(No Model.) 3 Sheets—Sheet 1.

D. C. STOVER & W. A. HANCE.

BICYCLE.

No. 418,142. Patented Dec. 24, 1889.

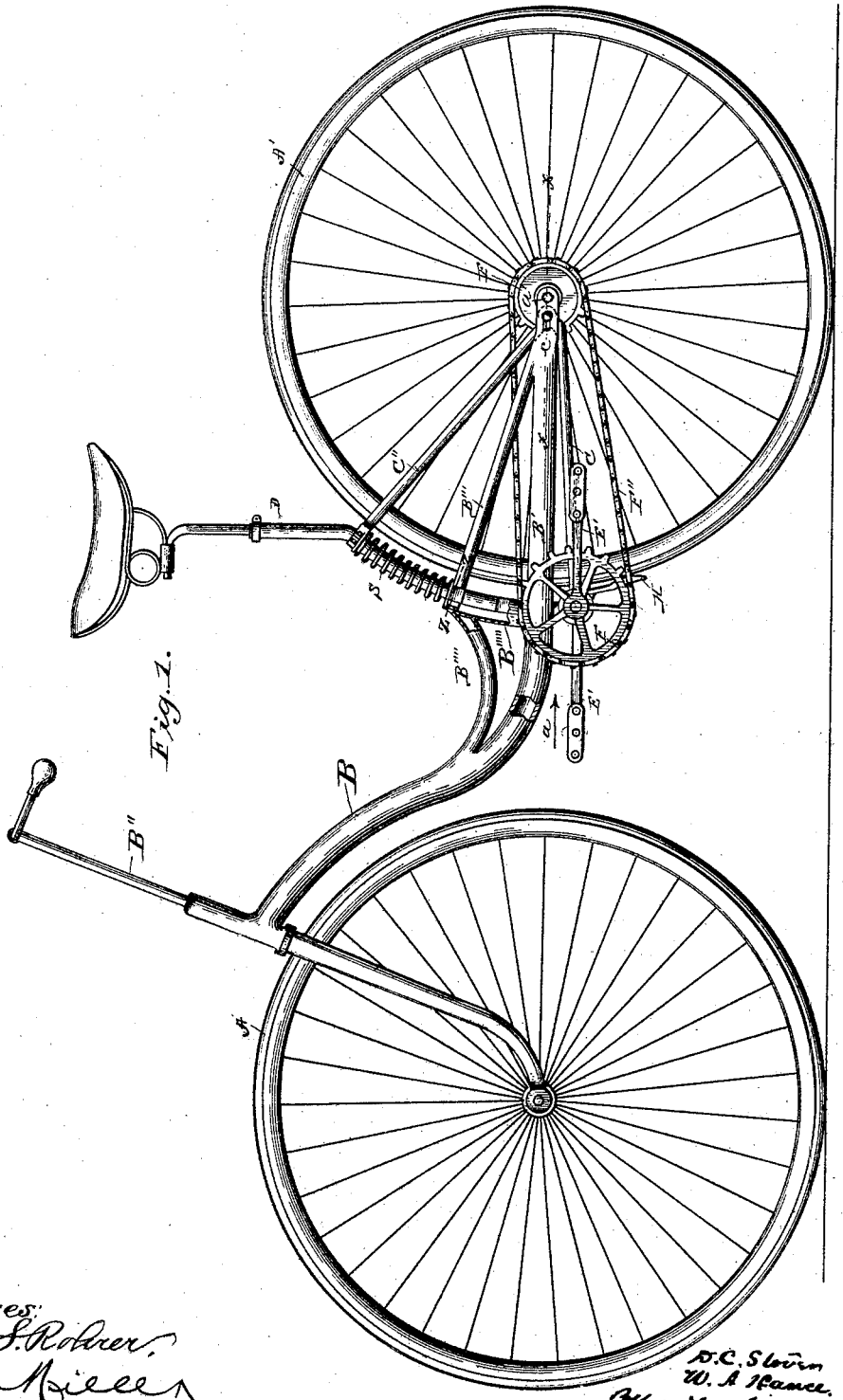

Fig. 1.

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BICYCLE.

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Fig. 2.

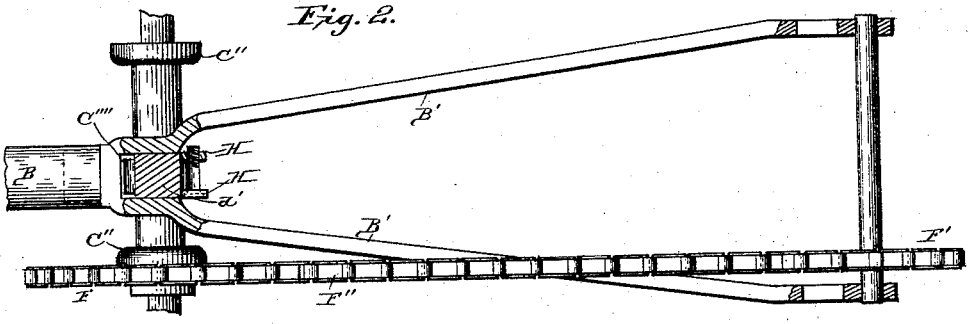


Fig. 8.

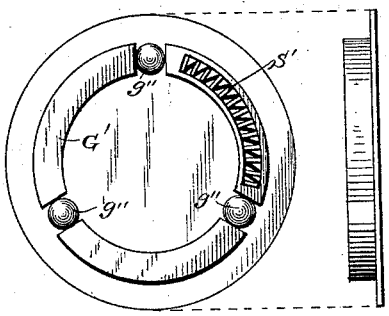


Fig. 9.

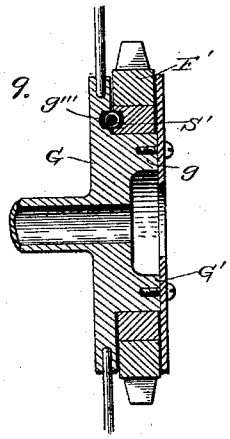
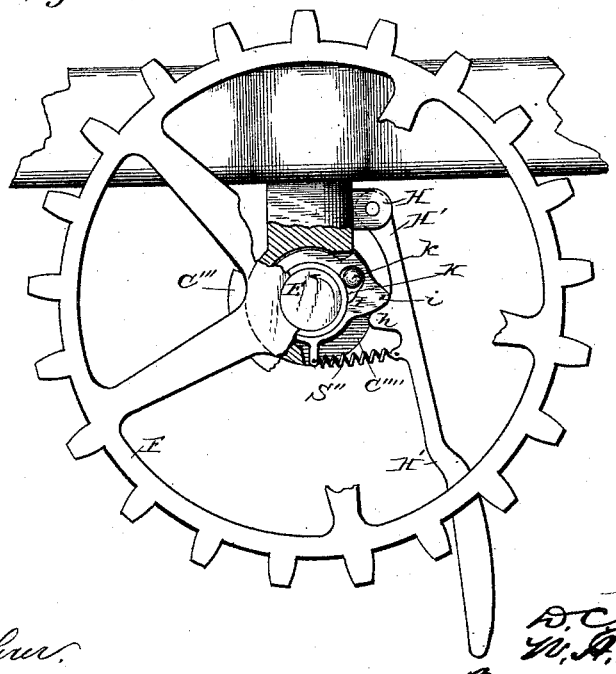


Fig. 10.



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(No Model.) 3 Sheets—Sheet 3.

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BICYCLE.

No. 418,142. Patented Dec. 24, 1889.

Fig. 4.

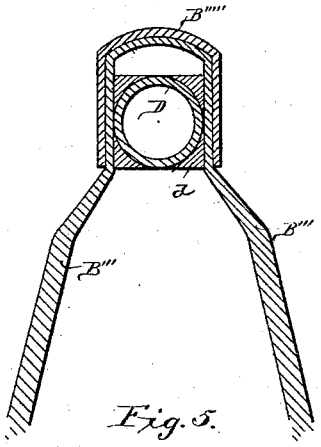
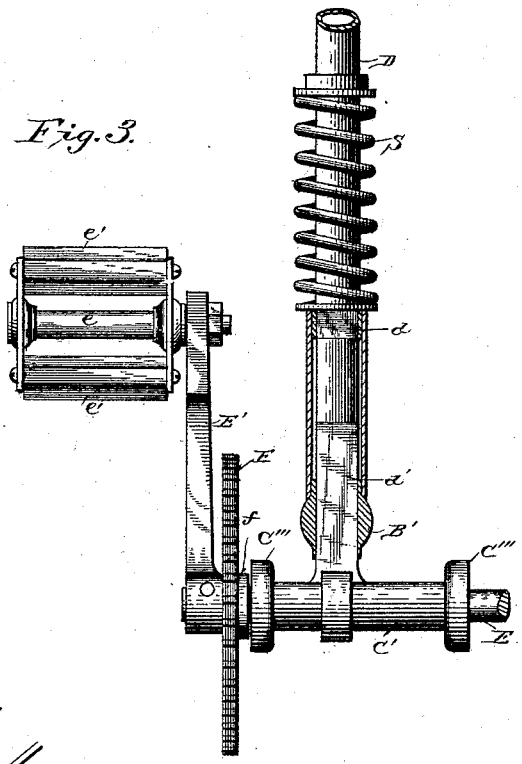


Fig. 5.

Fig. 3.



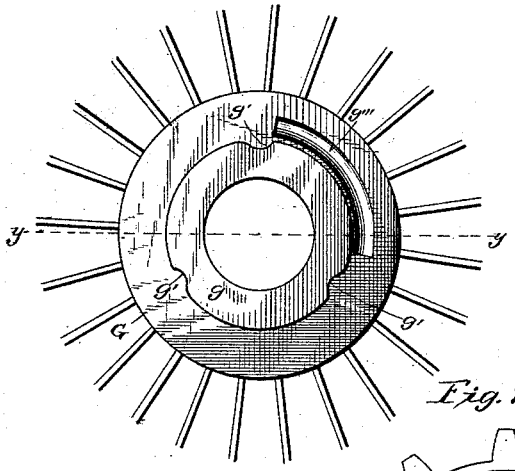


Fig. 6.

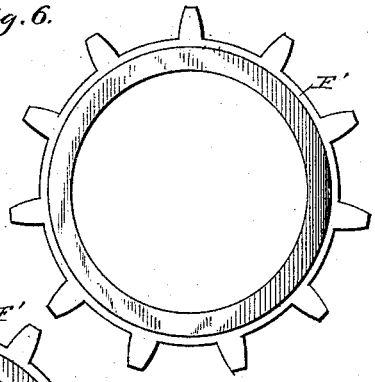
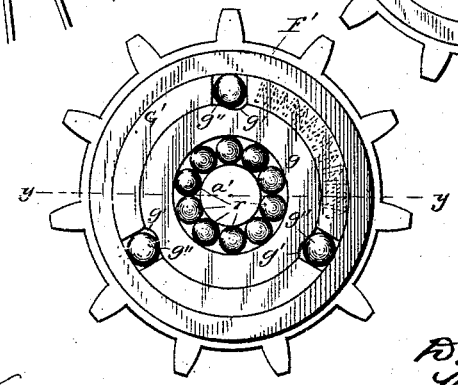


Fig. 7.



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UNITED STATES PATENT OFFICE.

DANIEL C. STOVER AND WILLIAM A. HANCE, OF FREEPORT, ILLINOIS, ASSIGNORS TO THE STOVER BICYCLE MANUFACTURING COMPANY, OF SAME PLACE.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 418,142, dated December 24, 1889.

Application filed August 22, 1889. Serial No. 321,611. (No model.)

To all whom it may concern:

Be it known that we, DANIEL C. STOVER and WILLIAM A. HANCE, residents of Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Bicycles; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to improvements in bicycles, and is fully described and explained in this specification, the object and nature of the invention being set forth in detail in such explanation and description.

In the accompanying drawings, which illustrate the invention, Figure 1 is a view of a complete bicycle, partly in side elevation and partly in vertical section. Fig. 2 is a view, partly in top plan and partly in horizontal section, showing the forks B′ C in their relative positions and in connection with certain other parts of the machine, the plane of section being through the line X X, Fig. 1. Fig. 3 is a view, partly in front elevation and partly in vertical section, showing a portion of the main frame and of the vertically-oscillating seat-frame and other parts connected therewith. Fig. 4 is an oblique section through the line Z Z, Fig. 1. Figs. 5, 6, 7, 8, and 9 are detail views illustrating the connection of the rear sprocket-wheel F′ with the hub of the rear wheel of the machine, Fig. 9 being a section through the line Y Y of Figs. 6 and 7. Fig. 10 is an enlarged view, partly in side elevation and partly in vertical section, illustrating the brake mechanism mounted on and operated by the shaft of the main sprocket-wheel F.

In the views, A A′ are the front and rear wheels, respectively, of a bicycle, said wheels being loosely mounted on their axles *a a′*, the front wheel being of ordinary construction and the rear wheel also being of ordinary construction except as to its hub, which has certain peculiarities, whose nature and purpose are hereinafter fully set forth.

A backbone B, of ordinary tubular form, is provided at its rear end with two members B′ B′, forming a fork whose ends are fastened to the axle *a′* of the rear wheel, and a slightly-oblique standard B″ is journaled in the front end of the backbone, and is provided with a fork whose lower ends are fastened to the front axle *a*. The backbone B and fork B′ are strengthened by means of oblique braces B‴, extending forward and upward from the rear ends of the members B′, and an oblique brace B⁗, extending backward and upward from a point on the backbone in front of the junction of the backbone with the members B′, the backbone and the braces B‴ B⁗ being bound together and formed into a solid truss by a short standard B⁗′, extending upward from the backbone to the junction of the braces. This connecting-standard is U-shaped in horizontal section, its rear edge being open, and the braces B‴ are joined together at their front ends and bent to coincide with the inner surface of the standard, as illustated in Fig. 4, the inner faces of those parts of the braces lying within the standard being preferably parallel, as shown in said figure. The backbone B, fork B′, braces B‴ B⁗, open standard B⁗′, and swiveled standard B″ form the main frame of the machine, and this frame supports the seat and the operating mechanism in the manner hereinafter described.

To the rear end of the main frame above described is pivoted a vertically-oscillating seat-supporting frame made up of two lower members C, whose front ends are rigidly fastened to and connected by a tubular shaft-box C′, two oblique braces C″, extending upward and forward from the rear ends of the members C, and a standard D, rigidly connecting the box C′ with the front ends of the braces C″. The rear end of the oscillating frame lies between the members B′ of the main frame, and is pivoted in said members in such a way as to allow slight adjustment of the point of connection of the two frames for the purpose of moving the oscillating frame forward or back with reference to the main frame. That portion of the standard D between the box C′ and the front ends of the braces C″ is an arc of a circle having for its center the pivot of the oscillating frame, and lies partly within and partly above and below the standard B⁗′ of the main frame. The curved standard D is in the main cylindrical in form, but is provided with two squared portions *d d′*, fitted closely and slid-

ing freely up and down in guides in the main frame, as illustrated in Figs. 2 and 4, the squared portions of the standard being so placed in the guides in the main frame as to permit the adjustment from front to rear provided for by the manner of pivoting the oscillating frame to the main frame. A stop *c* is rigidly fastened to the standard D at the upper end of the curved portion referred to, and a spring S is interposed between this stop and the upper surface of the standard B'''' of the main frame, thus supporting the oscillating frame in its normal position and offering a yielding resistance to its downward movement with reference to the main frame. The standard D extends vertically upward from the upper end of the curved portion referred to, and supports at its upper end a seat adjustably fastened to it in the ordinary manner and for the ordinary purpose.

In the box C' at the front end of the oscillating frame is journaled a shaft E, the box being provided with enlarged chambers C''', for receiving ball or roller bearings of ordinary construction, and on this shaft are rigidly keyed or otherwise fastened two cranks E' and a sprocket-wheel F. A second sprocket-wheel F' is mounted on the rear axle *a'* of the machine, and a chain F'' connects the two sprocket-wheels and transmits the rotation of the driving-sprocket F to the driven sprocket-wheel F'. The adjustment of the oscillating frame with reference to the main frame in the manner hereinbefore described provides for increasing or decreasing the distance between the sprocket-wheels, and thus renders it possible to tighten or loosen the chain without changing the position of either of the axles *a a'* of the machine.

It is evident from the foregoing description that the rider's seat and the driving sprocket-wheel F will always be separated by the same distance, since they are both supported by the oscillating frame, and this construction is a very great advantage, since it permits free vertical movement of the rider's seat with reference to the main frame without that variation of the distance between the seat and the sprocket-wheel shaft which is a disagreeable feature of the operation of many machines of this class.

In the use of a bicycle it is frequently convenient to be able to stop the motion of the driving-cranks while the machine moves forward and the wheels rotate, and we have illustrated in Figs. 5, 6, 7, 8, and 9 a mechanism providing for such cessation of the motion of the cranks whenever it may be desirable. In this figure, G is the hub of the rear wheel of the machine, and is provided on its outer face with a hollow boss *g*, formed with cam-shaped peripheral notches *g'*. The ring G' encircles the boss *g* and carries in suitable slots a series of balls or rollers *g''*, corresponding in relative positions with the notches *g'* of the boss. The sprocket-ring F' encircles the ring G', its inner circumference being in contact with the balls or rollers *g''*. A spring S', lying partly in a groove *g'''* in the face of the hub G, and partly in a corresponding groove in the contiguous face of the ring G', presses the ring in the direction indicated by the arrow on the sprocket in Fig. 7, and thus holds the balls or rollers *g''* in contact with the inner circumference of the sprocket-ring and with the outer surface of the boss *g*. The axle *a'* of the wheel lies within the boss *g*, and is held in position with reference thereto by means of anti-friction balls or rollers *r* in the usual manner, and a suitable end plate binds all the parts together. It is evident that so long as the sprocket-wheel is rotated in the direction indicated by the arrow in Fig. 7 the balls *g''* will bind between the sprocket-ring and the boss *g*, and thus form a rigid connection of the sprocket-ring and the hub of the wheel *a'*, and, on the other hand, if the sprocket-wheel be stopped and the wheel A' continue to move in the same direction as before, the balls *g''* will drop back into the deeper portions of the notches *g'*, and thus disconnect the sprocket-ring and hub. In other words, the device illustrated and described is a friction-clutch adapted to connect the sprocket-ring with or disconnect it from the hub, as desired. This being the case, it is evident that when the machine is moving forward the cranks E' and sprocket-wheel F may be held stationary, and the wheel A' will at once be disconnected from the sprocket-ring F', leaving the wheels A A' free to rotate. It is thus possible when the machine is running down an incline to hold the pedals stationary with the feet, while both wheels A A' turn freely, and this is a great improvement over the ordinary construction, in which the feet must either move with the cranks so long as the machine moves forward, or if taken from the cranks must be returned thereto while the cranks are rotating.

In every machine of this class it is necessary to provide some sort of a brake and means for pressing it against the rim of one of the wheels. The principal element of the brake-operating mechanism has heretofore been a hand-lever; but as the first movement when it is desired to stop the machine is naturally the reversal of the motion of the cranks of the driving-sprocket we have embodied in this machine a brake mechanism adapted to be operated by such reversal of the crank motion, the mechanism referred to being illustrated in Fig. 10. In this figure, H is one of two similar ears formed on the rear face of the standard of the oscillating frame at a point a short distance above the box C', and H' is a brake whose upper end lies between and is pivoted to said ears, while its lower end has a concave rear face in close proximity to the rim of the wheel A'.

C'''' is an enlargement of the box at a point in the vertical plane of the standard,

and this enlargement is recessed to make room for a ring I, fitted loosely on the shaft E and provided with a rearwardly-projecting lug *i*, which rests upon and inclined lug *h* on the front edge of the brake H′. A spring S″ is fastened to the brake H′ and to a lug *i′* upon the lower margin of the ring I, and draws the two parts together, thus holding the brake out of contact with the wheel and lifting the lug *i* of the ring upward to its limit of motion. A cam-shaped notch K is formed in the inner margin of the ring I, and incloses a ball or roller *k*, which impinges upon the surface of the shaft E. It is evident that so long as the shaft E turns in the direction indicated by the arrow in Fig. 10 the ball or roller *k* will be loose in the notch in which it lies and the ring I will be disconnected from the shaft E; but that if the rotation of the shaft be reversed the ball or roller will drop down into the narrow lower end of the notch and bind the ring and shaft together, thus pressing the lug *i* of the ring downward and forcing the brake against the wheel. This is in fact a friction-pawl arrangement adapted to leave the ring free from the shaft so long as the latter turns in the direction indicated by the arrow, but to rigidly connect the ring and shaft whenever the motion of the latter is reversed. This construction not only does away with a considerable part of the operating mechanism, but it also enables the operator to set the brake by the reverse movement of the cranks, which, as has been said before, is naturally the first movement made by the operator when he desires to stop the machine. This feature of construction is not only advantageous itself, but it is especially adapted for use with mechanism permitting the stopping or reversal of the cranks while the wheels of the machine are in motion, since its combination with such mechanism enables the operator to instantly stop the cranks and put his weight upon the brake-operating mechanism.

It is evident that many of the details of construction of this machine may be varied without affecting the principle of operation of its important elements. We desire, therefore, not to limit our invention to the precise forms shown and described herein, but to secure by Letters Patent what we believe to be new therein, as set forth in the following claims, to wit:

1. The combination, with the wheels, their axles, and the main frame connecting the axles, of a second frame supporting the seat and the driving-shaft and having its rear end connected to the main frame by pivots adjustable in distance from the rear axle, a spring supported by the main frame and itself supporting the front end of said second frame, sprocket-wheels mounted, respectively, upon said driving-shaft and rear axle, and a drive-chain connecting the sprocket-wheels, substantially as and for the purpose set forth.

2. The combination, with the wheels A A′ and their axles *a a′*, of the frame connecting them and made up of the backbone B, forks B′ braces B‴ B⁗, standards B⁗′, and swiveling standard B″, journaled in the backbone B, and provided with a fork *b*, the lower end of the fork *b* being supported by the axle *a* and the rear end of the fork *b′* by the axle *a′*.

3. The combination, with the sprocket-wheel F, of the hub G, having the boss *g*, formed with the peripheral notches *g′*, the ring G′, carrying the balls *g″*, the spring S, interposed between the ring and hub and holding them normally in proper relative positions, the sprocket-ring F′, encircling the ring G′ and having its inner circumference in contact with said balls, and the chain F″, connecting the sprocket-wheels F F′, substantially as and for the purpose set forth.

4. In a bicycle, the combination, with the wheels and their axles, of a frame supported by and connecting the axles, a driving-shaft supported by the frame and provided with means for its rotation, a brake adapted to be pressed against the rim of one of the wheels of the machine, and means connecting said driving-shaft with the said brake, whereby the backward rotation of the shaft presses the brake against said wheel-rim, substantially as and for the purpose set forth.

5. The combination, with the wheels A A′ and their axles, of the frame supported by and connecting the axles, the driving-shaft E, supported by the frame and provided with cranks for its rotation, the oscillating brake H, adapted to be pressed against the rim of the wheel A′, the ring I, loosely mounted on the shaft and adapted when rotated backward to press the brake against the wheel-rim, and means interposed between the ring I and the shaft E, whereby backward rotation of the shaft rotates the ring backward, thereby pressing the brake against the wheel-rim, substantially as and for the purpose set forth.

6. The combination, with the wheel A′, shaft E, and cranks E′, of the oscillating brake H, adapted to be pressed against the wheel, the ring I, loosely mounted on the shaft E and provided with a lug *i*, adapted when pressed downward to press the brake against the wheel-rim, and the pawl *k*, interposed between the ring I and shaft E and adapted to permit forward rotation of the shaft without movement of the ring, but to bind the shaft and ring together when the rotation of the shaft is reversed, substantially as and for the purpose set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

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WILLIAM A. HANCE.

Witnesses:
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