Jan. 22, 1924. 1,481,735

F. G. PECK

CHAIN PUMP

Filed March 2, 1921

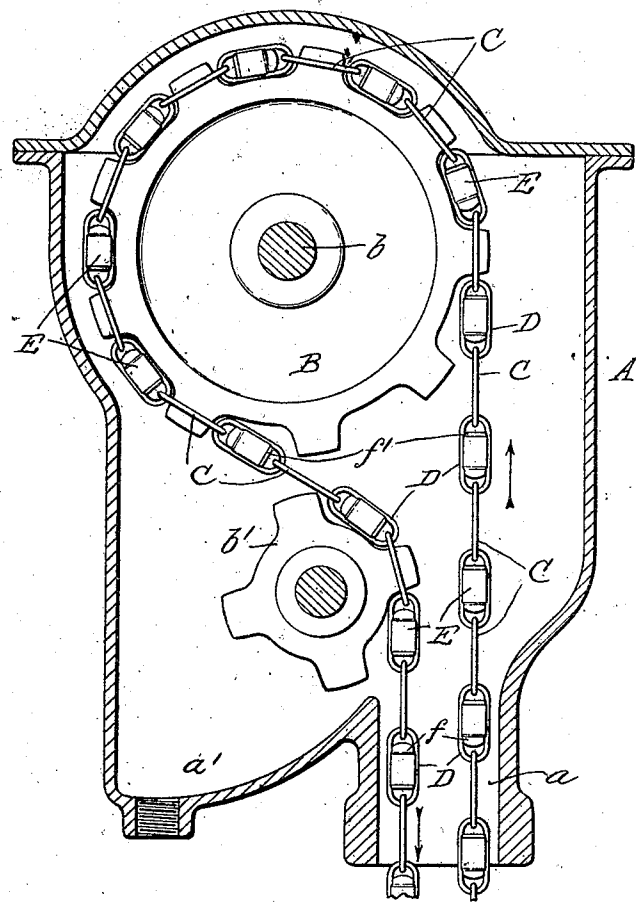


Fig. 1.

Fig. 2.

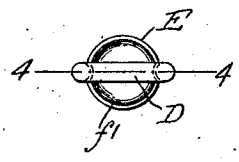


Fig. 3.

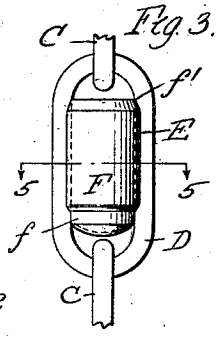


Fig. 4.

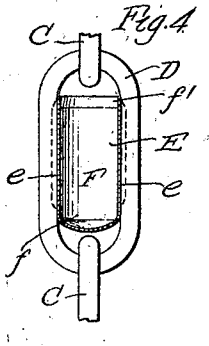


Fig. 5.

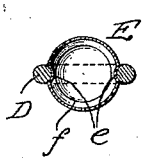
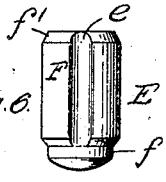


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERICK G. PECK, OF BRADFORD, PENNSYLVANIA.

CHAIN PUMP.

Application filed March 2, 1921. Serial No. 449,151.

To all whom it may concern:

Be it known that I, FREDERICK G. PECK, a subject of the King of Great Britain, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented a new and useful Improvement in Chain Pumps, of which the following is a specification.

This invention relates to pumps of the kind including an endless chain provided with buckets which carry the liquid, and more particularly to buckets adapted for use with a pump of this kind.

Chain pumps as heretofore made are so constructed that they are unsatisfactory for use in connection with deep wells, such as oil wells, for the reason that the chain and buckets are formed in such a manner that they could not withstand the severe strain to which they would be subjected if used in a deep well, due to the weight that the chain would be obliged to sustain.

The objects of this invention are to provide a bucket chain of this kind which is so constructed that it can be used in connection with deep wells; also to provide buckets of improved construction which can be used in connection with chains of standard make or size; also to improve the construction of buckets and bucket chains in other respects hereinafter specified.

In the accompanying drawings:—

Fig. 1 is a transverse sectional elevation of a pump housing containing the driving sprocket and showing the chain and buckets embodying the invention.

Fig. 2 is an end view on an enlarged scale, of a link of the chain, having a bucket secured thereon.

Fig. 3 is a fragmentary elevation of a chain showing a link supporting a bucket.

Fig. 4 is a view similar to Fig. 3, and showing the bucket in section, as indicated by 4—4, Fig. 2.

Fig. 5 is a transverse sectional view thereof on line 5—5, Fig. 3.

Fig. 6 is an elevation of a bucket detached from the chain.

A represents the housing of a bucket and chain pump or liquid elevating device, which housing is adapted to be secured at the upper end of a well casing, not shown, a tubular portion *a* of the housing forming substantially a continuation of the well casing. In the housing is journalled a shaft *b* on which a sprocket wheel B is mounted. The teeth of the sprocket wheel are adapted to cooperate with alternate links of an endless chain, the two flights of which extend into the well casing through the tubular portion *a* of the housing. *b'* represents an idler sprocket over which the chain passes and which guides the chain into the tubular portion *a* of the housing. The housing is also provided with a basin or depressed portion *a'* into which the oil is discharged from the buckets of the chain as the same pass over the sprocket wheel B.

The chain includes driving links C and bucket-carrying links D, the driving links C having adapted to engage with the sprocket teeth of the wheel B and the bucket carrying links are adapted to enter into the spaces between the sprocket teeth, and each of the bucket-carrying links D is provided with a bucket E. The chain is preferably of standard construction, the links being formed in the usual manner to ensure the strength required when a long length of chain is used.

The buckets E are so arranged as to cooperate with links of the chain without necessitating the making of a special chain and the buckets are preferably so made that they can be readily placed into engagement with the links of the chain or removed therefrom. In the construction shown for this purpose, the buckets E are preferably of unitary structure, being made of stamped metal and are made of a diameter slightly greater than the distance between the inner edges of the parallel sides of the chain links. In order to make it possible to hold the buckets in place on the links, the buckets are provided at diametrically opposite portions with longitudinal grooves or depressions *e*. When the buckets are in their operative relations in regard to the chain links, the sides of a link enter into the depressions in the sides of the corresponding bucket and thus hold the bucket rigidly on the link. The buckets are preferably made of stamped or drawn metal and this metal is sufficiently resilient to permit the buckets to be placed into operative relations to the links after the chain has been formed. If for any reason a bucket becomes worn out or damaged, it can be readily removed from the chain by simply driving it out laterally from the link, and another bucket can be placed into the link by pressing it laterally into the link until the sides

of the link snap into engagement with the grooves in the bucket. By making the grooves in the form of depressions extending inwardly from the cylindrical periphery of the buckets, the walls of the buckets serve to guide the buckets into their operative relations to the links.

The buckets may be of any suitable or desired construction, those shown being of unitary structure and are provided with a lower end *f* of reduced size, the diameter of this portion of the bucket preferably being approximately the same as the distance between the inner portions of the parallel sides of a chain link. This eliminates the necessity of having the closed or bottom end of the bucket yield when a bucket is forced into its operative position in the chain link, the yielding of this portion of the bucket being of course resisted by the bottom of the bucket, and since this portion is necessarily near the ends of the link, the chain link also will not yield as much as at this portion as at the intermediate portions thereof. The securing of the buckets in the links can also be assisted by providing the upper edges of the buckets with an inwardly tapering portion *f'*, which is preferably employed. The body portion F of the bucket between the portions *f* and *f'* is as before stated, slightly larger in diameter than the space between the parallel sides of a chain link, but the portion of the bucket is considerably smaller in diameter than the distance between the outer edges of the parallel portions of the link. Since the chain, as shown, is made with all links of substantially the same size, the sprocket links as well as the bucket-supporting links will protect the sides of the buckets from rubbing against the casing of the well, since the links are of greater outside dimension than the diameter of the buckets.

By means of the construction described, a standard chain can be used, in which all of the links may be of the same size and shape. The buckets can be readily placed into operative relation to the links by either pressing the same laterally into the links, or by driving them in with the blow of a hammer or other tool. Consequently, the chain and buckets can be very readily assembled so that a bucket of this kind can be inexpensively produced. Furthermore, by using a standard chain the buckets themselves will not be subjected to any strains when a chain of great length is used, and the buckets can be made of light construction so as not to materially increase the weight which the chain has to support. This is an important consideration in the use of a device of this kind for pumping deep wells, in which a very long chain is used. This chain and bucket pumping or elevating apparatus is particularly desirable for use in oil wells where the well is kept clear of sand or other obstructions, which are carried to the top together with the oil, so that the apparatus does not become inoperative owing to the accumulation of sand or other material in the bottom of the well.

I claim as my invention:

1. The combination of a chain having links of relatively heavy material, and buckets secured to alternate links of said chain and made of resilient material, said buckets having body portions of substantially cylindrical form and having longitudinal recesses in each of the sides thereof extending inwardly from the cylindrical periphery of said buckets and into which the sides of the link may enter, whereby the cylindrical sides of said buckets serve to guide the sides of the links into their operative positions in said recesses, said buckets being forced laterally into their operative positions in said links.

2. The combination of a chain having links of relatively heavy material, and buckets secured to alternate links of said chain and made of resilient material, said buckets having body portions of substantially cylindrical form and having longitudinal recesses in each of the sides thereof into which the sides of the links may enter by forcing said buckets laterally into their operative positions in said links, the closed ends of said bucket being convex so that said cylindrical portions of the sides thereof may be sprung while the buckets are forced into their operative positions in said links.

3. The combination of a chain having all of its links of substantially equal transverse outside dimensions, and buckets of resilient material adapted to be sprung into locking engagement with alternate links, said buckets having cylindrical body portions of lesser diameter than the outside dimension of said links and of greater diameter than the distance between the sides of the links and having longitudinal diametrically opposite grooves in the sides thereof, whereby said chain links protect said buckets against wear.

FREDERICK G. PECK.