No. 617,681. Patented Jan. 10, 1899.

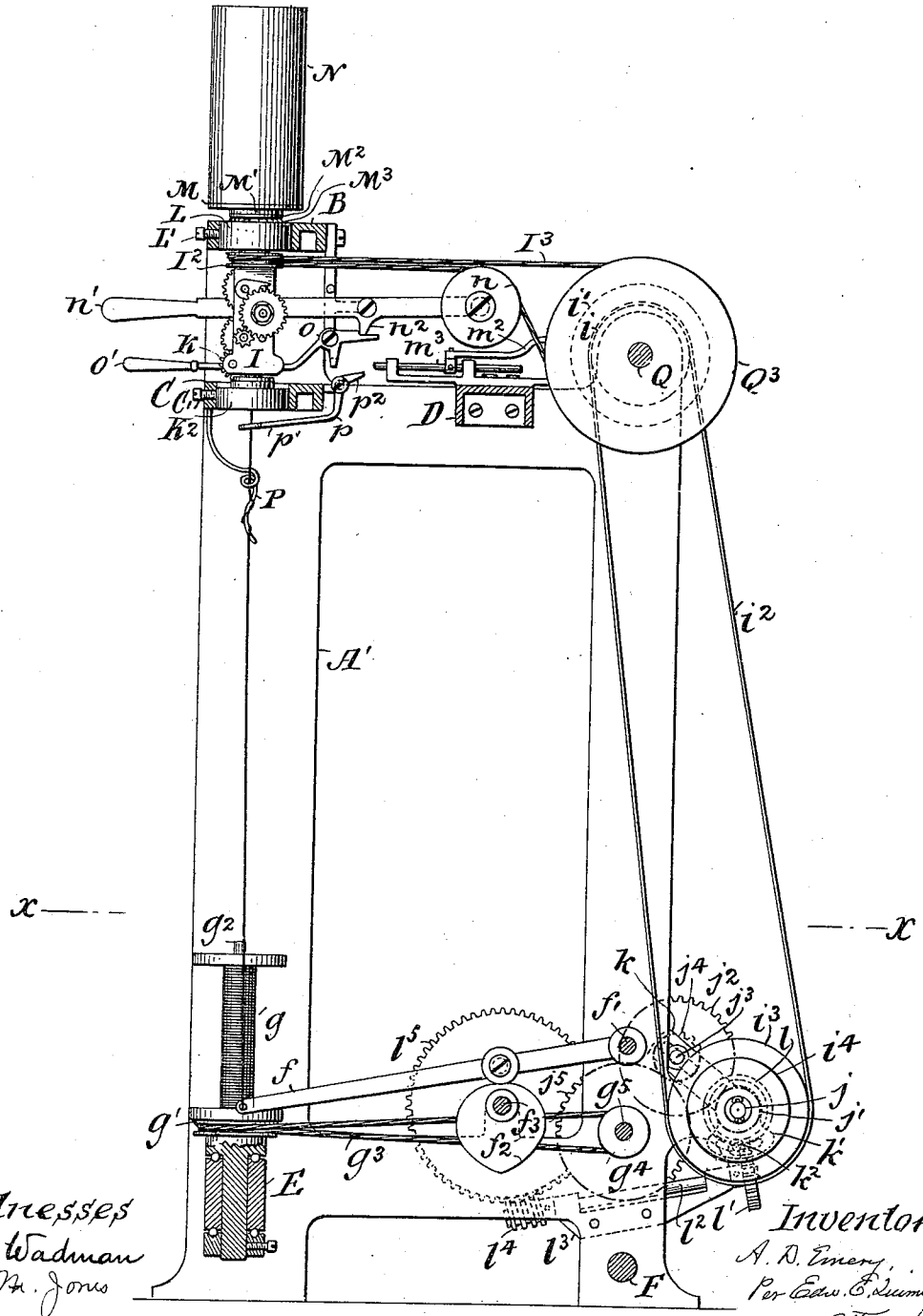
A. D. EMERY.

SPINNING HEAD.

(Application filed Feb. 25, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1



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3 Sheets—Sheet 2.

Fig. 2

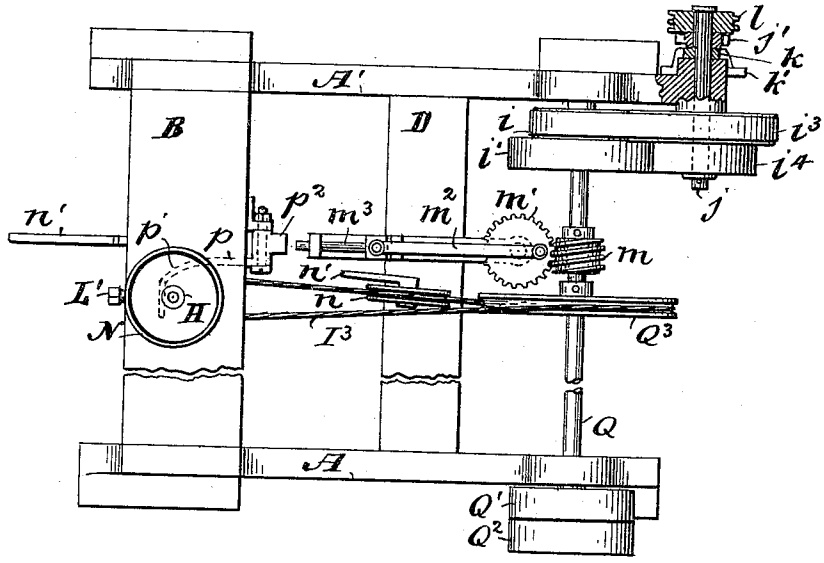

Fig. 3

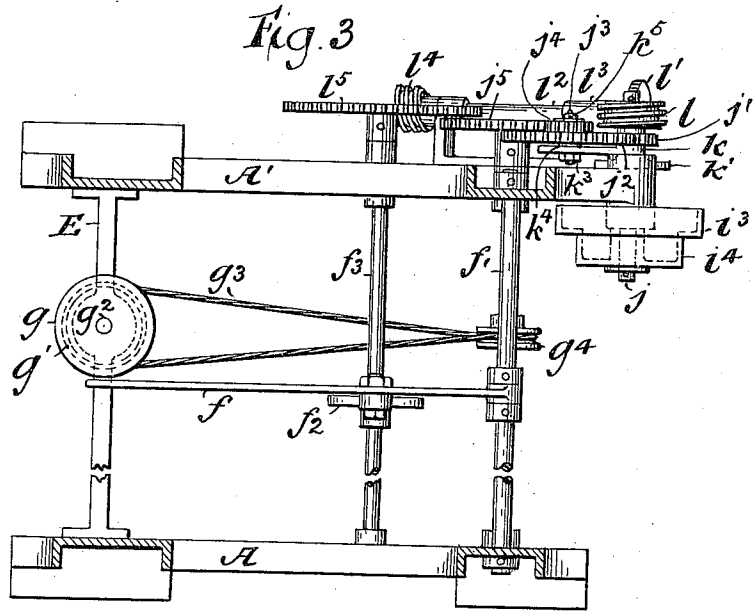

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Fig. 5

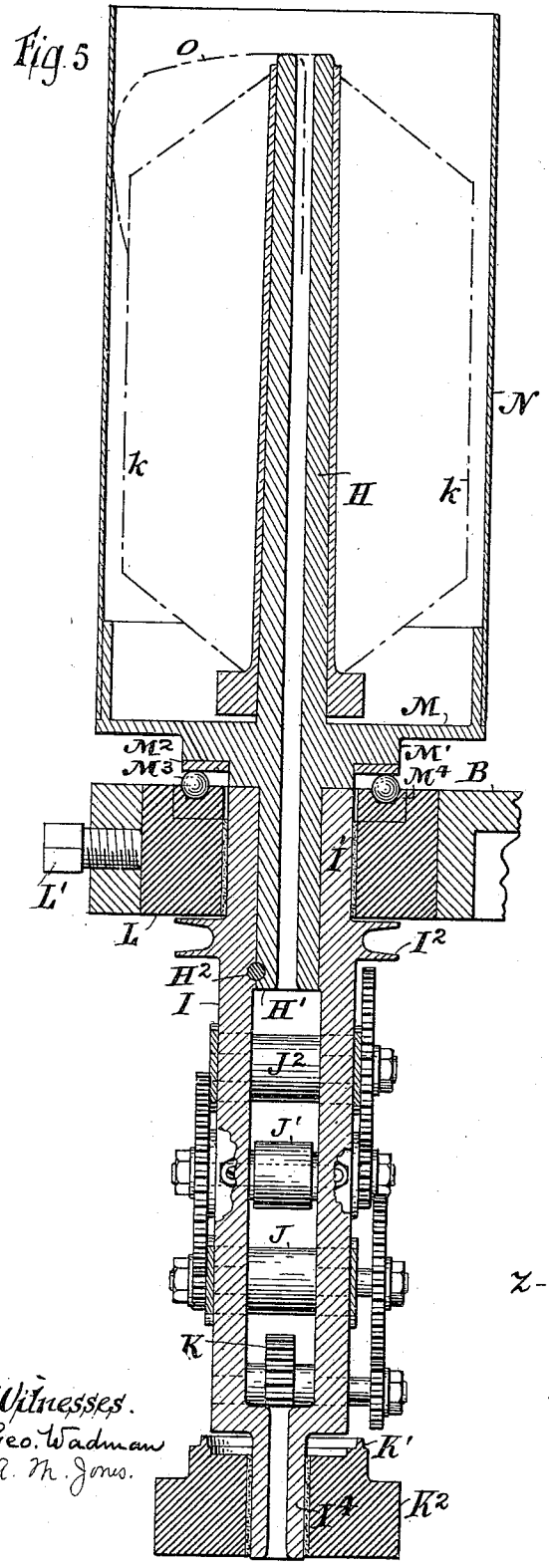


Fig. 7

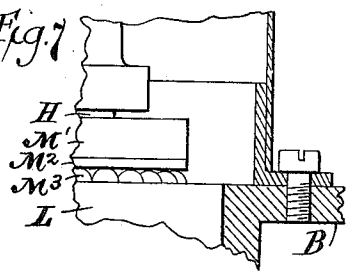


Fig. 6

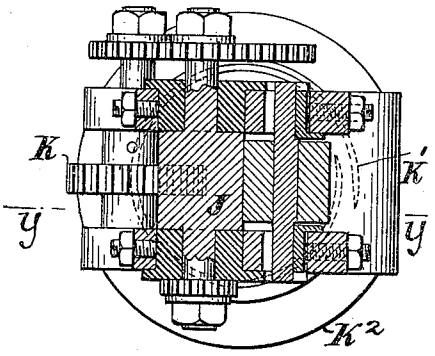
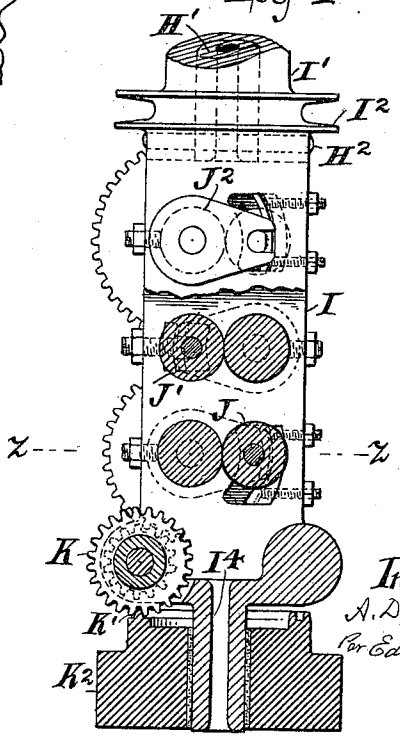


Fig. 4



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UNITED STATES PATENT OFFICE.

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SPINNING-HEAD.

SPECIFICATION forming part of Letters Patent No. 617,681, dated January 10, 1899.

Application filed February 25, 1898. Serial No. 671,574. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, of Taunton, Massachusetts, have invented certain Improvements in Spinning-Heads, of which the following is a specification.

This invention belongs to the class of spinning-heads heretofore invented by me in which the roving-bobbin is concentrically supported in upright position within a drum surmounting a draw-roll frame carrying a system of pairs of draw-rolls which rotate upon horizontal axes, while the draw-roll frame, the drum, and the bobbin rotate upon a common vertical axis, and in which the roving is progressively unwound from the bobbin by centrifugal force and thrown tangentially against the inner wall of the drum and thence led downwardly through a central vertical aperture in the lower head of the drum to the draw-rolls, by which it is drawn down at a prescribed rate and receives its twist at its point of delivery from the lowest pair of draw-rolls.

The present invention embraces two improvements. First, the bobbin is carried upon a hollow spindle connected to and projecting upwardly from the draw-roll frame instead of, as heretofore, upon a spindle secured to and projecting downwardly from the top head of the said rotating drum, and, secondly, the shield for limiting the range of tangential throw of the roving is a hollow cylinder which may be open at its upper end and which is supported in a position concentric with the spindle either upon the frame of the machine or preferably upon the edge of a horizontal disk with which the base of the spindle is provided. As will be obvious, this construction greatly facilitates the application of the bobbin to or its removal from the spindle, lessens the weight of the rotating structure, and renders the exact centralization of the spindle with relation to the axis of rotation of the draw-roll-carrying frame more easily and certainly attainable than in my former construction, in which the spindle is secured to and depends downwardly from the top head of a rotating drum.

The accompanying drawings of a spinning-head, embodying an illustration of the invention, are as follows, viz:

Figure 1 is an elevation in which there is conventionally represented an upright frame supporting a spinning-head and spooling mechanism, together with a driving-band engaging a whirl on the spinning-head, the horizontal members of the frame being shown in section. Fig. 2 is a top view of the structure represented in Fig. 1. Fig. 3 is a horizontal section on the plane indicated by the dotted line $x\ x$ on Fig. 1. Fig. 4 is an elevation of one of the sides of the draw-roll frame which are at right angles to the axes of rotation of the draw-rolls, partly in section on the plane indicated by the dotted line $y\ y$ on Fig. 6. Fig. 5 is an axial vertical section of the spinning-head, showing the cylindrical shield affixed to and rotating with the hollow bobbin-holder. Fig. 6 is a transverse section of the spinning-head on the plane indicated by the dotted line $z\ z$ on Fig. 4. Fig. 7 is a vertical section showing a portion of the frame adjoining the upper bearing of the spinning-head and illustrating the modification in which the cylindrical shield surrounding the roving-bobbin is supported upon the frame.

The drawings embrace a representation of a spinning-head frame composed of two uprights A A′, united by horizontal members B, C, D, E, and F, and a single example of a vertical spinning-head and winding appliances, the frame being adapted to support a multiplicity of such vertical spinning-heads and winding appliances arranged side by side, together with the necessary shafting and gearing for operating the same.

The spinning mechanism containing the present improvements consists, broadly, of a rotating spinning-head embracing, first, an upright hollow spindle H, connected to or formed integrally with the hollow trunnion H′ and adapted to rotate upon its geometrical axis and to carry a bobbin of roving; secondly, a draw-roll frame I, provided at the top with the hollow trunnion I′ for containing the hollow trunnion H′ and provided with a whirl I^2 for engaging a driving-band I^3, by which the said draw-roll frame and spindle are rotated upon a common vertical axis, the hollow trunnion H′ being secured in the upper end of the draw-roll frame by the transverse pin H^2. Thirdly, a system of three superposed

pairs J, J′, and J² of draw-rolls mounted in said draw-roll frame and rotated upon their parallel horizontal axes by motion derived from a toothed wheel K, mounted upon the lower end of the draw-roll frame and engaging a spiral worm or scroll K′, occupying a horizontal plane and erected upon the top of the box K², in which the hollow trunnion I⁴ at the lower end of the draw-roll frame has its bearing. This mode of imparting motion to the draw-rolls is the same as that shown and described in my pending application, Serial No. 624,112.

The upper bearing for the spinning-head is afforded by the removable box L, which is seated in a vertical aperture in the horizontal girder B and secured by the set-screw L′, as shown in Fig. 5. The aperture in which the box L is secured is preferably made large enough to allow clearance for the draw-roll frame and the gearing mounted thereon, so that the spinning-head can easily be removed from or replaced in the frame if occasion arises.

The box K², in which the trunnion I⁴ at the lower end of the draw-roll frame has its bearing, is seated in a vertical aperture in the girder C, wherein it is secured by the set-screw C′, as shown in Fig. 1.

The bobbin-holder H is affixed to or preferably formed integrally with the cupped disk M, having on its under side the boss M′, underneath which is the hardened-steel ring M² for bearing upon a system M³ of balls adapted to travel in the circular groove formed in the hardened-steel ring M⁴, seated in the top of the box L. In Fig. 5 a full-sized bobbin of roving is indicated by the dotted line *k k*.

When the spinning-head revolves, the roving is detached from the bobbin by centrifugal force and is thrown against the cylindrical shield N, which may either be seated upon the cupped disk M, so as to revolve with the spinning-head, as shown in Fig. 5, or may be mounted upon the top of the girder B, as shown in Fig. 7, so that it will be concentric with the axis of the bobbin-holder.

The detached roving, as indicated by the dotted line O in Fig. 5, is led into the upper end of the hollow bobbin-holder H and downwardly therethrough to the draw-rolls. The lowest pair J of draw-rolls, as is customary, rotate slightly faster than the upper pairs of draw-rolls and deliver the roving through the hollow trunnion I⁴ to the usual tension device or so-called "pig-tail" P. As shown and described in my pending application, Serial No. 624,112, the twist is given to the roving at its place of exit from the lowest pair of draw-rolls. From the pig-tail the roving extends down to the traverse-arm *f*, by which it is appropriately fed to the spool *g*, loosely mounted upon the rotating disk *g′* and the stem *g²*, by the frictional influence of which the spool is rotated.

The traverse-arm *f* is loosely mounted upon the horizontal bar *f′*, extending entirely across the frame, and is vibrated by the heart-cam *f²*, affixed to the cam-shaft *f³*, also extending entirely across the frame. The disk *g′*, carrying the spool *g*, is rotated by the band *g³* from the pulley *g⁴*, affixed to the horizontal shaft *g⁵*, extending entirely across the frame.

The number of traverse-arms and the number of spools will of course equal the number of spinning-heads mounted upon the frame. Motion to rotate the cam-shaft *f³* and the spool-driving shaft *g⁵* is transmitted by any suitable gearing from the main driving-shaft Q, which is provided at one end with the fast and loose pulleys Q′ and Q². At appropriate intervals the main shaft Q has affixed to it the spinning-head driving-pulleys, one of which, Q³, is shown in the drawings as engaging the driving-band I³ for rotating the adjacent spinning-head.

The shaft Q has affixed to it two adjoining pulleys *i* and *i′* of different diameters for engaging the driving-belt *i²*, by which rotation is imparted to one or the other, as the case may be, of the pulleys *i³* and *i⁴*, affixed to the counter-shaft *j*, which is rotated at different rates of speed, according to which pair of pulleys *i* and *i³* or *i′* and *i⁴* is engaged by the driving-belt *i²*. The counter-shaft *j* has its bearing in the upright A′. As represented in the drawings, the pulleys *i³* and *i⁴* are arranged upon the part of the counter-shaft *j* which projects inside the standard A′. On the portion of the shaft *j* which projects outside the upright A′ there is affixed the pinion *j′*, which engages the change-gear *j²*, loosely mounted upon the adjustable stud *j³*. Affixed to the gear *j²* and also loosely mounted upon the stud *j³* is a pinion *j⁴*, which engages the gear *j⁵*, affixed to the spool-driving shaft *g⁵*. The stud *j³* is given the capacity of adjustability for the purpose of permitting the removal of the gear *j²* and its attached pinion *j⁴* and the substitution of others in their places, as occasion may demand, in order to communicate to the spool-driving shaft *g⁵* the required rate of rotation. To this end the stud *j³* is carried by the upper arm of the lever *k*, which is loosely mounted on the counter-shaft *j* and has its lower arm *k′* concentrically slotted to admit the set-screw *k²*, by the screwing home of which the lever *k* is clamped to the upright A′. The upper arm of the lever *k* is radially slotted to admit the screw-threaded end of the stud *j³* and is adapted to engage the jam-nut *k³*, by means of which the upper arm of the lever *k* is firmly clamped against the collar *k⁴*, which is affixed to or integral with the stud *j³*. The gear and pinion are retained on the stud *j³* by the usual washer and cotter *k⁵*.

The outer extremity of the counter-shaft *j* has affixed to it the worm *l*, which engages and drives the worm-wheel *l′*, secured to the outer end of the transverse counter-shaft *l²*, mounted in suitable bearings in the bracket *l³*, affixed to the upright A′. The inner end

of the transverse counter-shaft l^2 is provided with the worm l^4, which engages and drives the worm-wheel l^5, affixed to the cam-shaft f^3.

It will of course be understood that the described trains of gearing for rotating the cam-shaft f^3 and the spool-shaft g^5 are herein shown and described merely for the purpose of illustration and that the invention is not limited to the particular forms of gearing shown.

Provision is made for stopping the rotation of any spinning-head when its bobbin runs out or the yarn breaks. To this end there is provided upon the driving-shaft Q, immediately adjoining each of the pulleys Q^3, a worm m, which drives the horizontal gear m', the face of which is provided with a crank-pin for engaging one end of a pitman m^2, the opposite end of which is pivoted to and imparts endwise reciprocating motion to the tripper-bar m^3. The driving-band i^3 is held taut and made to rotate its spinning-head by means of the tightening-pulley n, mounted upon the inner end of the hand-lever n'. The tightening-pulley n is retained in its band-tightening position by the engagement of the shoulder n^2 on the hand-lever with the horizontally-extending arm of the trigger o, the downwardly-extending arm of which is perforated to allow the passage through it of the adjacent end of the tripper-bar m^3. The weighted arm o' of the trigger may be operated manually if it should be desired to stop the rotation of the spinning-head. The automatic stopping of the spinning-head when the yarn breaks or the roving runs out is effected by means of the detector-lever p, the longer arm p' of which is provided with an eye or hook which normally engages the yarn immediately below its point of delivery from the spinning-head. When the detector-lever p is thus engaged, its shorter arm p^2 occupies the position in which it is shown in Fig. 1, in which it is below the path of movement of the tripper-bar m^3; but if the yarn breaks or gives out the detector-lever p is released to the influence of gravity and its shorter arm p^2 then swings upward against the downwardly-projecting arm of the trigger, in which position it receives the impact of the tripper-bar m^3 and by communicating the motion thereof to the trigger o releases the trigger o from the shoulder n^2 and permits the tightening-pulley n to fall, and thus slack the band I^3, so that it will cease to rotate the spinning-head.

What is claimed as the invention is—

1. In a spinning-head, a draw-roll-carrying frame rotating upon a vertical axis; superposed pairs of draw-rolls having horizontal axes of rotation and carried in said frame; means for imparting prescribed rotatory motions to said draw-rolls; a hollow vertical bobbin-holder secured to and extending upwardly from the upper end of said draw-roll frame, and a hollow cylinder concentrically surrounding said bobbin-holder, as and for the purposes set forth.

2. In a spinning-head, a draw-roll-carrying frame rotating upon a vertical axis; superposed pairs of draw-rolls having horizontal axes of rotation and carried in said frame; means for imparting prescribed rotatory motions to said draw-rolls; a hollow vertical bobbin-holder secured to and extending upwardly from the upper end of said draw-roll frame, and a hollow cylinder concentrically surrounding, affixed to, and rotating with said bobbin-holder, as and for the purposes set forth.

3. In a spinning-head, a draw-roll-carrying frame; means for rotating said frame upon a vertical axis; superposed pairs of draw-rolls having horizontal axes of rotation; means for imparting rotatory motions to said draw-rolls, and a hollow vertical bobbin-holder secured to and extending upward from the upper end of said draw-roll frame, as and for the purposes set forth.

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