

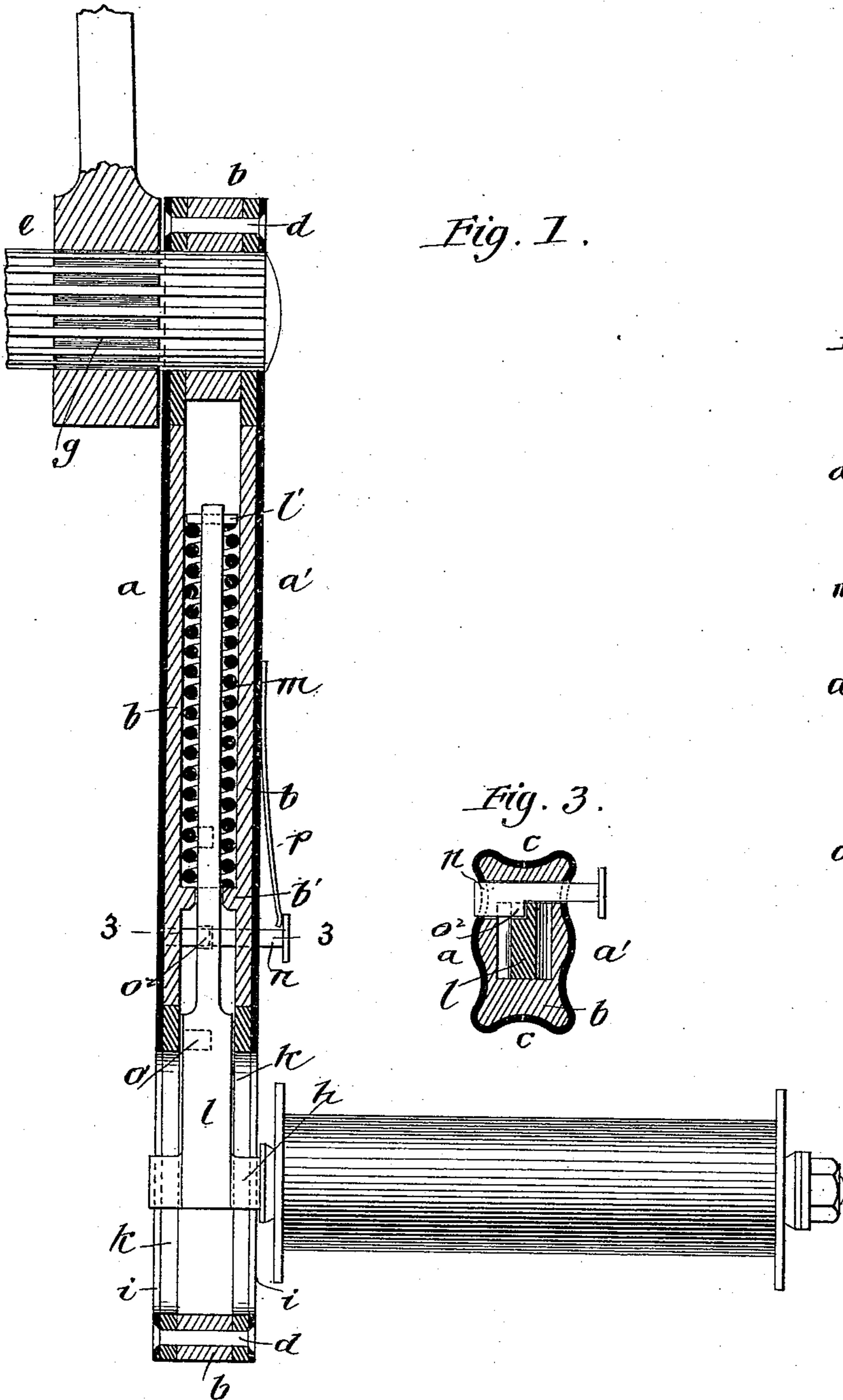
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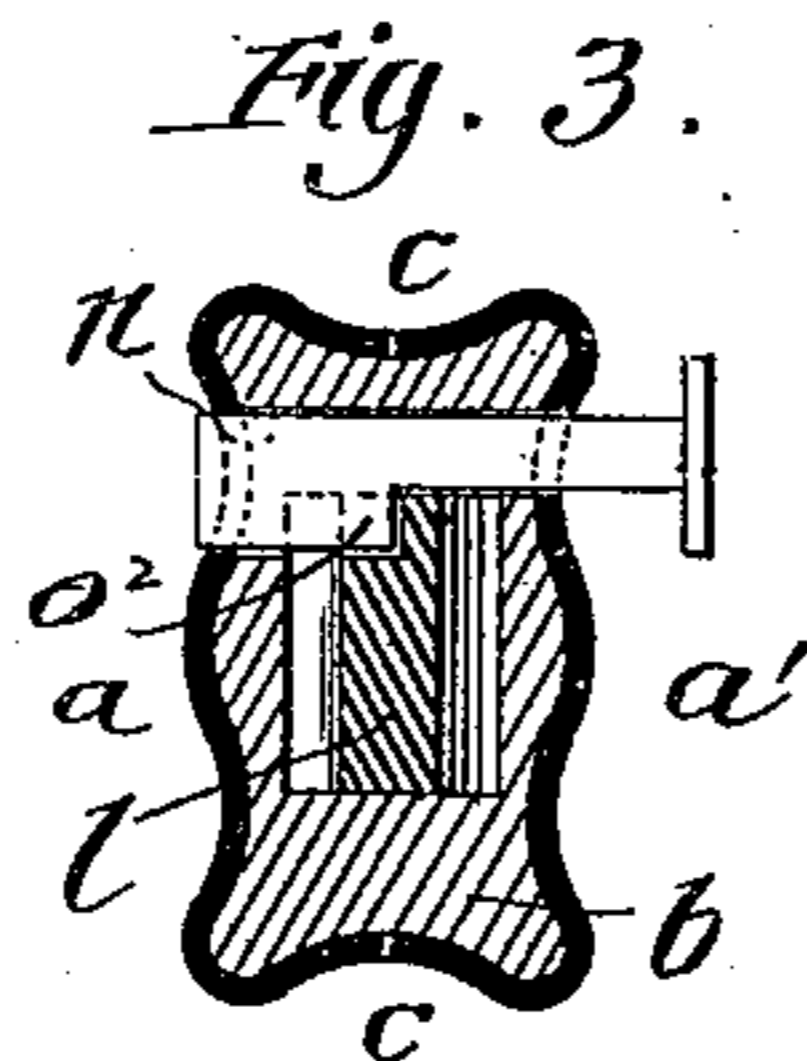
W. BLAKELY.  
CRANK FOR BICYCLES.

No. 446,280.

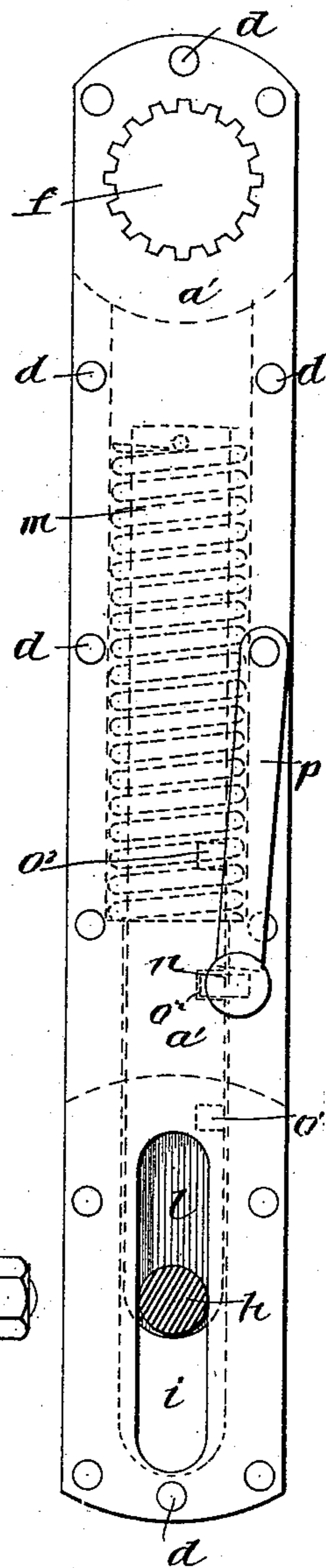
Patented Feb. 10, 1891.



*Fig. 1.*



*Fig. 2.*



*Witnesses.*

C. M. Clark  
C. Sedgwick

Inventor  
W. Blakely.

by many  
Attorneys

(No Model.)

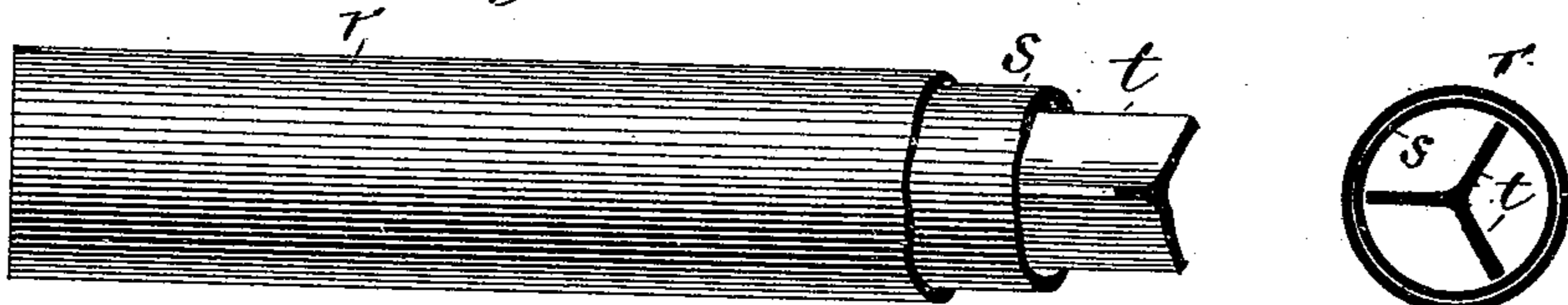
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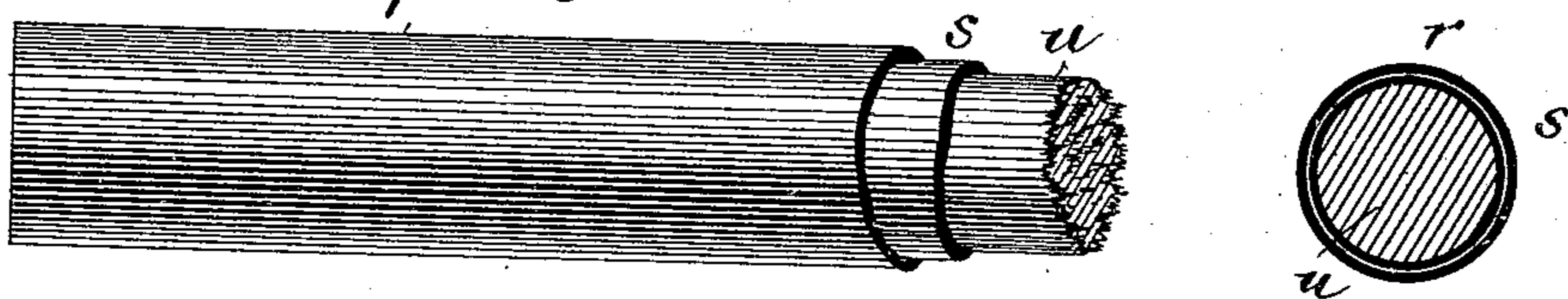
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*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

WILLIAM BLAKELY, OF BOURNEMOUTH WEST, ENGLAND.

## CRANK FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 446,280, dated February 10, 1891.

Application filed July 1, 1890. Serial No. 357,409. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM BLAKELY, engineer, of Vernon, Princess Road, Bournemouth West, in the county of Hants, England, have invented new and useful Improvements in the Construction of the Cranks and Crank-Shafts of Cycles and other Machines and the Bearings Therefor, of which the following is a full, clear, and exact description.

My invention relates to the construction of the cranks and crank-shafts of cycles and other light machines, and is illustrated in the accompanying drawings, forming part of this specification, wherein—

Figure 1 represents a longitudinal section, Fig. 2 a face view, and Fig. 3 a cross-section, (on line 3 3, Fig. 1,) of a bicycle-crank arm. Figs. 4 and 5 show longitudinal and cross-sectional views of modified constructions of crank-axle.

Similar letters of reference indicate like parts in all the figures.

According to my invention I build up the crank of an external shell composed of two stamped sheet-steel plates  $a a'$  upon a core of tough wood  $b$ , whereby I am enabled to combine lightness with strength. The plates  $a a'$  are both stamped up of channeled section, as shown in cross-section in Fig. 3, so that their flanges butt-joint along the edges of the crank-arm, as at  $c c$ , and they are corrugated longitudinally to give increased stiffness. They embrace the wood core, as shown, the whole being firmly united by rivets  $d$ . The crank-arm is slotted at  $i$ , at which point the wood core is replaced or strengthened by metal linings  $k$  to take the wear. The ends of the crank-axle  $e$  are longitudinally fluted, as shown in Fig. 1, and the parts of plates  $a a'$  which form the eyes  $f$  of the crank-arms are stamped with notched edges corresponding to the flutes of the axle, so as when driven onto the ends of the axle they will be securely keyed thereon by the interlocking flutes without the use of any loose keys. The flutes may continue throughout the length of the axle  $e$ , the flutes at the parts which form the journals being either filled up with agate or other hard material to form a cylindrical journal, as at  $g$ , or being left wholly or partially fluted for the purpose of holding lubricant. The flutes at the other parts of the axle or shaft serve to

receive the keys of the other parts of the driving-gear (if any) to be keyed thereon. I further provide means of varying the radius of the crank-pin or pedal at the will of the rider for hill climbing or running on level roads. For this purpose the pin  $h$ , on which the pedal is mounted, is fitted to slide in the longitudinal slot  $i$  in the crank-arm, the edges of said slot being lined with metal  $k$ , as above mentioned. The pin  $h$  is carried by a bar  $l$ , fitted to slide telescopically within the crank-arm, the wood core of which is made hollow to receive it. This bar  $l$  is of oblong cross-section, so as to have the necessary transverse strength, and it is surrounded by a spiral spring  $m$ , of oval form in section, which is confined between a cross-pin  $l'$  at the inner end and a shoulder  $b'$  on the core of the crank-arm, so as to tend to draw the crank-pin inward to its shortest radius. It is shown in its mid-position in Fig. 1, and is locked in either of these positions by a spring locking-bolt  $n$ , sliding through a transverse slot in the crank-arm and adapted to engage with either of three notches  $o' o^2 o^3$  in the edge of the arm  $l$ . The locking-bolt  $n$  is drawn into engagement with one of said notches by a spring  $p$ , and the head of the locking-bolt projects from the face of the crank-arm in such position that it may be conveniently pressed inward to disengage the bolt from the notch in the arm  $l$  by a side motion of the rider's foot at the same time that by pressure of the same foot on the pedal the crank-pin may be moved along the crank-arm to a greater radius, or by relaxing the pressure of the foot the spring  $m$  is permitted to act so as to draw the crank-pin inward to a less radius, as the case may be, the bolt in either case relocking the sliding bar automatically. Thus the radius of the cranks or pedals may be altered by the rider without dismounting and while the vehicle is running.

Fig. 4 shows a mode of constructing an axle or shaft of two or more thin steel or other metal tubes  $r s$ , shrunk the one on the other and upon a core  $t$ , formed of a metal rod of triangular (or it may be cruciform) cross-section.

Fig. 5 shows a similar tubular construction, the outer tube being shrunk on the inner one, which is filled by a core  $u$  of hard tough wood,

such as lance-wood, iron wood, or hickory dried, and forced tightly into the inner tube. By these constructions a light and very stiff shaft or axle is produced, which is not likely  
5 to spring or bend under the weight of a heavy rider.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—  
10

1. The herein-described construction of crank-arms of a shell formed of stamped steel plates clamped upon a wood core, as specified.

2. An improved crank-arm formed of a core  
15 and an external shell of sheet metal and provided with a notched eye, substantially as described.

3. Fluting the axle-journals and filling the flutes with agate or other hard material, as  
20 specified.

4. The combination, with a fluted axle, of a crank formed of a core and a sheet-metal shell and provided with an eye notched to correspond with the flutes of the axle, substantially as herein shown and described.  
25

5. The combination of a hollow crank-arm,

a bar to which the pedal is connected, fitted to slide in the crank-arm, a spring for drawing the bar into the crank-arm, and a spring-pressed bolt engaging the bar to lock it in position in the said crank-arm, substantially as described. 30

6. The combination, with a hollow crank-arm having its lower end slotted, of a bar to which the pedal is connected, fitted to slide  
35 in the crank-arm and having its lower end projecting into the slot thereof, a spring surrounding the bar in the crank-arm, and a spring-pressed bolt for engaging the bar to lock it in position in the crank-arm, substantially as described. 40

The foregoing specification of my improvements in the construction of the cranks and crank-shafts of cycles and other machines and the bearings therefor signed by me this 10th  
45 day of April, 1890.

WILLIAM BLAKELY.

Witnesses:

GEO. J. B. NUNKLIN,

W. J. NORWOOD,

Both of 17 Gracechurch Street, London, E. C.,  
Notary's Clerks.