Jan. 24, 1956

F. BRASELMANN

2,731,842

LIFTING DEVICE

Filed Nov. 8, 1951

Fig. 4

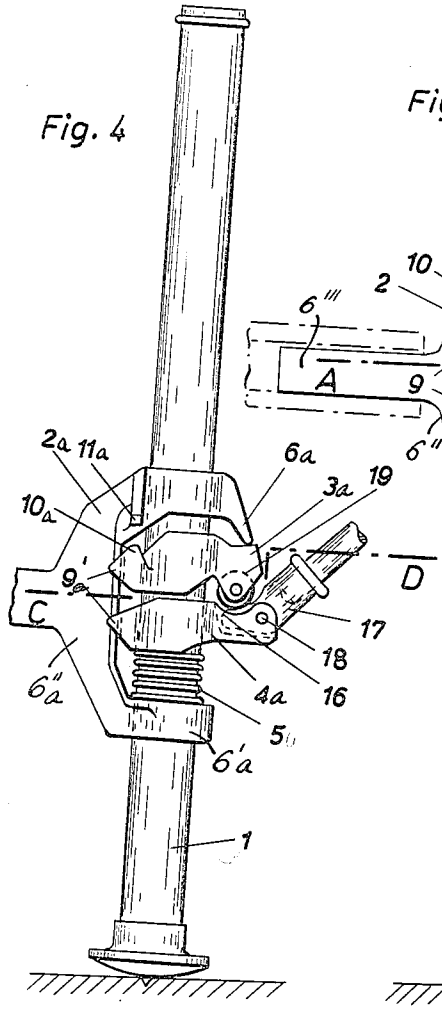


Fig. 1

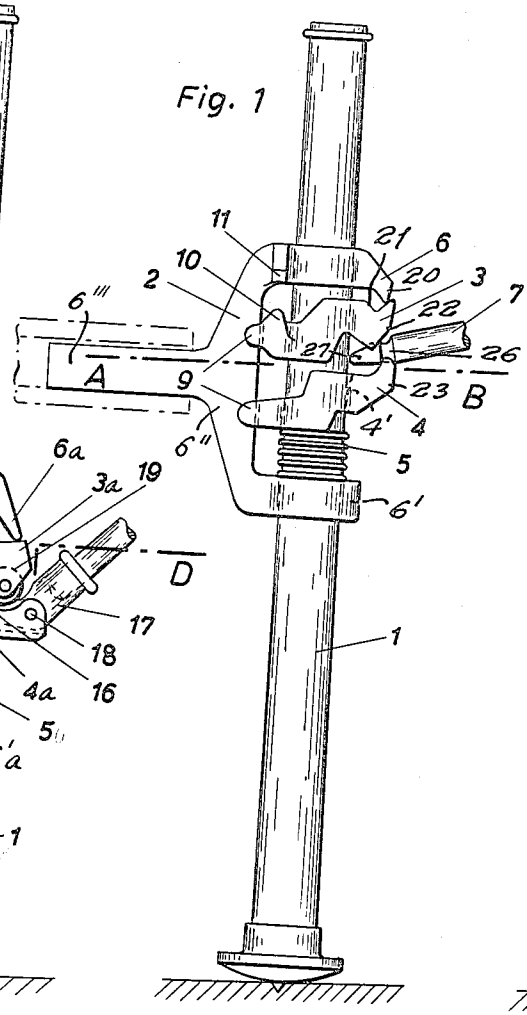


Fig. 2

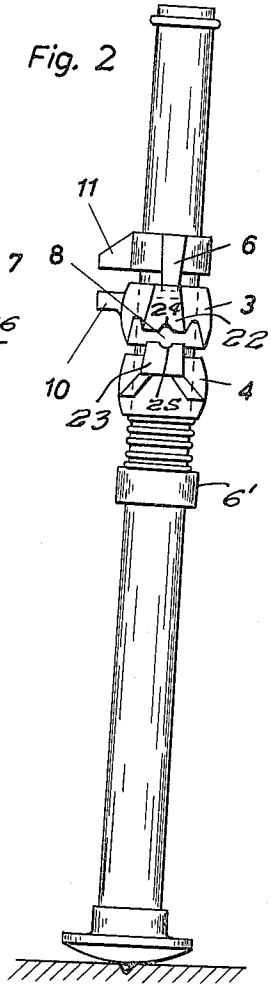


Fig. 5

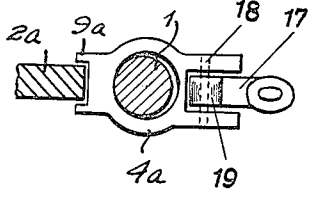
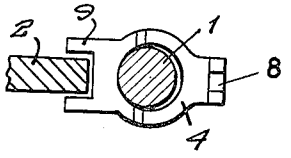


Fig. 3



Inventor

Ferdinand Braselmann

by Michael S. Striker

Atty

United States Patent Office 2,731,842 Patented Jan. 24, 1956

2,731,842

LIFTING DEVICE

Ferdinand Braselmann, Ennepetal-Oberbauer, Germany, assignor to Firma Ferd. Braselmann, Ennepetal-Oberbauer, Germany

Application November 8, 1951, Serial No. 255,406

Claims priority, application Germany November 9, 1950

11 Claims. (Cl. 74—141.5)

The present invention relates to a lifting device or a jack, for lifting loads or for exerting on the same a force which acts in a direction different from the vertical.

The present invention relates to an improvement of the lifting device disclosed and claimed in the co-pending application Serial No. 226,043, filed May 12, 1951, now abandoned, for a Lifting Device.

It is an object of the present invention to simplify further the structure of the lifting device.

It is another object of the present invention to render the parts of the lifting device separate from one another whereas according to the copending application Serial No. 226,043, filed May 12, 1951, now abandoned, the parts of the lifting device are permanently connected with each other.

A lifting device according to the present invention comprises in combination, an elongated shaft, a forked member having a first prong and a second prong, each of the prongs having an aperture surrounding the shaft, a first clamping member having an aperture surrounding the shaft, a second clamping member having an aperture surrounding the shaft, the clamping members being arranged between said prongs of the forked member, the first prong of the forked member being arranged adjacent to the first clamping member, releasable means for force-locking the first prong of the forked member with the first clamping member, resilient means inserted between the second clamping member and the second prong of the forked member, and means for exerting an oscillating force on the clamping members whereby the clamping members are alternately clamped to the shaft and the forked member is moved stepwise along the shaft.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of a first embodiment of the present invention;

Fig. 2 is an end elevation of the device shown in Fig. 1;

Fig. 3 is a cross-section along the line A—B of Fig. 1;

Fig. 4 is a side elevation of a second embodiment of the present invention; and

Fig. 5 is a cross-section along the line C—D of Fig. 4.

Referring now to the drawings and first to Figs. 1 to 3, 1 denotes a substantially vertical shaft along which are displaceable a load-supporting forked member 2, a first clamping member 3, and a second clamping member 4. The forked member 2 is provided with an upper or first prong 6 and a lower or second prong 6′ which are substantially horizontal and connected by a substantially vertical part 6″ of the forked member 2. Both the first prong 6 and the second prong 6′ have apertures surrounding the shaft 1. The vertical part 6″ is provided with a load-supporting extension 6‴.

The first clamping member 3 and the second clamping member 4 are arranged between the prongs 6 and 6′ of the forked member 2, and have apertures provided with tilted walls such as 4′ which come into clamping contact with the shaft 1, similar to the tilted walls of the clamping members disclosed in the co-pending patent application Serial No. 226,043, filed May 12, 1951, now abandoned. However, in contradistinction to the devices disclosed in patent application Serial No. 226,043, filed May 12, 1951, now abandoned, the clamping members 3 and 4 are displaceable independently of each other within the space defined by the prongs 6, 6′ of the forked member 2. A helical compression spring 5 is arranged between the second clamping member 4 and the second prong 6′ of the forked member, the first prong 6 of the forked member 2 being arranged adjacent to and above the first clamping member 3. The helical spring 5 presses the second clamping member 4 against the first clamping member 3 which is connected to the first prong of the forked member 2 by releasable force-locking means which are preferably designed as a suspension of the forked member 2 from the first clamping member 3. To this end the first prong 6 is provided with a downwardly directed projection 20 having inclined side faces and engaging a recess 21 provided in the first clamping member 3 and having an inclined wall on which one of the side faces of the projection 20 slides. Thus it will be understood that the forked members 2 supporting the load urges the first clamping member 3 into clamping position. It should be noted that this is due not only to the action of the load but also to the mutually engaging inclined faces of the projection 20 and the recess 21.

The clamping members 3 and 4 have, respectively, peripheral portions 22 and 23 which are turned away from the vertical part 6″ of the forked member 2 and are arranged one above the other, the peripheral portion 23 of the second clamping member having a slightly larger radial distance from the axis of the shaft 1 than the peripheral portion 22 of the first clamping member 3. The peripheral portions 22, 23 are provided, respectively, with recesses 24 and 25, which form with each other an approximately cylindrical space 8 into which the groove 26 provided near the tip 27 of a lever 7 can be introduced so that the latter is held in position when it is swung upwards and downwards in the manner more fully disclosed hereinafter.

In order to prevent a rotation of the clamping members 3 and 4 with respect to the shaft 1, forked end portions 9 engaging the vertical part 6″ of the forked member 2 are provided on the clamping members.

Furthermore, cams 10 and 11 are laterally projecting from the first clamping member 3 and the first prong 6 of the forked member 2, respectively, the purpose of which will be more fully disclosed hereinafter.

The operation of this device is as follows:

If it is intended to lift the load supported by the extension 6‴ of the forked member 2 and indicated by dotted lines in Fig. 1, the tip 27 of a preferably manually operated lever 7 is inserted between the clamping members 3 and 4 so that the groove 26 of the lever 7 engages the cylindrical space 8. The lever 7 is alternately swung downwards and upwards and during each downward stroke the tip 27 of the lever 7 presses the first clamping member 3 upwards, the lever 7 abutting against the second clamping member 4. During the opposite stroke of the lever 7 the second clamping member 4 is pressed upwards by the helical spring 5 thus completing a full operating cycle which can be repeated any number of times up to the top end of the shaft 1.

If it is intended to lower the load supported by the forked member 2, the tip 27 of the lever 7 is inserted between the first clamping member 3 and the first prong

6 of the forked member 2 near the vertical part 6'' thereof. In order to facilitate this operation the cams 10 and 11 are provided. The lever 7 is carefully moved downwards in order to slightly turn and thereby release the clamping member 3 from the clamping position thereof whereupon the clamping members 3, 4 and the forked member supporting the load are lowered a short distance after which the lever 7 is swung upwards in order to allow the first clamping member 3 to come again into clamping position. If it is desired to lower the load further, this cycle of operation is repeated as often as desired.

The point of abutment of the lever 7 against the second clamping member 4 has a slightly larger radial distance from the axis of the shaft 1 than the point of abutment of the lever 7 against the first clamping member 3. By this arrangement it is accomplished that the lever 7 during the upward and downward strokes thereof carries out very little or no displacement in the axial direction thereof with respect to the first clamping member 3 so that a force due to sliding of the shorter arm 27 of the lever 7 on the first clamping member 3 is avoided. However, this structure has the disadvantage that the length of the shorter arm 27 of the lever 7 must exceed a definite lower limit, thus limiting the lifting power of the manually operated device. This disadvantage is avoided in the second embodiment of the present invention more fully disclosed hereinafter.

If desired, the forked member 2 supporting the load could be made stationary and the shaft 1 could be moved by the ratchet-like operation of the clamping members 3 and 4.

Referring now to Figs. 4 and 5, showing a shaft 1, a forked member 2*a*, two clamping members 3*a*, 4*a* and a helical spring 5 inserted between the lower prong 6*a*' of the forked member 2*a* having the same functions as the corresponding parts of the embodiment shown in Figs. 1 to 3, it will be noted that the driving lever 17 is pivoted by the pivot 18 to the second clamping member 4*a*, and has an end portion 16 forming the shorter arm of the two-armed lever 17 and being designed as a lifting cam or eccentric having a small inclination. A roller 19 is pivoted freely at 30 to the peripheral portion of the first clamping member 3*a*. The lifting cam 16 of the two-armed lever 17 engages the roller 19 from below, the pivot 18 being arranged below and laterally displaced with respect to the point of contact between the cam 16 and the roller 19. It should be noted that in view of the slight inclination of the cam 16 the latter slides over a longer path on the roller 19 which, however, does not involve an increased friction since the roller 19 is loosely connected to the first clamping member 3*a* by the pivot 30 thereof. With the lifting device according to Figs. 4 and 5 loads of several tons weight can be lifted without difficulty by swinging the relatively short lever 17 downwards and upwards.

The vertical part 6*a*'' of the forked member 2*a* is engaged by forked portions 9*a* of the clamping members 3*a* and 4*a* which have the same function as the corresponding portions of the embodiment shown in Figs. 1 to 3. However, instead of engaging the vertical part 6*a*'' from the outside, the forked portions 9*a* could be designed so as to enter a groove provided in the vertical portion 6*a*''. Furthermore, cams 10*a* and 11*a* are provided on the first clamping member 3*a* and the first prong 6*a* of the forked member 2*a* which serves the same purpose as the corresponding portions of the embodiment shown in Figs. 1 to 3.

Also in the embodiment according to Figs. 4 and 5 the forked member 2*a* could be the stationary part and the shaft 1 the movable part, if desired.

It should be noted that in both of the embodiments shown in the drawing, spring 5 urges the lower clamping member upwardly towards the upper clamping member, and when the lever means shown in the respective embodiments is in an inoperative position, that is, when no lifting force is exerted thereby on the upper clamping member, it will be evident that spring 5 will press the lower clamping member against the upper clamping member, the clamping members in this condition being in "rest position," as hereinafter referred to in the claims.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of lifting devices differing from the types described above.

While the invention has been illustrated and described as embodied in a jack having a forked member and two clamping members engaging a shaft, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A jack, comprising in combination, an elongated shaft; a forked member having a first prong and a second prong, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member, said first prong of said forked member being arranged adjacent to said first clamping member; releasable means for force-locking said first prong of said forked member with said first clamping member; resilient means inserted between said second clamping member and said second prong of said forked member; and means for exerting an oscillating force on said clamping members whereby said clamping members are alternately clamped to said shaft and said forked member is moved step-wise along said shaft.

2. A jack, comprising in combination, an elongated substantially vertical shaft; a load-supporting forked member having a first prong and a second prong, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from one side of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member; and means for exerting an oscillating force on said clamping members whereby said clamping members are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

3. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member and having each a

peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member; and means for exerting an oscillating force alternately on said peripheral portions of said clamping members whereby said clamping members are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

4. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member; and recesses arranged, respectively, in said peripheral portions of said clamping members arranged above each other whereby after insertion of a lever an oscillating force can be alternately exerted on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

5. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member; a roller pivoted to said peripheral portion of said first clamping member; and a lever pivoted to said peripheral portion of said second clamping member and having an end portion cooperating with said roller whereby by imparting a pivotal motion to said lever an oscillating force is exerted alternately on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

6. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member; means for exerting an oscillating force alternately on said peripheral portions of said clamping members whereby said clamping members are alternately clamped to said shaft and said forked member is moved stepwise along said shaft; and a pair of cams arranged, respectively, one above the other on said first clamping member and said first prong of said forked member, said pair of cams allowing a lever to be inserted between them in order to release said clamping members from the clamping positions thereof.

7. A jack, comprising in combination, an elongated shaft; a forked member having a first prong and a second prong, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged between said prongs of said forked member, said first prong of said forked member being arranged adjacent to said first clamping member; releasable means for force-locking said first prong of said forked member with said first clamping member; resilient means inserted between said second clamping member and said second prong of said forked member; means for coupling said forked member with said clamping members so as to prevent a rotation of the same with respect to said shaft; and means for exerting an oscillating force on said clamping members whereby said clamping members are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

8. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged lying against each other in rest position between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member urging said second clamping member against said first clamping member; a roller pivoted to said peripheral portion of said first clamping member; a two-armed lever pivoted to said peripheral portion of said second clamping member; and an end portion forming one arm of said two-armed lever, said end portion being designed as a lifting cam being in contact with said roller, the pivot of said lever being arranged below and laterally displaced with respect to the point of contact between said roller and said lifting cam, whereby while imparting a pivotal motion to said lever an oscillating force is exerted alternately on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved stepwise along said shaft.

9. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged lying against each other in rest position between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member urging said second clamping member against said first clamping member; a roller pivoted to said peripheral portion of said first clamping member; a lever pivoted to said peripheral portion of said second clamping member and having an end portion cooperating with said roller whereby by imparting a pivotal motion to said lever an oscillating force is exerted alternately on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved step-wise along said shaft; and a pair of cams arranged, respectively, one above the other on said first clamping member and said first prong of said forked member, said pair of cams allowing a lever to be inserted between them in order to release said clamping members from the clamping positions thereof.

10. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged lying against each other in rest position between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member urging said second clamping member against said first clamping member; a roller pivoted to said peripheral portion of said first clamping member; a two-armed lever pivoted to said peripheral portion of said second clamping member; an end portion forming one arm of said two-armed lever, said end portion being designed as a lifting cam being in contact with said roller, the pivot of said lever being arranged below and laterally displaced with respect to the point of contact between said roller and said lifting cam, whereby while imparting a pivotal motion to said lever an oscillating force is exerted alternately on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved stepwise along said shaft; and a pair of cams arranged, respectively, one above the other on said first clamping member and said first prong of said forked member, said pair of cams allowing a lever to be inserted between them in order to release said clamping members from the clamping positions thereof.

11. A jack, comprising in combination, a substantially vertical elongated shaft; a forked member having a substantially horizontal first prong, a substantially horizontal second prong, and a substantially vertical part connecting said horizontal prongs, each of said prongs having an aperture surrounding said shaft; a first clamping member having an aperture surrounding said shaft; a second clamping member having an aperture surrounding said shaft, said clamping members being arranged lying against each other in rest position between said prongs of said forked member and having each a peripheral portion turned away from said vertical part of said forked member, said peripheral portions being arranged one above the other, said first prong of said forked member being arranged adjacent to said first clamping member; means for suspending said first prong of said forked member from said peripheral portion of said first clamping member so as to press the same into clamping position; resilient means inserted between said second clamping member and said second prong of said forked member urging said second clamping member against said first clamping member; a roller pivoted to said peripheral portion of said first clamping member; a two-armed lever pivoted to said peripheral portion of said second clamping member; an end portion forming one arm of said two-armed lever, said end portion being designed as a lifting cam being in contact with said roller, the pivot of said lever being arranged below and laterally displaced with respect to the point of contact between said roller and said lifting cam, whereby while imparting a pivotal motion to said lever an oscillating force is exerted alternately on said peripheral portions of said clamping members so that the same are alternately clamped to said shaft and said forked member is moved stepwise along said shaft; and a pair of cams projecting laterally from said first clamping member and said first prong of said forked members, said cams being arranged one above the other and allowing a lever to be inserted between them in order to release said clamping members from the clamping positions thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

2,227,397	Lucker	Dec. 31, 1940
2,242,431	Lucker	May 20, 1941
2,305,238	Coates	Dec. 15, 1942
2,513,978	White	July 4, 1950
2,534,837	Crewe	Dec. 19, 1950
2,537,839	Lord	Jan. 9, 1951