

(No Model.)

3 Sheets—Sheet 1.

M. B. RYAN.  
FOLDING BICYCLE.

No. 518,330.

Patented Apr. 17, 1894.

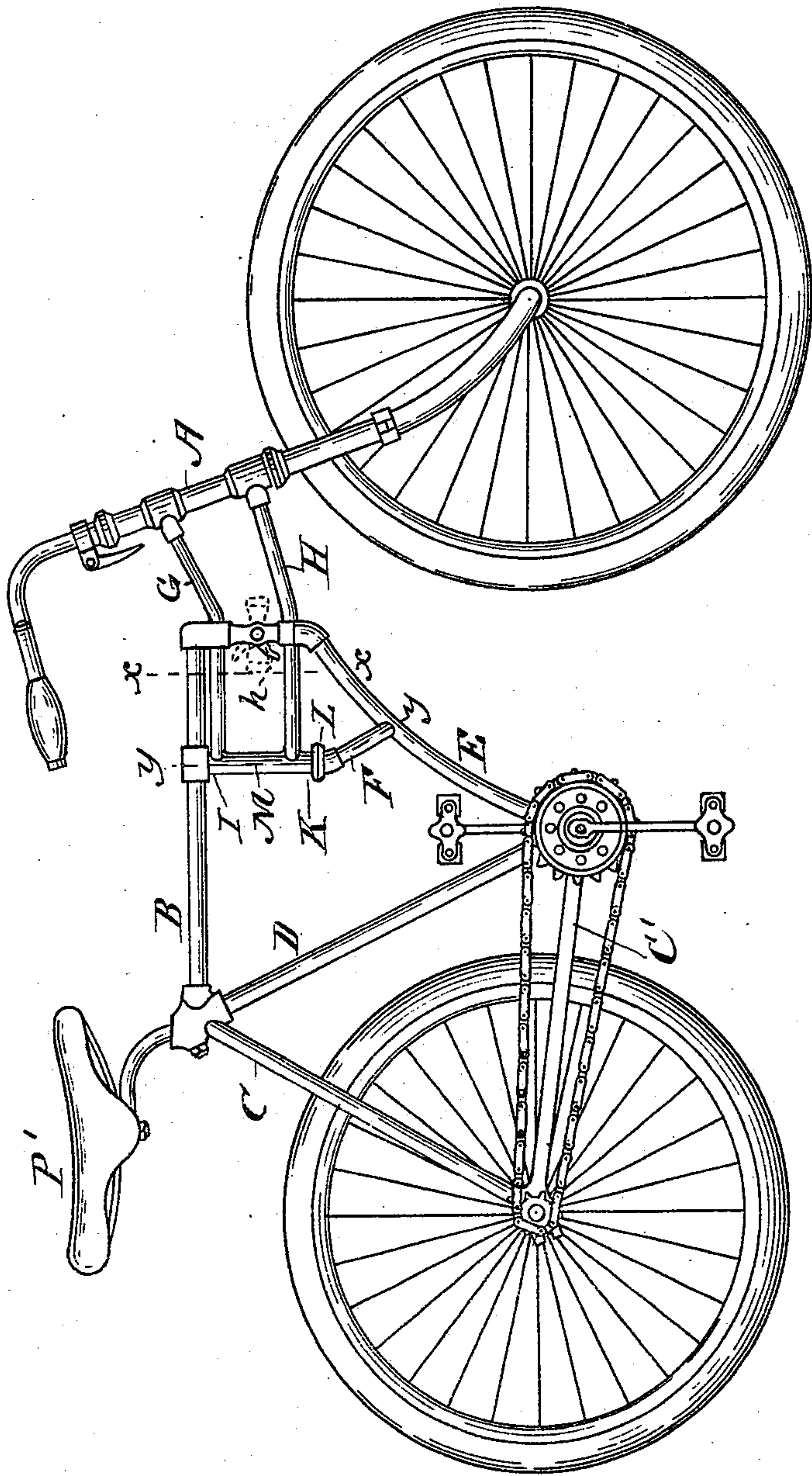


Fig. 1.

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INVENTOR  
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By Bowdoin S. Parker  
his Atty.

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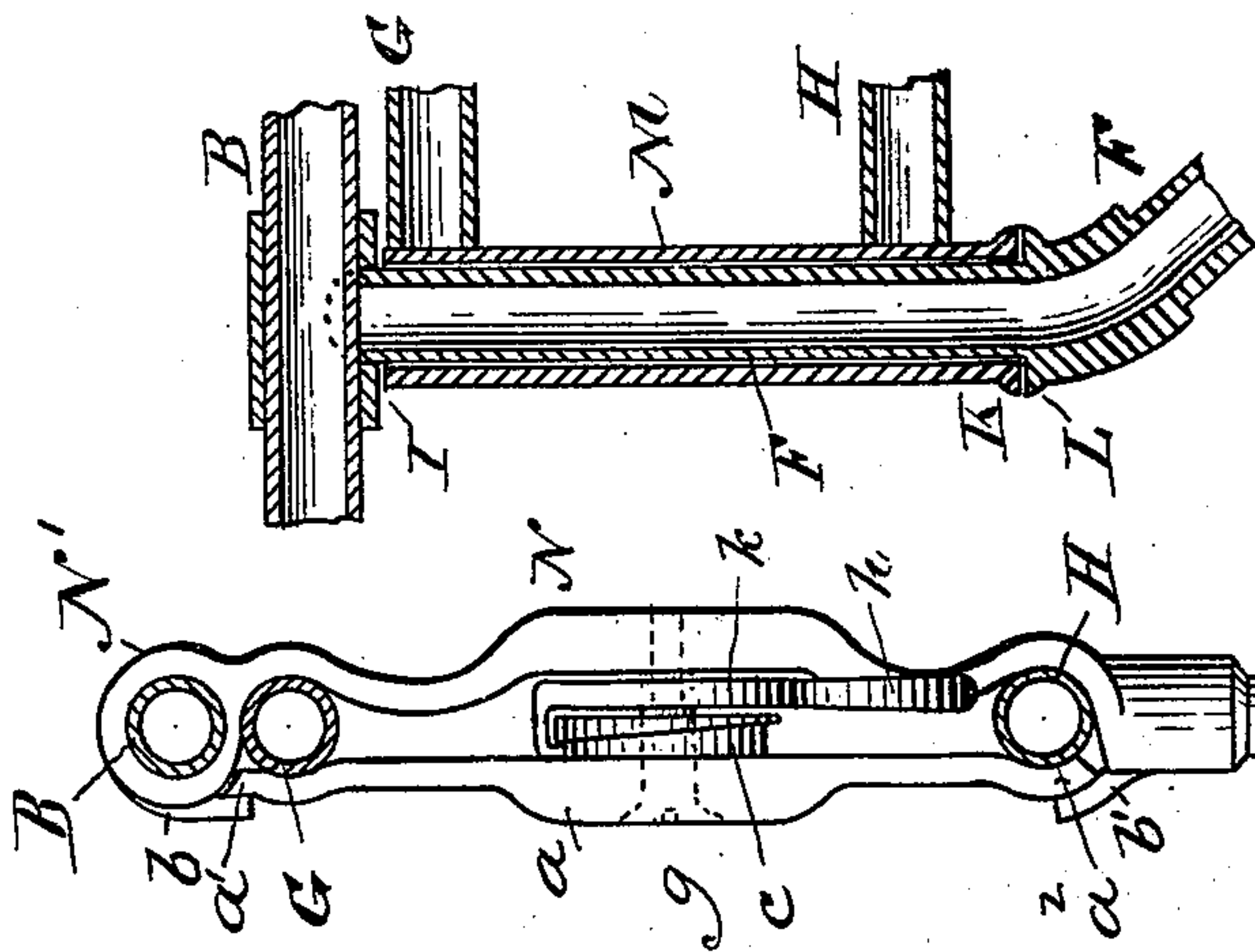


Fig. 4.

Fig. 5.

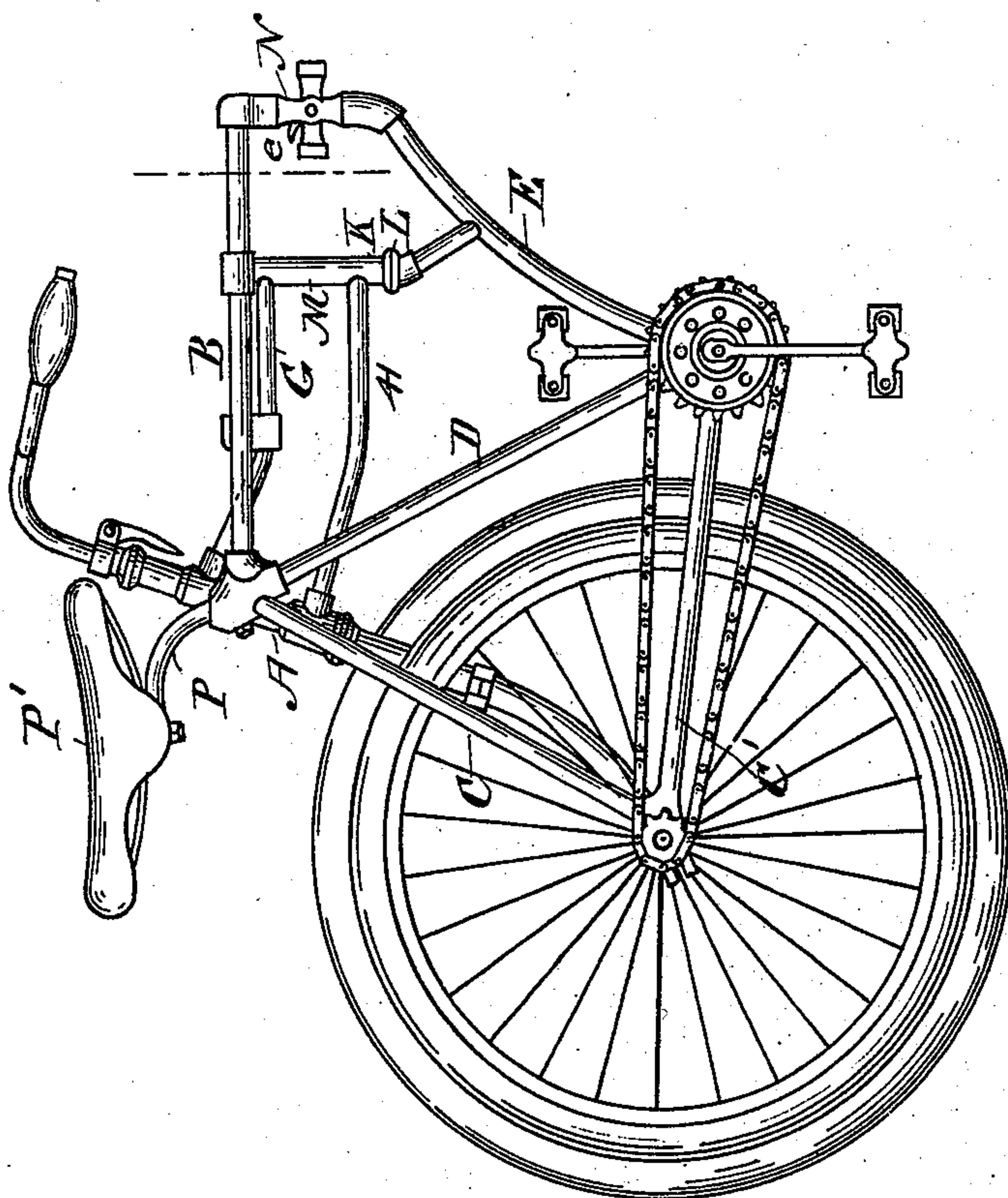


Fig. 2.

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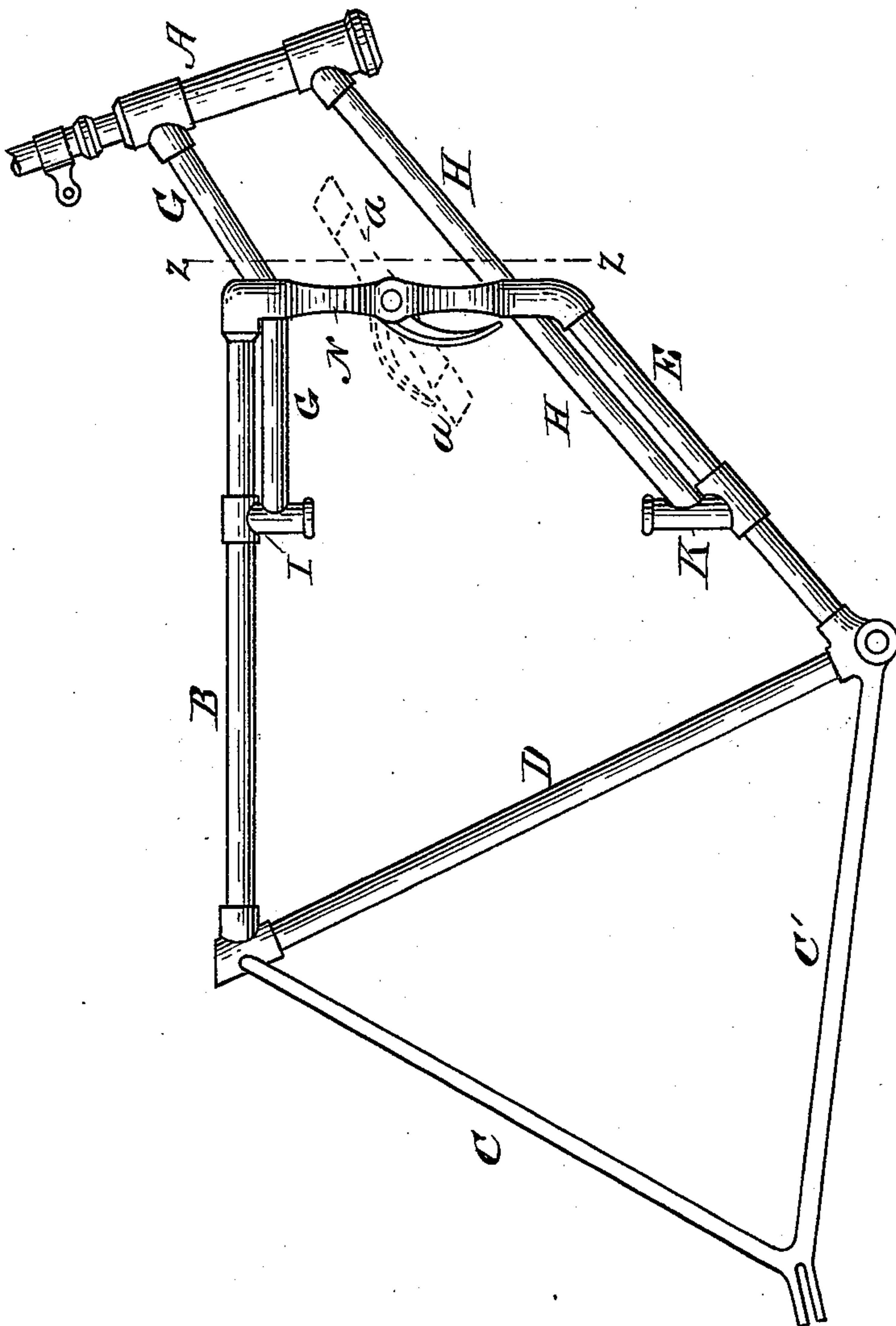
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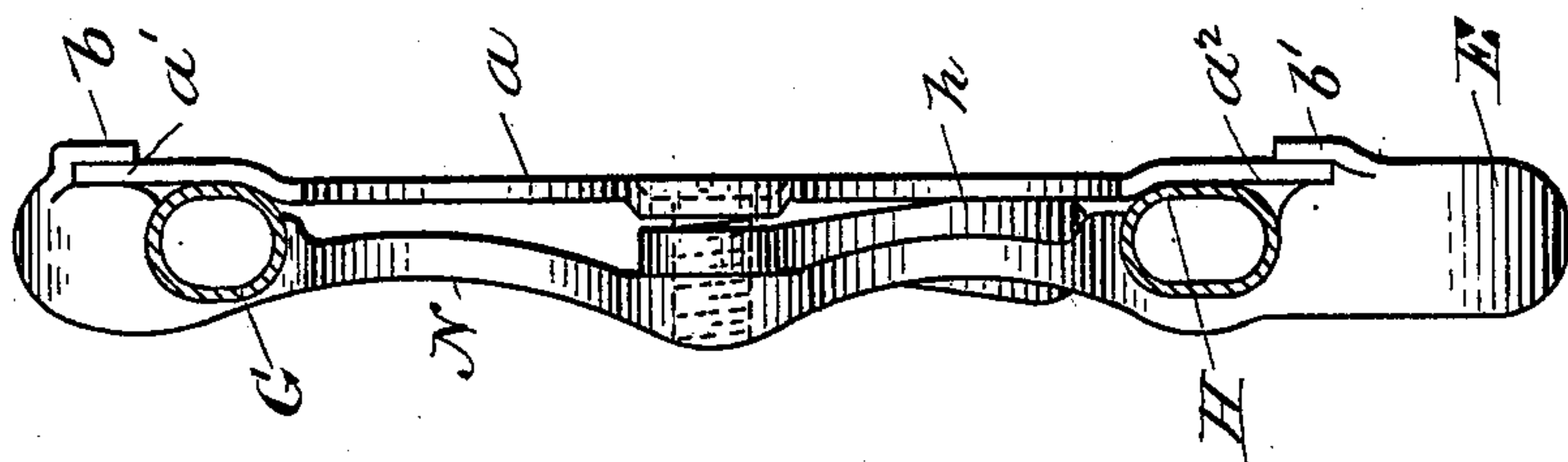
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# UNITED STATES PATENT OFFICE.

MICHAEL B. RYAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO CHARLES L. BACKUS AND CHARLES F. LINCOLN, OF ANDOVER, CONNECTICUT.

## FOLDING BICYCLE.

SPECIFICATION forming part of Letters Patent No. 518,330, dated April 17, 1894.

Application filed December 26, 1893. Serial No. 494,747. (No model.)

*To all whom it may concern:*

Be it known that I, MICHAEL B. RYAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Folding Bicycles, of which the following, taken in connection with the accompanying drawings, is a specification.

Like letters of reference indicate corresponding parts.

My present invention relates to bicycles and more especially to a new style in which the frame folds upon itself, and in which a peculiar form of frame is devised giving great strength.

Figure 1 is a side elevation of the bicycle in usual form for use. Fig. 2 is an elevation representing the article folded. Fig. 3 is a sectional elevation of clasp device on line  $x, x$  of Fig. 1. Fig. 4 is a sectional elevation on line  $y, y$ , of Fig. 1. Figs. 5 and 6 are a modification.

The principal object of my present invention is to produce a bicycle, so constructed that it can be easily folded and thus take up less space in length, when not in use or when transported or stored. This object I attain by means of a novel construction of parts which will be hereinafter explained.

In a device of this character, it is essential that the frame itself should not be weakened and the several parts must be fully secured by easily and quickly adjusting locking mechanism. All of these requisites I have provided. The general style, wheels, pedals and running parts are of the ordinary pattern in use; indeed, my improvements are easily applied to all the ordinary bicycles in market.

It is unnecessary to explain the ordinary parts. I will therefore confine my explanation more especially to the special improvements to which my present invention particularly relates.

Referring to the drawings, the frame proper consists of the front standard A. the bar B. the back standards C. and D. with the braces E. and F. The connecting bars or rods G. and H. are peculiar to the folding mechanism. The brace E. being secured at its lower end with standard D. rises in an angle of sufficient degree to give a strong longitudinal

support to the extremities of the frame; it also makes a support for the bar B. and brace F. with interlocking rods G. and H. The upper end of brace E. also forms a portion of the interlocking parts as shown in Fig. 3. and represented by N. The forward end of bar B. is firmly secured to the upper end of brace E. at N'. The button piece  $a$ . extends in both directions from its center, one end overlapping the rod G, when the parts are interlocked, and the opposite end of  $a$ . overlapping rod H. similarly. I also preferably form a catch or something of like nature upon the inside of part N. one at the top and the other at the bottom as indicated by  $b, b'$ . Fig. 3. I also extend the ends of button  $a$ . and suitably form each end, so that the ends  $a'$ . and  $a''$  of button  $a$ . will slide into catch parts  $b, b'$ . and thus more securely hold the button  $a$ . in place, and also more firmly hold the rods G. and H. interlocked. The cam device for securing or interlocking the button  $a$ . is shown in Figs. 1 and 3, and consists of a cam part  $c, d$ . and the cam lever  $k$ . The cam part may be formed of two plates, in which case  $c$ . would represent one and  $d$ . the other, or they may be formed of one piece the cam part being represented by  $c$ . and the wedge part by  $d$ . The cam lever  $k$ . is formed to overlap or hook over the edge of part  $d$ . as shown in Fig. 3. When the cam lever  $k$ . is thrown up the upper end or hook or catch part slides around the plates and the plates are released or loosened, of course the end of the cam bar or lever will slide around on the part  $c$ . and the wedge or bevel formed by the part  $d$ . will press more or less upon the end of lever according as the lever is shifted. When the lever is pressed down the hook end will follow the bevel of the wedge of part  $d$ . until it reaches its thickest part and by this means will tightly clamp the cam plates and the button  $a$ . to which, the cam plates are attached. A rivet  $g$ . passes through the button, cam plates and cam lever into the part N. This form of cam device operates very similarly to the ordinary window catches or fastenings employed to secure the two sashes together. In Fig. 1 the dotted lines indicate the position of the cam lever  $k$ . when thrown up, releasing the button  $a$ . and permitting it



to be turned so as to release the interlocked bars G. and H.

The cam device may be held in place by a variety of means, and arranged to operate in several well known ways, upon the button. The brace F. is secured to brace E. and extends upward to bar B. to which it is united. Upon the upper end of brace F. is formed upon it, a sleeve M. said sleeve extending from point indicated by I. to K. Fig. 4, the bottom of sleeve M. resting upon a collar L. attached to or integral with brace F. To the sleeve M. are secured the rods or bars G. H. the opposite ends being secured to standard A. This construction forms an elongated hinge joint by which the two parts of the frame are united. The braces E. and F. may be each formed of one continuous piece of metal or they may be composed of several pieces joined together in any suitable manner. The essential thing being that they be so formed and placed as to give the requisite stability to the frame structure and aid in supporting a movable folding connection between the different parts of the frame and provide a suitable interlocking device in connection therewith.

The mode of folding the bicycle is as follows: Throw up the cam lever *h*,—turn the button *a*. quarter round. This releases the bars G and H. and the standard A. and forward wheel is turned or folded back, the sleeve hinge M. allowing the bars G and H. to be turned carrying standard A. and parts with them. The two portions being brought together can be secured by a simple catch, lock or similar device. To reverse the operation it is only necessary to bring the bars G and H. forward against the support N. fitted to receive the said bars and which forms the upper end of brace E. Then turn the button *a*. its ends entering the catch device attached to part N. therefor and indicated by *b*. *b'*., and finally tightening cam *k*. by turning the cam lever *h*. downward to its proper position. The cam devices will bring the button *a*. tightly upon the bars G and H. The several parts will thus be securely interlocked, and the whole frame as strong, stiff and secure as if made of one rigid immovable frame.

The operation of folding or unfolding the machine takes but a moment, and the advantages of such a construction are self evident.

I do not confine myself to the precise construction shown and described as it is evident that the details may be varied and still not depart from the spirit of my invention. For instance the brace F. may be shortened so as to merely form a bearing for a hinge joint at or near its junction with brace E. and the upper end of brace F. dispensed with, in this case the rod H. would be bent or inclined to correspond with brace E. and hinged at a point near the lower end of brace F. and rod G. would be hinged directly to bar B. at point I, the two hinges being placed substantially in a line one above the other. Such a modi-

fication I illustrate in Fig. 6. In both instances, I get the principles of my folding device and the longitudinal bracing and frame support hereinbefore mentioned. Again, the folding connection between the standard and back frame, might consist of one rod, instead of the two rods G and H. although this latter construction would not be as serviceable.

I prefer the form illustrated in Fig. 1; the modification, however, shown in Figs. 5 and 6, (Fig. 5 being a section on line *z, z* of Fig. 6,) would be a strong and serviceable construction.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The herein described folding bicycle, consisting of the standard A. bar B. frame standards C, D, braces E and F. the connecting rods G. H. sleeve M. button *a*. and suitable wheels, saddle, pedals, and connecting parts, all arranged and adapted to operate substantially as and for the purposes set forth.

2. In a bicycle the standard A. the bar B. the rods G and H. suitably hinged to the after part of the machine, and secured to said standard A. the brace E, provided with the part N. and suitable means for securing or interlocking the said rods G and H. to part N. combined and adapted to operate substantially as and for the purposes set forth.

3. In a bicycle, the herein-described interlocking mechanism consisting of the part N. of brace E. suitably formed to receive one or more connecting rods, secured to the front standard of the machine and having a hinged connection with the after part of the machine and in rear of said interlocking mechanism; the cam plates *c* and *d*. and the button *a*. movably secured to said part N. and adapted to hold the said connecting rods interlocked all substantially as and for the purposes set forth.

4. In a bicycle, the brace E. provided with the part N. suitably formed to receive one or more rods, connecting the front standard A. with the after part of the machine by a hinged connection, and also having suitable catches *b*. and *b'*. near the ends of said part N. the button *a*. adapted to turn so that the ends *a'* and *a''*. of said button will enter said catches *b* and *b'*. and said button will interlock the said connecting rods when placed between the part N. and the button, the cam plates *c* and *d*. and cam device *k*. all arranged, combined and adapted to operate as an interlocking mechanism, substantially as and for the purposes set forth.

5. In a bicycle, the combination of the bar B. the brace E. having the part N. the cam device *k*. *c*. *d*. and the button *a*. suitably secured to part N. in connection with said cam device, with one or more connecting rods secured to the main front standard A. and having a suitable hinged connection with the after part of the machine, substantially as described.



6. In a bicycle, the combination of the bar  
B. brace E. provided with the part N. adapt-  
ed to receive one or more rods connecting the  
front standard with the after part of the ma-  
chine by a suitable hinged connection and in  
5 combination therewith, and suitable means  
for securing said connecting rods to said part  
N. 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, on this 22d day of December, A. D. 1893.

MICHAEL B. RYAN.

Witnesses:

CHAS. F. LINCOLN,  
BOWDOIN S. PARKER.