No. 633,107. Patented Sept. 12, 1899.

F. T. SNYDER.

KEY AND KEYWAY.

(Application filed Dec. 10, 1897.)

(No Model.)

Fig. 1.

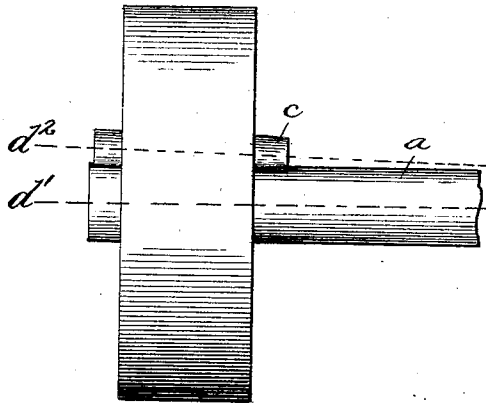


Fig. 2.

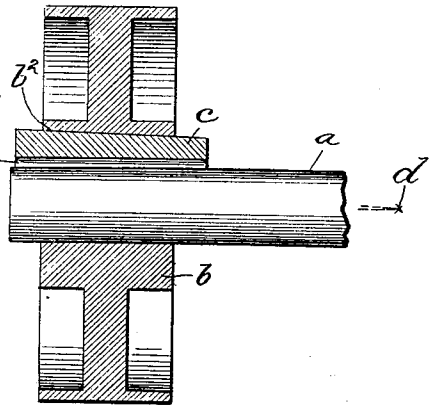


Fig. 3.

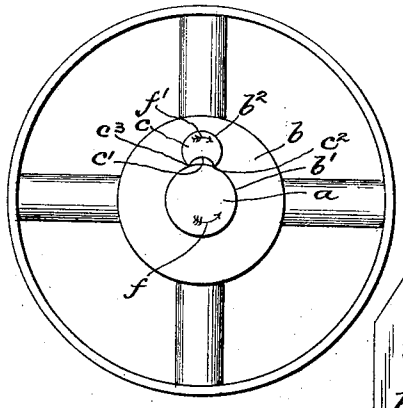


Fig. 4.

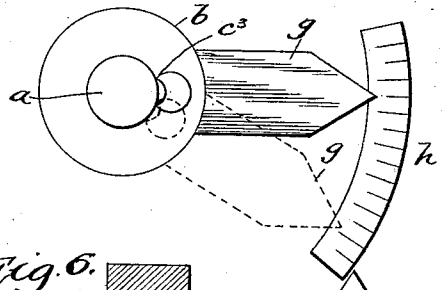


Fig. 5.

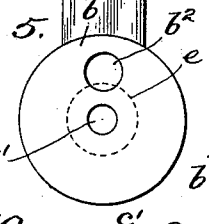


Fig. 6.

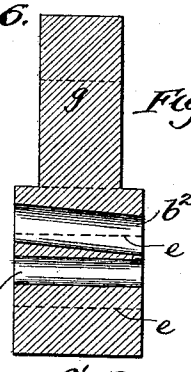


Fig. 7.

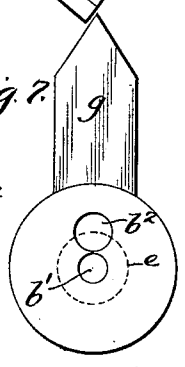


Fig. 10.



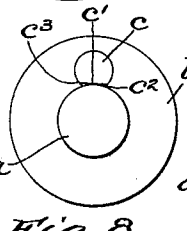


Fig. 8

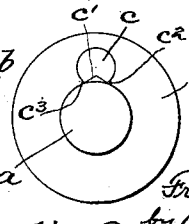


Fig. 9.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK T. SNYDER, OF KEEWATIN, CANADA.

KEY AND KEYWAY.

SPECIFICATION forming part of Letters Patent No. 633,107, dated September 12, 1899.

Application filed December 10, 1897. Serial No. 661,364. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK T. SNYDER, a citizen of the United States, residing at Keewatin, Ontario, Dominion of Canada, have invented a certain new and useful Improvement in Keys and Keyways, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improved key and keyway, my object being to provide an improved, simple, cheap, and efficient means for securely fastening or keying together rotatable parts, whereby the necessity of cutting or providing prepared keyways in both of the parts is avoided.

In the art to which the present invention relates it is customary to fasten the hub to the shaft by means of a tapering key rectangular in section fitted into grooves or keyways in both the hub and the shaft. This arrangement necessitates milling, channeling, and filing the respective grooves until the bottom and the sides thereof are plane surfaces having the opening or groove of exactly the same dimensions as the key—a long, laborious, and expensive procedure. It is obvious that channeling weakens the shaft in the proportion to the depth of the groove. Then, too, if a new position of the hub on the shaft is for any reason desired a new channel must be made and the shaft thereby again and further weakened. These and other objections are overcome in the present invention, in which in the preferred construction I provide a cylindrical keyway in one of the parts adapted to receive therein a key axially rotatable or rotatable on its own axis, having a gripping edge or edges for engaging or gripping the other part. Said keyway is inclined with respect to the surface to be gripped by the key. The key when placed in the keyway in firm contact with the part not having a prepared keyway is in position to be slightly or partially rotated by the rotation of one of the parts to be keyed, whereby the edge of the key grips or engages the part not having a prepared keyway and digs into the part unprovided with a prepared keyway and becomes wedged between the parts to be keyed or fastened together. The gripping edges on the key are preferably formed by removing a portion from one side of the key, which removed portion increases from one end of the key to the other, and thereby forms non-parallel gripping edges. Edges of this non-parallel construction in operation in a keying device such as has been described (wherein the keyway is at an angle with the axes of the parts) produce a shearing effect, in that the entire edge is not presented to the shaft or part at the same time; but (as in the blade of shears) a point or small portion of the edge first engages the part not provided with a prepared keyway, and as this point or small portion engages the shaft or part and digs into same the adjoining points or portions of the gripping edge are brought successively into contact with the shaft or parts, and so on, until the first point of contact is deep into the part or shaft, while the last point is barely in engagement.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a side view of a shaft and wheel provided with the device of my invention. Fig. 2 is a sectional view thereof. Fig. 3 is an end view. Fig. 4 is a view showing the application of a particular construction. Fig. 5 is an end view of hub, showing keyway before bore of hub is enlarged. Fig. 6 is a sectional view thereof. Fig. 7 is the other end view. Figs. 8, 9, and 10 are modifications.

Like letters refer to like parts in the several figures.

Through the bore b' of the hub b extends the axle or shaft a. Adjoining and intersecting the bore b' is the cylindrical keyway b^2, having the axis thereof d^2 in the same plane with and (if extended) intersecting the axis d' of the bore b' at the remote point d. Through the keyway b^2 extends the cylindrical key c, having a portion of its surface, increasing from one end of the key to the other, removed to form the concave side c' and the longitudinal non-parallel edges c^2 c^3.

In the application and operation of the key of my invention I preferably have the hub formed or cast with the bore thereof of less diameter than the diameter of the axle or shaft. This is done for the purpose of hav-

ing solid material in which to drill the keyway, as it is difficult in practice to drill a hole partially intersecting an approximately parallel hole.

As indicated, the axis of the cylindrical keyway is at an angle with or inclined with respect to the axis of the bore of the hub and of the axis of the shaft when the latter is in position. The preferable manner for forming the inclined keyway is to support the hub or other device in an inclined position at the desired angle with respect to the axis of the drilling-tool and after drilling the keyway to then bore out or otherwise enlarge the bore of the hub to the desired size. In Figs. 5, 6, and 7 is illustrated by the dotted lines *e e e* the size to which the bore should be brought after forming, as there shown, the keyway b^2. The hub being placed on the shaft *a*, the key *c* is then placed into position, so that the edges c^2 c^3 bear on or engage the surface of the shaft. It will be observed that a rotation of the shaft in the direction indicated by the arrow *f*, Fig. 3, will tend to partially rotate the key in the opposite direction, or as indicated by the arrow *f'*. This will cause the edge c^2 to dig into the shaft and produce a tight or hard grip or contact, thus forcing the rotation of the hub with the shaft. If the rotation of the shaft *a* be reversed, the other edge c^3 of the key *c* comes into use and the same actions occur in the reversed directions. Should the key work loose by reason of the continual reversal or oscillation of the shaft, the key can again be readily placed into firm contact with the shaft by simply moving the key farther into the keyway.

In Fig. 4 is illustrated a particular form or construction to which the key is particularly applicable, especially if it is desired to change the arm *g* in respect to the scale *h* to the position indicated by the dotted lines. By forcing out the key the arm and hub can be turned to any desired position and there fastened by replacing the key, thus making a great saving in time and expense that otherwise would be expended in preparing new channels.

While in practice I usually and preferably form the edges c^2 c^3 by removing a portion of the key, so that the surface between the edges is cylindrically concave and of a less radius than the radius of the shaft, yet the radius of the concave surface of the key may be greater than that of the shaft and the groove or removed portion of the key forming the edges may be of other form than cylindrical without departing from the spirit of my invention.

In Figs. 8 and 9 are illustrated two modifications. Fig. 8 shows the removed portion of the key *c* as one plane surface, while Fig. 9 shows the removed portion as of more than one plane surface. The operation in these constructions is the same as already indicated, the rotation of the shaft causing the key to rotate until the edge c^2 or c^3 comes into such forcible contact as to cause the hub to rotate with the shaft.

Fig. 10 shows a modification and the application of the invention where the hub or surrounding sleeve is thin, and the keyway is therefore preferably placed in the shaft or inner part.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a keying device, the combination with a driving and driven part one only of said parts having a prepared keyway therein and the axis of said prepared keyway being non-parallel with the axes of the parts, of an axially-rotatable key of circular cross-section adapted to fit in said keyway and having gripping edges provided thereon for engagement with the part not having the prepared keyway, substantially as described.

2. In a keying device the combination with a driving and driven part one only of said parts having a prepared keyway therein, of a cylindrical axially-rotatable key adapted to fit into and partially rotate within said keyway and having one side cut away, the cut-away portion increasing from one end to the other to form gripping edges for engagement with the part not provided with a prepared keyway, substantially as described.

3. In a keying device the combination with a driving and driven part one only of said parts having a prepared keyway at an angle with the axis of the part in which the keyway is located, of an axially-rotatable key having gripping edges provided on the side thereof adapted to engage the part not provided with a prepared keyway, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

FREDERICK T. SNYDER.

Witnesses:
R. A. MATHER,
S. W. DIXON.