pull line and the clevis portion; and a connecting link coupling the chain to the pin of said clevis portion, said link having a generally annular portion passing about the pin and between said spaced nose portions, said annular portion having a radius of curvature substantially greater than that of the pin and said rounded noses being spaced apart a distance to permit free lateral movement of said annular portion over either nose portion without binding to a position laterally out of normal pulling position so that the tubular portion may pass laterally over either rounded nose avoiding breakage of the link upon dropping the bucket thereupon.

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