June 10, 1941. A. J. AMSLER 2,245,316

CLAMPING CHUCK

Filed Aug. 28, 1939

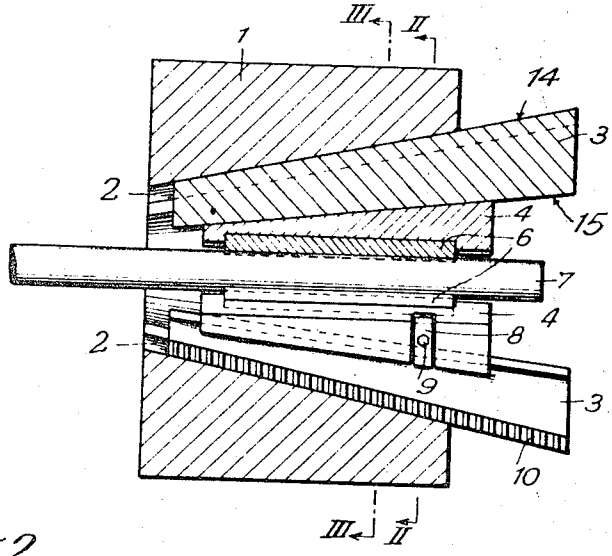


Fig. 1

Fig. 2

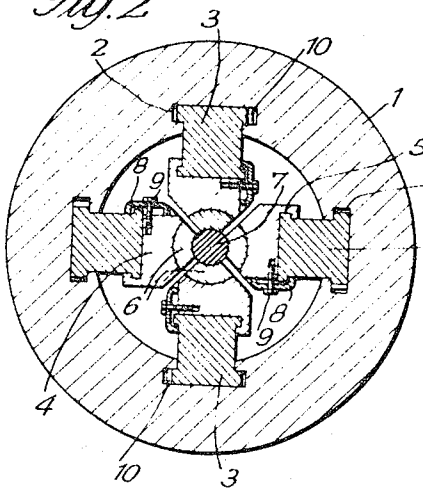


Fig. 3

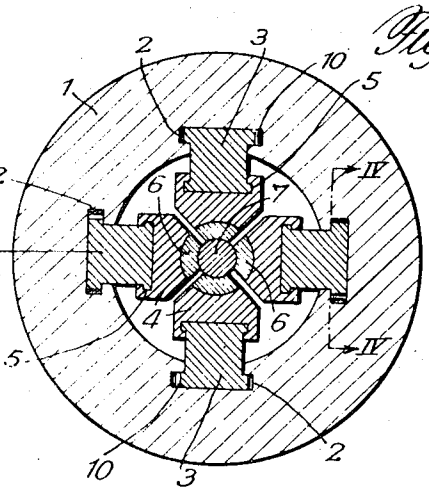


Fig. 5

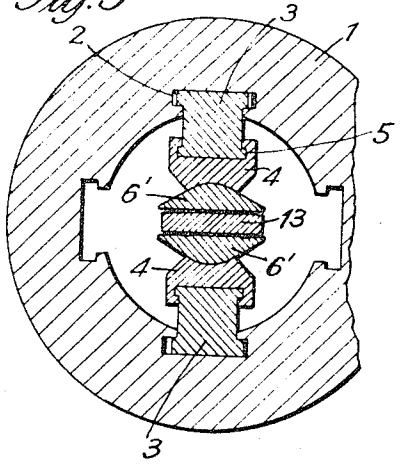
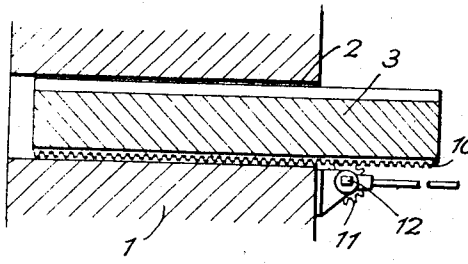


Fig. 4



Inventor:

Alfred J. Amsler.

By Sommers & Young Attys

Patented June 10, 1941

2,245,316

UNITED STATES PATENT OFFICE

2,245,316

CLAMPING CHUCK

Alfred J. Amsler, Schaffhausen, Switzerland

Application August 28, 1939, Serial No. 292,333
In Switzerland August 31, 1938

3 Claims. (Cl. 24—263.5)

This invention relates to clamping chucks, and more particularly to devices for clamping ropes, cables or bars in the chucks of tensile test machines.

Devices for clamping ropes and bars by means of simple clamping wedges have been in use heretofore. In order that such wedges securely grip ropes or bars of high specific resistance and of great dimensions, it is necessary for the wedges to have a feeble taper. In this case, however, the inconvenience is experienced that the wedges, upon loading the test piece, may become so tightly clamped in the chucks that they can be loosened only with great difficulty after releasing the test piece. Such gripping of the wedges occurs particularly when the test piece has not been loaded to the rupture point and no sudden recoil of the chucks is obtained upon release of the test piece. This drawback can be avoided by providing special devices for retracting the clamping wedges, but owing to the considerable power required for such retraction, these devices are complicated and expensive.

It is an object of the invention to provide clamping chucks for tensile test machines in which gripping of the clamping wedges after the release of a test piece is avoided.

The invention consists in a chuck comprising at least two pairs of clamping wedges each comprising an outer and an inner wedge, the total taper of both wedges being greater than the taper of the inner wedge alone, and the outer wedge being guided along the interior side of the chuck body, while the inner wedge has its outer face guided along the inner side of the outer wedge and is provided at its inner side with a jaw for gripping the rope or the bar. When the testing machine exerts a tensile force on the rope or bar, the inner wedges are driven by the test piece, and owing to the weak taper of these inner wedges they are moved to a greater extent than the outer wedges which, owing to the greater total taper, effect only a small sliding movement relative to the chuck body. Afterwards, when the test piece is released, the inner wedges, owing to the weak taper, usually are not loosened singly, but together with the outer wedges, which, owing to the greater total taper, are pushed back by the radial stresses of the chuck body, whereby all the wedges are released and the test piece can be removed.

Preferably the two wedges of each pair of wedges are connected one with another by a friction clutch which allows relative movement of the two wedges in the direction of taper by overcoming the frictional resistance of the clutch. The clutch body can be provided with a device for displacing the outer wedge. A further advantage of the combination of two cooperating wedges is obtained in that upon an axial movement of the outer wedges, when the inner wedges remain stationary, these latter effect a movement at right angles to the axis only, and thus grip the testing piece without effecting any axial movement as is the case in known chucks; this feature is particularly convenient when the rope or bar must be clamped at an exactly prescribed length.

The accompanying drawing illustrates two constructional embodiments of the invention.

Fig. 1 shows an axial section of a chuck according to the invention;

Figs. 2 and 3 show transverse sections according to the lines II—II and III—III, respectively of Fig. 1.

Fig. 4 is a section on the line IV—IV of Fig. 3.

Fig. 5 is a transverse section of a modified arrangement.

In the example according to Figs. 1 to 4, the body 1 of the chuck is provided with four grooves 2 on its inner surface. An outer wedge 3 is guided in each groove 2 and has its outer tapered face 14 in contact with the bottom of the groove. An inner wedge 4 is guided along the inner tapered face 15 of each wedge 3 and is provided with a slot 5 in which the outer wedge 3 is engaged. Each wedge 4 is provided on its inner face with a jaw 6 adapted to grip a rope or bar 7 of circular cross section. A screw 9 carried by each wedge 4 serves to urge a clamping plate 8 against adjacent wedges 3 and 4. This clamping plate forms a friction clutch and permits relative sliding movement of the two wedges when one of the wedges is submitted to an effort which overcomes the frictional resistance between plate 8 and the wedge 3. A rack 10 is formed on one side of each wedge 3 and engages with a pinion 11 of a manually operable ratchet 12 serving to move the wedge 3 relatively to the chuck body 1.

In the described device the pitch of the wedge 4 is relatively weak; the angle between the tapered surface 14 of the wedge 3 and the longitudinal axis of the chuck is approximately twice as large as the angle between the tapered surface of the wedge 4 and the axis. The total pitch of the combined wedges 3 and 4 is accordingly substantially double the pitch of the inner wedge 4 alone. Owing to this arrangement the jaws 6 and the wedges 4 are moved along with

the rope or bar 7 when a tension is exerted on this rope or bar, whereby the clamping pressure of the jaws increases in proportion to the tensile stress. When releasing the rope or bar 7, the wedges 3 and 4 become loose, since owing to the considerable taper of the surface 14 relatively to the axis of the chuck the wedge 3 does not stick to the chuck body but will be pushed backwards by the radial stresses of the chuck body so that both inner and outer wedges will become loose and the test bar can be removed.

In the example according to Fig. 5 only two pairs of wedges 3 and 4 are used, the wedges 3 being again each engaged in a groove 2 of the chuck body 1 and the wedges 4 being guided by means of slots 5 along the inner side of the wedges 3. The clamping jaws 6 are shaped to grip a flat bar 13.

It is to be understood that the invention is not limited to the structural features as illustrated by way of example only in the accompanying drawing, and minor changes in the size, shape and arrangement of parts may be made without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A clamping chuck for tensile test machines, comprising an annular chuck body having the internal surface thereof provided with a plurality of axially converging slots, a plurality of pairs of movable clamping wedges, each pair including relatively movable inner and outer wedges, each outer wedge having a longitudinally tapering outer surface slidably fitted in one of said converging slots, the inner wedges being adapted to grip the test piece to be clamped, each inner wedge having a longitudinally tapering outer surface in sliding contact with the inner face of the outer wedge, both wedges of the same pair of wedges tapering in the same direction and the pitch of the inner wedge alone being smaller than the total pitch of the combined inner and outer wedges, the outer wedges being mounted for unlimited axial movement along the converging slots of the chuck body whereby test pieces of widely varying diameters may be clamped in the chuck.

2. A clamping chuck for tensile test machines, comprising an annular chuck body having the internal surface thereof provided with a plurality of axially converging slots, a plurality of pairs of movable clamping wedges, each pair including relatively movable inner and outer wedges, each outer wedge having a longitudinally tapering outer surface slidably fittted in one of said converging slots, the inner surfaces of the outer wedges forming an axially converging seat for the outer surfaces of the inner wedges and tapering in the same direction as said converging slots of the chuck body, the converging slots of the chuck body having a greater pitch than the converging seat formed by the inner surface of the outer wedges, the outer wedges being mounted for unlimited axial movement along the converging slots of the chuck body whereby test pieces of widely varying diameters may be clamped in the chuck, and a friction clutch connection between the two wedges of each pair of wedges whereby the two wedges move together until the resistance against displacement of one of the wedges is greater than the frictional resistance of said clutch.

3. A clamping chuck for tensile test machines, comprising an annular chuck body having the internal surface thereof provided with a plurality of axially converging slots, a plurality of pairs of movable clamping wedges, each pair including relatively movable inner and outer wedges, each outer wedge having a longitudinally tapering outer surface slidably fitted in one of said converging slots, the inner wedges being adapted to grip the test piece to be clamped, each inner wedge having a longitudinally tapering outer surface in sliding contact with the inner surface of the outer wedge, both wedges of one pair of wedges tapering in the same direction and the pitch of the inner wedge alone being smaller than the total pitch of the combined inner and outer wedges, the outer wedges being mounted for unlimited axial movement along the converging slots of the chuck body whereby test pieces of widely varying diameters may be clamped in the chuck, rack and pinion means for moving the outer wedges along said slots, and a friction clutch connection between the two wedges of each pair of wedges whereby both wedges move together until the resistance against displacement of one of the wedges is greater than the frictional resistance of said clutch.

ALFRED J. AMSLER.