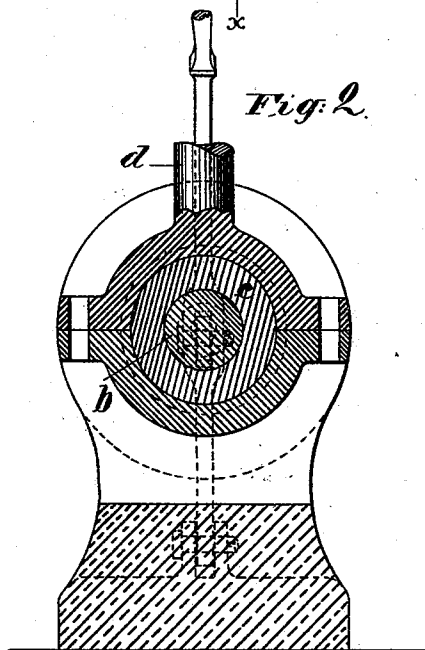
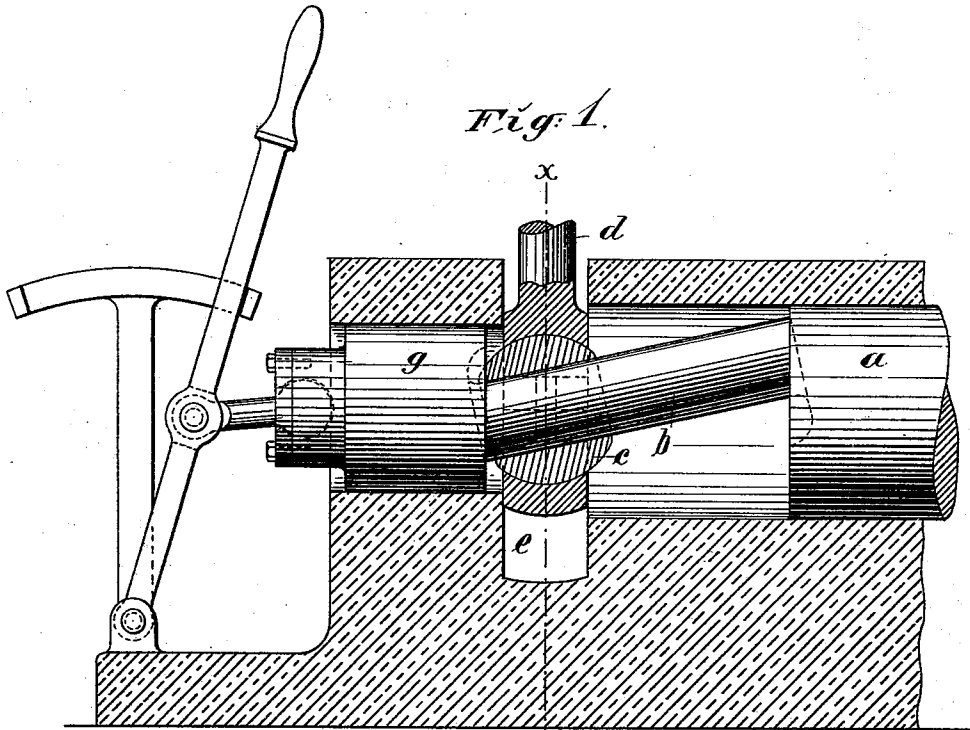


(No Model.)

J. P. JOHANSSON.  
ADJUSTABLE STROKE CRANK.

No. 547,853.

Patented Oct. 15, 1895.



Witnesses.  
*Alex. Scott*  
*Bunyan Olive.*

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his Attorney

# UNITED STATES PATENT OFFICE.

JOHAN PETTER JOHANSSON, OF ENKJÖPING, ASSIGNOR TO B. A. HJORTH & CO., OF STOCKHOLM, SWEDEN.

## ADJUSTABLE-STROKE CRANK.

SPECIFICATION forming part of Letters Patent No. 547,853, dated October 15, 1895.

Application filed June 21, 1895. Serial No. 553,585. (No model.)

*To all whom it may concern:*

Be it known that I, JOHAN PETTER JOHANSSON, a subject of the King of Sweden and Norway, and a resident of Enkköping, Sweden, have invented an Improved Adjustable-Stroke Crank, of which the following is a specification.

This invention relates to devices by means of which the length of the stroke of the reciprocating parts of a machine may be varied in an easy and convenient manner.

In the accompanying drawings the invention is illustrated in Figure 1 in elevation, and in Fig. 2 in a vertical section on the line  $x x$  of Fig. 1.

The devices consist of a driving-shaft  $a$ , which is adapted to be moved in the direction of its length by hand or by any suitable or known means (not needing to be shown) and provided at one end with a crank-pin  $b$ , located obliquely in such a manner that its geometrical axis will describe a conical surface as the driving-shaft revolves. The crank-pin may be attached either eccentrically to the end of the driving-shaft  $a$ , so as to converge to the axis of the latter, as shown in the drawings, or conversely it may be attached to the central portion of the end of the driving-shaft, diverging from its axis. On the crank-pin  $b$  a spherical bearing  $c$  is arranged in which the crank-pin can be shifted longitudinally, said spherical bearing forming at the same time a gudgeon, which fits into a correspondingly-shaped socket in the end of the connecting-rod  $d$ . This rod is guided laterally by the driving-shaft box  $f$ , into which it enters through a recess  $e$ , so that the connecting-rod, with its ball-bearing, cannot be shifted in the direction of the axis of the driving-shaft. The outer end of the crank-pin  $b$  may of course be free; but for the sake of rigidity it is advisable to attach it to the end of a journaled pin  $g$ , whose axis forms a prolongation of that of the driving-shaft  $a$ .

When the driving-shaft is shifted longitudinally in its box  $f$ , and which shifting may be done by hand or by any kind of simple or well-known means, such as shown, but which means do not constitute part of my in-

vention or claims, the crank-pin will cause the ball-gudgeon  $c$ , which cannot move in the same direction as the shaft, to move from or approach the axis of the driving-shaft, and consequently as the latter rotates the center of the connecting-rod end will describe circles of greater or less diameter, according to the position of the ball on the crank-pin, or, in other words, the stroke of the connecting-rod will vary.

By the means described above very slight alterations in the length of the stroke can be made, since the variation in the latter depends directly on the motion of the driving-shaft axially, and this motion may be made very small.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An improved means for varying the length of stroke of reciprocating parts of machinery, consisting of the combination of the following devices, namely, a shaft box, a driving shaft free to be shifted lengthwise, a crank pin at one end of such shaft and placed at an incline relatively to the axis of the shaft, a ball gudgeon in which this pin can be shifted longitudinally, a connecting rod for the reciprocating part of a machine and having an end socket in which the ball gudgeon fits, said shaft-box having a guide recess to prevent shifting of this connecting rod in the direction of the axis of the shaft, the combination being and operating substantially as and for the purposes set forth.

2. In combination, the shaft  $a$ , its shaft-box in which it may be shifted endwise and having a recess  $e$ , oblique pin  $b$ , gudgeon  $c$ , rod  $d$ , and pin  $g$ , all substantially as and for the purposes set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHAN PETTER JOHANSSON.

Witnesses:

H. TELANDER,  
T. RISBERG.