

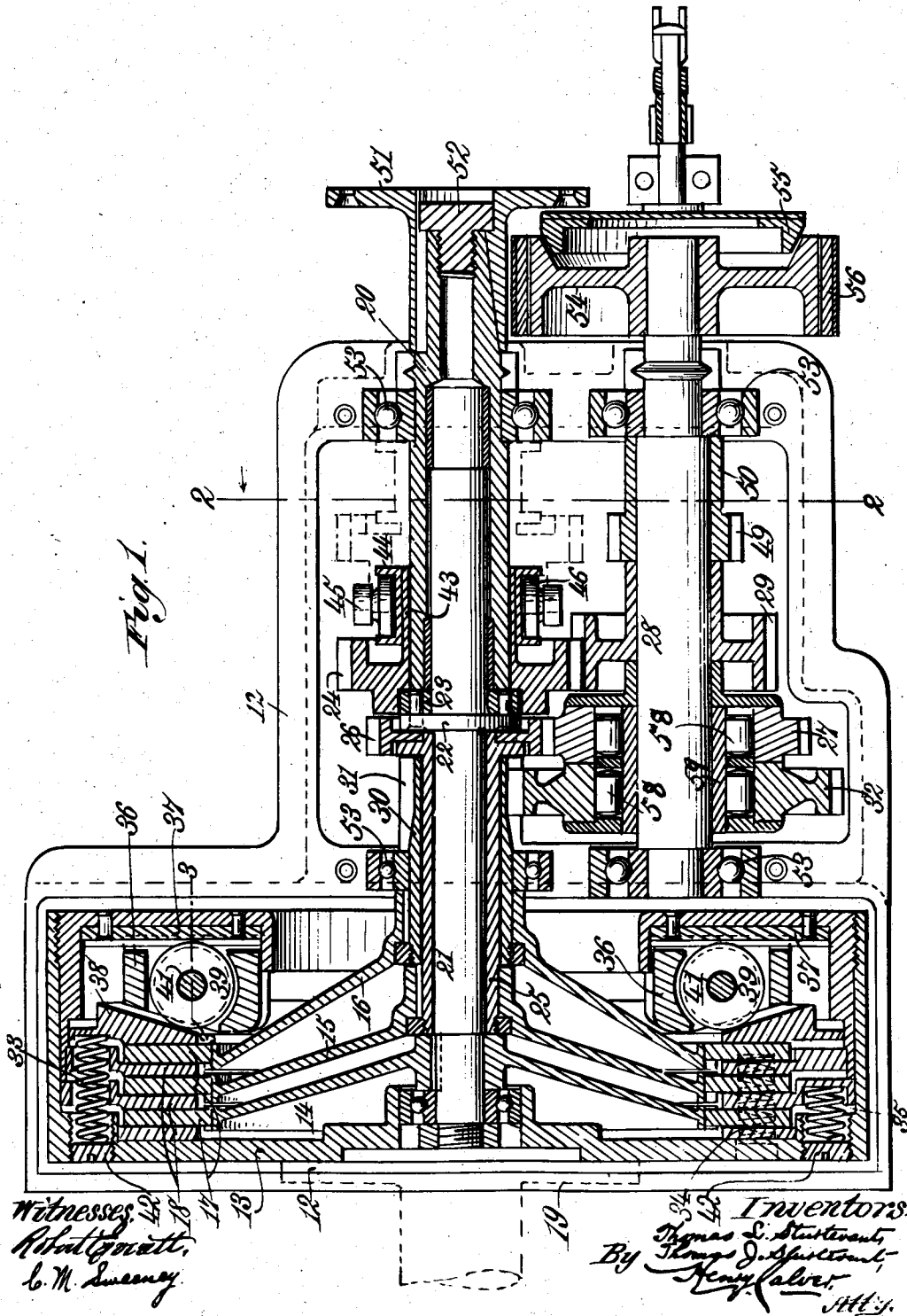
No. 834,592.

PATENTED OCT. 30, 1906.

T. L. & T. J. STURTEVANT.
POWER TRANSMITTING MECHANISM.

APPLICATION FILED DEC. 7, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

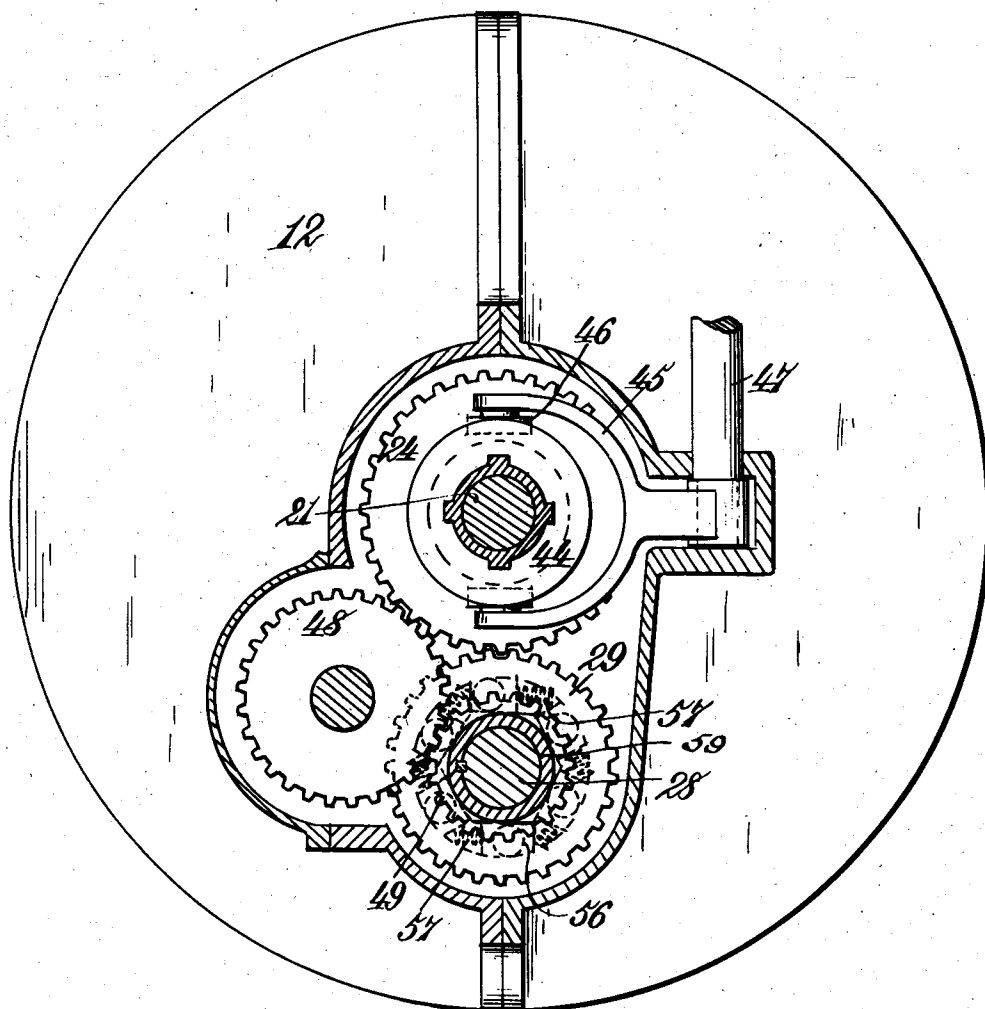
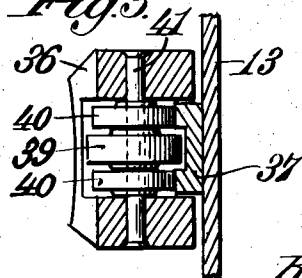


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS LEGGETT STURTEVANT, OF QUINCY, AND THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

POWER-TRANSMITTING MECHANISM.

No. 834,592.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed December 7, 1905. Serial No. 290,721.

To all whom it may concern:

Be it known that we, THOMAS LEGGETT STURTEVANT, residing at Quincy, and THOMAS JOSEPH STURTEVANT, residing at Wellesley, in the county of Norfolk and State of Massachusetts, citizens of the United States, have invented or discovered certain new and useful Improvements in Power-Transmitting Mechanisms, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a clutch-device power-transmitting mechanism more especially adapted for use with motor-vehicles, but which is also suitable for other purposes, the present invention being an improvement upon the invention covered by our United States Patent No. 766,551, granted August 2, 1904. In the device covered by our said patent the clutching elements are forced into frictional engagement with each other by arms or weights moved outward by centrifugal force against the stress of springs, and as the stress of the said springs increases with the outward movements of the weights the power of the latter in forcing the clutching elements into frictional contact with each other became less and less in proportion to the increased speed of rotation as the speed becomes greater. In the present improved construction the clutching elements are forced into frictional engagement with each other by outwardly moving or sliding weights and cooperating inclined surfaces, said weights being preferably provided with rollers to diminish friction. In this improved construction the leverage of the said weights against a cooperating disk or master-plate increases with the outward movements of the weights, due to centrifugal force, in a ratio greater than the increased resistance or stress of the springs which normally hold the clutching elements out of engaging frictional contact and which have a tendency to move the said weights inward as the centrifugal force, due to diminished speed of rotation, decreases. Thus the power of the centrifugal weights in forcing the clutching elements into engagement with each other will be increased with the outward movements of said weights instead of being diminished, as in our former construction.

The preferred form of the present invention provides a centrifugally-controlled friction-clutch power-transmitting device adapted to impart three different speeds of rotation to the driven part or shaft from one speed of rotation of the driving part or motor, but provides means whereby the first or highest speed mechanism may when desired be entirely cut out, so that the entire speed or power of the motor may be concentrated on the second and third or lower speed mechanisms, thus providing a selective arrangement whereby for difficult work a three-speed power-transmitting mechanism may at the option of the motorman be converted into a two-speed mechanism, which is very desirable in many instances.

In the accompanying drawings, Figure 1 is a central sectional view of a clutch-device power-transmitting mechanism embodying the present invention. Fig. 2 is a cross-section of the same on line 2 2, Fig. 1. Fig. 3 is a detail section through one of the centrifugal weights and its guideways on line 3 3, Fig. 1.

Referring to the drawings, 12 denotes a gear-casing which when the invention is to be used in connection with automobiles will preferably be bolted or otherwise rigidly attached to the crank-casing of the engine or motor, the said casing 12 inclosing a fly-wheel 13, which is adapted to contain a lubricant and within which the clutch devices are housed, so that they may run in oil. Within the fly-wheel in the form of the invention herein illustrated are three clutch-wheels or shells 14, 15, and 16, the peripheries of which are in notched engagement with disks 17, which are intended to be frictionally engaged with flat rings or disks 18, which are in notched engagement at their peripheries with the inner wall of the said fly-wheel 13. The fly-wheel 13 will in practice be rigidly connected with a driving-shaft or other source of power by means of a hub 19 or otherwise, and when the several clutch devices are out of operation said fly-wheel will of course be free to rotate independently of the driven or power-transmitting hollow shaft 20, which is to be operatively connected with the axle or wheels to be driven. The clutch-wheel 14 is splined directly to a shaft 21, so that the full speed of the fly-wheel will be imparted to the said

shaft 21 when the high-speed clutch device (represented by the clutch-wheel 14 and the clutch-disks; which will impart movement to the said wheel 14) is set in operation, as will
5 be hereinafter described.

The shaft 21 is provided with a flange 22, one face of which is constructed to form one member of a grab-clutch 23, the other member of which is formed on the adjacent face of
10 a gear-wheel 24, splined to the hollow power-transmitting shaft 20 and slidingly mounted on said hollow shaft. When the members of this grab-clutch are in engagement, as shown in Fig. 1, and the high-speed clutch-wheel 14
15 is in clutching engagement with the fly-wheel 13, the full speed of said fly-wheel and of the shaft 21 will be imparted to the driven or power-transmitting shaft 20.

The second-speed clutch-wheel 15 is
20 splined to a sleeve or hollow shaft 25, adapted to rotate independently of the shaft 21, said sleeve or hollow shaft 25 being provided with a gear 26, meshing with a gear 27, connected with a counter-shaft 28, journaled in
25 suitable bearings in the gear-casing and provided with a wide-faced gear 29, meshing with the gear 24, operatively connected with the hollow shaft 20, so as to rotate said shaft 20 when the said second-speed clutch-wheel
30 15 is in clutching engagement with the fly-wheel 13.

The low-speed clutch-wheel 16 is splined to a sleeve or hollow shaft 30, provided with a pinion 31, meshing with a gear 32, operatively connected with the counter-shaft 28 to
35 rotate the same, so that when the said low-speed clutch-wheel 16 is in clutching engagement with the fly-wheel 13 power will be transmitted to the shaft 20 through the pinion 31, gear 32, counter-shaft 28, and gears
40 29 and 24.

The clutch rings or disks 17 and 18 are normally held out of frictional clutching engagement with each other by springs 33, 34 and
45 35 and are forced into frictional clutching engagement by centrifugal weights 36, mounted to slide in and out radially of the fly-wheel 13. To this end said fly-wheel is provided with guideways afforded by radially-disposed
50 plates 37, attached to the inner wall of the fly-wheel and fitting in grooves or recesses formed in the said centrifugal weights, so that the latter may move in and out on the guides or guideways afforded by the said
55 plates. To force the clutching-disks into clutching engagement with each other, the centrifugal weights are provided with inclined inner faces to cooperate with the inclined face of a master-plate 38, which bears
60 against one of the clutch rings or disks 17, so that as the centrifugal weights move outward radially the said master-plate will be moved by wedging action toward the said
65 clutches, the stress of said springs serving

when the centrifugal force is relaxed by a retardation of the speed of rotation of the fly-wheel to force the centrifugal weights inward by wedging action, causing said weights to move inward down the inclined face of 70
said master-plate.

To facilitate the inward and outward radial movements of the centrifugal weights, said weights are each preferably provided with wheels or rollers 39 and 40, mounted 75 for free rotation on pins 41. The wheels or rollers 40, which are somewhat smaller in diameter than the wheels or rollers 39, bear against guides or runways afforded by the plates 37, while the wheels or rollers 40 bear 80 against the master-plate 38, but are received in grooves in the plates 37, so as to be free from contact with said plates. The anti-friction construction afforded by the wheels or rollers 39 and 40 makes the sliding or in- 85 and-out radial movements of the centrifugal weights more sensitive and much more easily effected than they otherwise would be, as will be understood.

The stress of the springs 33, 34, and 35 90 may be regulated by means of the screw-plugs 42 bearing against the outer ends of said springs, the low-speed springs 33 bearing at their inner ends against the master-plate 38, while the other springs 34 and 35 95 bear against the clutch rings or disks 18.

Fixed to the sleeve 43, extending from said gear 24, is a grooved ring 44 to be engaged by a fork 45, preferably provided with anti-friction-rollers 46, fitting in the said 100 grooved sleeve, so that by moving said fork in a proper direction the members of the grab-clutch 23 can be disengaged from each other without disengaging the gear 24 from the wide-faced gear 29, with which it meshes. 105 By thus disengaging the members of said grab-clutch from each other the first or high-speed clutch, which directly drives the power-transmitting shaft 20, will be disengaged from the lower-speed clutch devices and will 110 thus be cut out of action altogether, so that the full power and speed of the driving-shaft or motor may be concentrated on the second and third speed clutch devices, thus converting the three-speed clutch power transmitting or driving mechanism into a two-speed 115 driving mechanism.

The fork 45 is connected with a rod or shaft 47, which may be rocked manually (as from a hand or foot lever or push-rod) to operate the said fork for the purpose of moving the sliding gear 24 along the hollow power-transmitting shaft 20. The said gear 24 may be moved to bring it into mesh with an idler-gear 48, suitably mounted in the gear- 120 casing 12 and meshing with a reversing-gear 49, carried by a sleeve 50, splined to the counter-shaft 28, so that when the said gear 24 is brought into mesh with the said idler-gear the direction of rotation of the power- 130

transmitting shaft 20 will be reversed for the purpose of reversing the motor-vehicle when the invention is used in such connection.

Fixed to the outer end of the hollow shaft 20 is a hub 51, which is preferably splined to the tapering outer end of the said shaft and held to the latter by a headed screw 52, tapped in said hollow shaft 20.

The different rotating sleeves and shafts comprised by the invention are preferably constructed to run on antifriction-bearings afforded by balls or rollers 53, suitably mounted to provide such antifriction-bearings.

Splined to the counter-shaft 28 is a brake-wheel or drum 54, adjacent to which is a clutch-disk 55 to be manually thrown into engagement with the said wheel or drum 54 for the purpose of setting into operation an automatic mechanism which will cause the brake-band 56 to be automatically tightened about the said brake-wheel or drum. This feature, however, forms no part of the present invention, being embraced by our application, Serial No. 284,631, filed October 27, 1905.

The gears or gear-rings 27 and 32 are connected with a hub 59, splined to the counter-shaft 28, by silent ratchet or clutch devices comprising rollers 58 and cooperating springs 57 like the similar devices of our said patent No. 766,551, so that either or both of said gears or gear-rings may overrun and become inoperative to transmit motion when a higher-speed clutch device than that which operates either the low-speed gear 32 or the second speed-gear 27 is set in operation.

The operation of the invention is as follows: When the fly-wheel 13 is at rest or is rotating very slowly, the centrifugal weights 36 occupy the inner inoperative positions shown in Fig. 1, being held in such positions by the stress of the springs 33, 34, and 35. When the said centrifugal weights are in such inner positions, the clutch rings or disks 17 and 18 are not in holding frictional engagement with each other, and the fly-wheel 13 is therefore free to rotate independently of the clutch and gearing mechanisms. When the speed of rotation of the fly-wheel is increased so that the centrifugal force of the weights 36 will be sufficient to overcome the stress of the low-speed springs 33, the said weights will be moved outward radially and the master-plate 38 will be caused, by the wedging action of the centrifugal weights, to compress said springs and produce a clutching engagement between the inner disks 17 and 18, so as to impart rotation to the low-speed clutch-wheel 16, and thus, through the connections hereinbefore described, will cause said clutch-wheel to impart rotation to the power-transmitting or driven shaft 20. A further increase of speed of rotation of the fly-wheel will successively cause the second-speed clutch-wheel 15 and the high-speed

clutch-wheel 14 to be set in operation when the speed of rotation of the fly-wheel is sufficient to cause by centrifugal action the weights 36 to move outward so as to overcome the stress of the other sets of springs 34 and 35. Owing to the fact that the gear wheels or rings 27 and 32 have silent ratchet or clutch connections with the counter-shaft 28, so that the low-speed gear wheel or ring 32 may overrun, and thus operate idly when the second-speed clutch mechanism is in operation, and so that the second-speed gear wheel or ring 27 may overrun when the high-speed clutch-wheel 14 is in operation. It will be apparent that either set of clutch and gearing devices will be free to operate without interference with the other sets of such devices, as in the mechanism of our Patent No. 766,551, hereinbefore referred to.

If it be desired to permit the fly-wheel 13 to run at such speed as will produce frictional engagement of any or all of the clutching devices, but without imparting motion to the driven or power-transmitting shaft 20, the gear-wheel 24 may be moved by the fork 45 to occupy an inoperative or idle position out of engagement either with the gear 29 or the idler-reversing gear 48, meshing with the gear 49, and thus the several sets of the clutch and gearing mechanisms may all be thrown out of action without stopping the fly-wheel or arresting the rotation thereof.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a power-transmitting mechanism, the combination with driving and driven parts, of means for transmitting power at several speeds from the said driving to the said driven part, said means including clutch devices automatically forced into frictional gripping contact by centrifugal action, and through the medium of which any one of said several power-transmitting means may be operatively connected with the said driving part, said means also including a manually-controlled device whereby one of said clutch devices may be rendered inoperative to transmit power.

2. In a power-transmitting mechanism, the combination with driving and driven parts, of means for transmitting power at several speeds from the said driving to the said driven part, said means including clutch devices automatically forced into frictional gripping contact by centrifugal action, and through the medium of which any one of said several power-transmitting means may be operatively connected with the said driving part, said means also including a manually-controlled clutch device whereby one of said automatic clutch devices may be rendered inoperative to transmit power to the said driven part.

3. In a power-transmitting mechanism,

the combination with driving and driven parts, of means for transmitting power at three different speeds from the said driving to the said driven part, said means including
 5 automatic clutch devices by which either one of several power-transmitting devices may be rendered operative, and manually-controlled means whereby one of the said clutch devices may be rendered inoperative to transmit
 10 power to the said driven part.

4. In a power-transmitting mechanism, the combination with driving and driven parts, of means for transmitting power at three different speeds from the said driving
 15 to the said driven part, said means including centrifugally-controlled clutch devices by which either one of several power-transmitting devices may be rendered operative, and manually-controlled means whereby one of
 20 the said clutch devices may be rendered inoperative to transmit power to the said driven part.

5. In a power-transmitting mechanism, the combination with a driving and a driven
 25 part, of a gearing mechanism whereby power at different speeds may be transmitted from said driving to said driven part, a plurality of clutch devices coöperating with said gearing mechanism to operatively connect said driving
 30 and driven parts, and radially-sliding centrifugal weights by which the said clutch devices may be frictionally engaged, so as to be operatively connected with the driving part, and opposing springs against the stress
 35 of which the said sliding centrifugal weights operate to set said clutch devices.

6. In a power-transmitting mechanism, the combination with rotary driving and driven parts, of a plurality of clutch devices,
 40 centrifugally-acting means for effecting the clutching action of said clutch devices, gearing mechanism and connections by which power at different speeds may be transmitted from said clutch devices to said driven part,
 45 and manually-controlled means for breaking the operative connection of one of said clutch devices with said driven part.

7. In a power-transmitting mechanism, the combination with driving and driven
 50 parts, of automatic clutch devices and gear-

ing for transmitting power at several speeds from said driving to said driven part, and means, comprising a clutch, by which the operative connection of one of said automatic clutch devices with the said driven part may be maintained or broken, so that, when desired, one of said automatic clutch devices may be cut out or rendered inoperative to transmit power.

8. In a power-transmitting mechanism, the combination with driving and driven parts, of automatic clutch devices and gearing for transmitting power at several speeds from said driving to said driven part, and manually-controlled means, comprising a clutch, by which the operative connection of one of said automatic clutch devices with said driven part may be maintained or broken; so that, when desired, one of said automatic clutch devices may be cut out or rendered inoperative to transmit power.

9. In an automatic power-transmitting mechanism, the combination with driving and driven parts, of centrifugally-controlled clutch devices and gearing for transmitting power at several speeds from said driving to said driven part, and manually-controlled means, comprising a grab-clutch, by which the operative connection of one of said automatic clutch devices with said driven part may be maintained or broken; so that, when desired, one of said clutch devices may be cut out or rendered inoperative to transmit power.

10. In a power-transmitting mechanism, the combination with driving and driven parts, of a three-speed power-transmitting mechanism comprising three centrifugally-controlled friction-clutch devices and manually-controlled means whereby the operative connection of one of said clutch devices with the driven part may be broken, when desired.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS LEGGETT STURTEVANT.
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