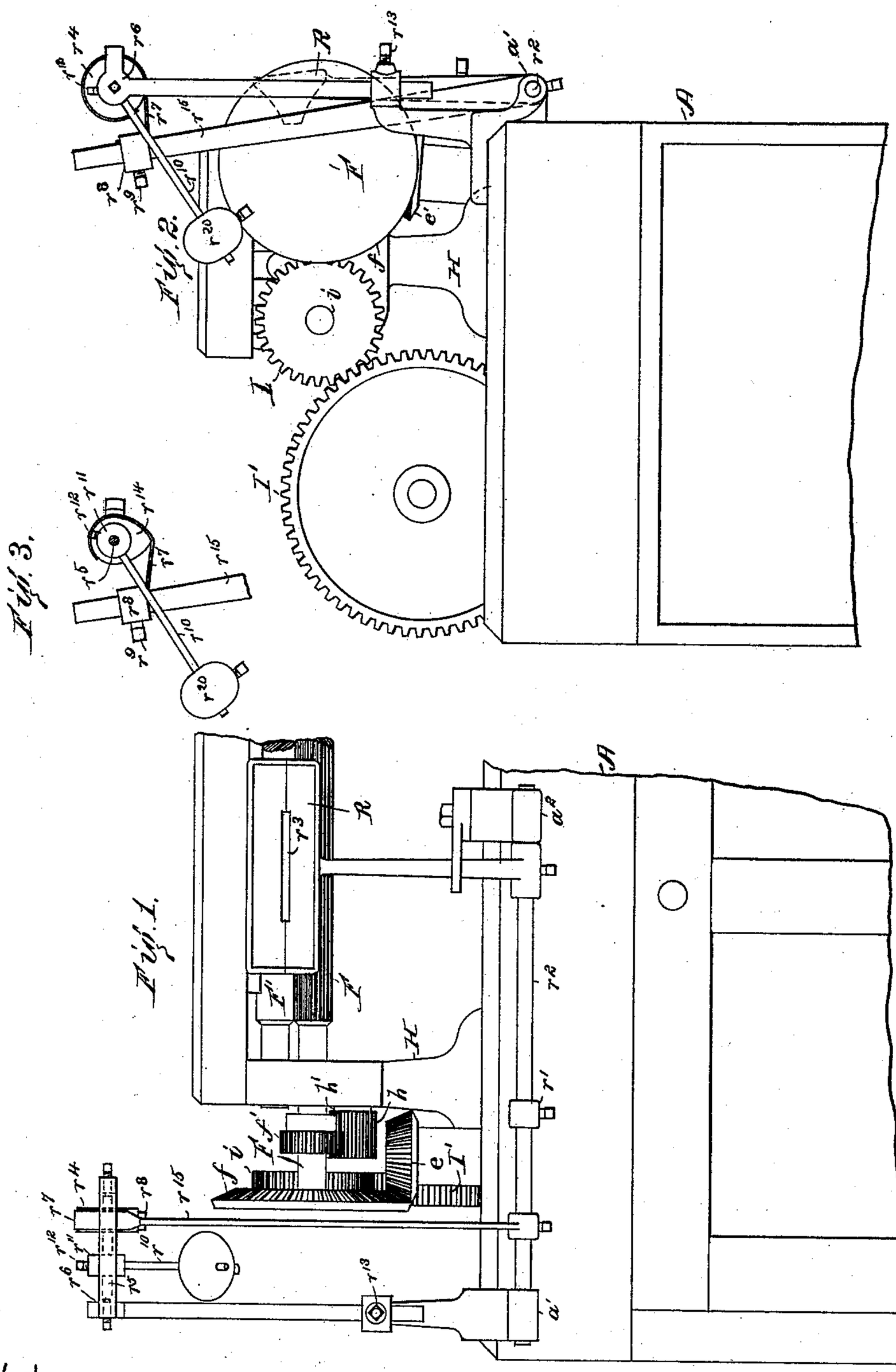
(No Model.) 4 Sheets—Sheet 1.

C. E. WILKINS.

EVENING MECHANISM FOR RAILWAY HEADS.

No. 392,172. Patented Oct. 30, 1888.



Witnesses—
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Emma F. Kittredge.

Inventor—
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By Albert M. Moore,
His Attorney.

(No Model.) 4 Sheets—Sheet 2.

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(No Model.) 4 Sheets—Sheet 3.

C. E. WILKINS.

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(No Model.) 4 Sheets—Sheet 4.

C. E. WILKINS.

EVENING MECHANISM FOR RAILWAY HEADS.

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Fig. 8.

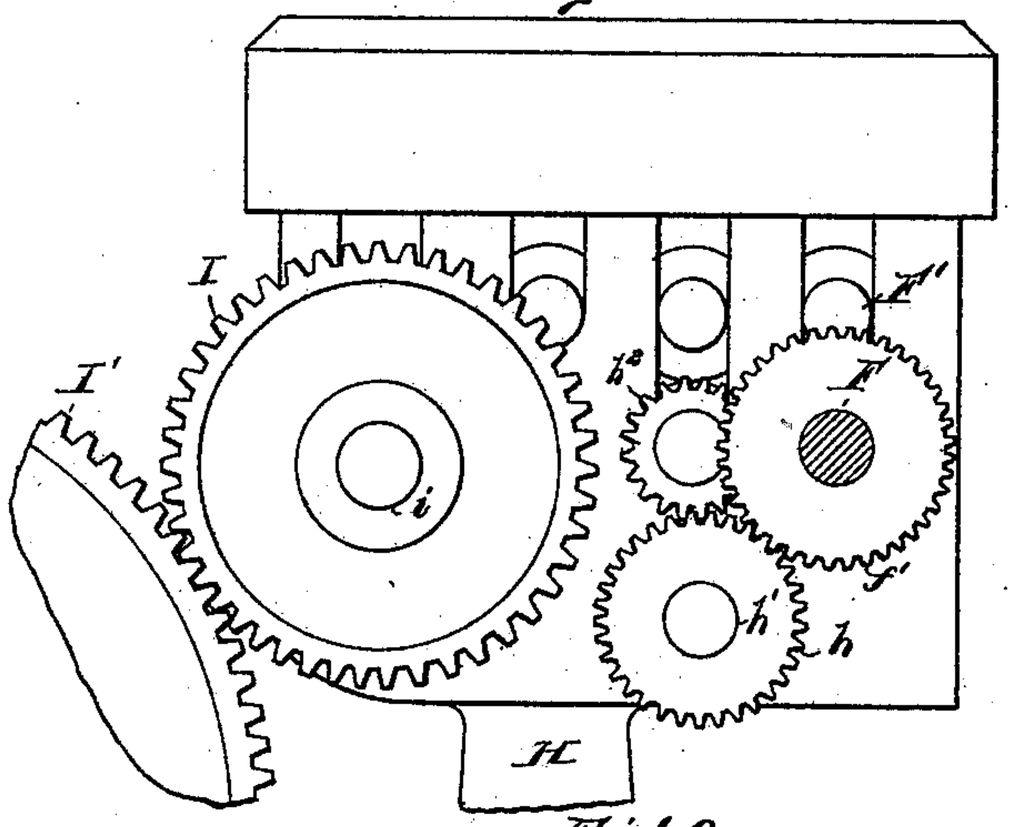
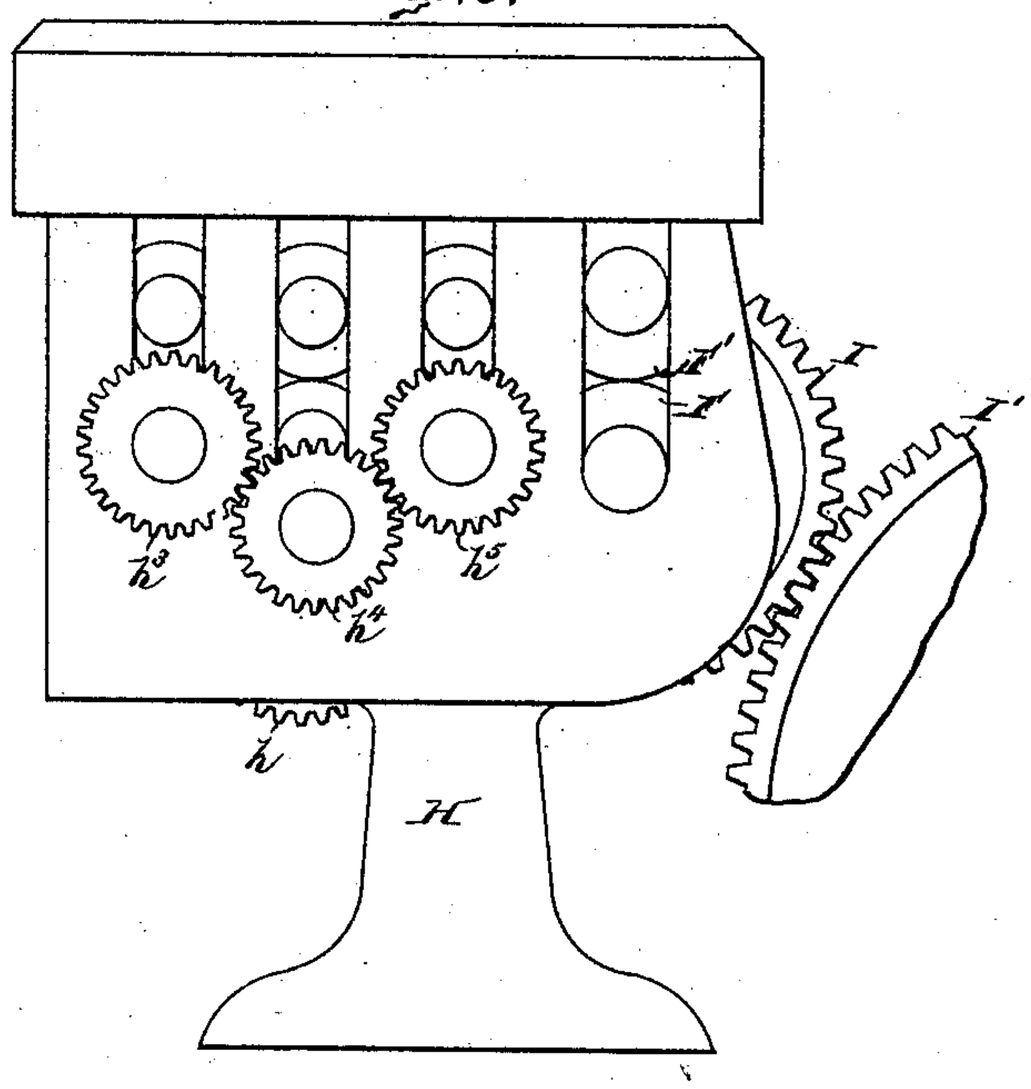


Fig. 9.



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His Attorney.

UNITED STATES PATENT OFFICE.

CHARLES E. WILKINS, OF LOWELL, MASSACHUSETTS.

EVENING MECHANISM FOR RAILWAY-HEADS.

SPECIFICATION forming part of Letters Patent No. 392,172, dated October 30, 1888.

Application filed March 5, 1888. Serial No. 266,214. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. WILKINS, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Evening Mechanism for Railway-Heads, of which the following is a specification.

My invention relates to evening mechanism for railway-heads; and it consists in the devices and combinations hereinafter described and claimed.

In the evening mechanism commonly employed in railway-heads the drawing is substantially completed before the slivers reach the trumpet which operates the evening mechanism, and is arranged in front of the front pair of drawing-rolls, so that any unevenness in the sliver does not affect the evening mechanism until after the drawing takes place, said evening mechanism being operated by the movement of the trumpet and the rock shaft or trumpet-shaft to which said trumpet is secured, and the movement of the trumpet being caused by more or less friction of the sliver upon said trumpet, the friction varying with the size of the sliver, so that any undue weight or thickness of the sliver will appear in the yarn made from it and in the cloth woven from said yarn, and not only involve a waste of material but cause an unsightly defect in the cloth. To illustrate, suppose that the sliver is too thick for a distance just equal to the distance from the front drawing-rolls to the trumpet, while the rest of the sliver is of proper thickness, and it is evident that the trumpet will not be affected until this thick portion has been drawn by the rolls, but that immediately after the trumpet will be swung forward, and the speed of the front drawing-rolls will be increased until this thick part of the sliver has passed through the trumpet, the drawing-rolls acting meanwhile upon a portion of the sliver, which, although of a suitable weight, when entering the drawing-rolls will be drawn out too thin, and this thin place entering the trumpet will allow the trumpet to be drawn backward in the usual manner, reducing the speed of said front rolls below the normal standard and allowing the sliver to emerge from the drawing-rolls too thick and heavy, and thereby again operating the evening mechanism. So unreliable is the common evening mechanism in these machines that it is sometimes referred to as the "unevening" mechanism, and it is only useful where a long stretch of the sliver is above or below the standard weight. I therefore arrange the evening-trumpet at the back of the drawing-rolls in order that the speed of the front rolls may be varied enough to operate upon the deficient or excessive portions of the sliver, and not upon the portions which succeed them in the drawing-rolls; but the usual mechanism which by the movement of the ordinary front trumpet, varies the speed of the front drawing-rolls cannot be used when the trumpet is placed behind the rolls, because such mechanism would continue to diminish or accelerate the speed of the rolls as long as the portion of the sliver within the trumpet continued to vary from the standard in the same direction of deficiency or excess in weight, until the lowest or highest possible speed of the rolls was attained. I therefore use in connection with the back trumpet the evening mechanism hereinafter described, which will vary the speed of the front drawing-rolls to the proper amount and then maintain this speed until the defective sliver has been drawn, balancing the evening mechanism by the friction of the sliver on the trumpet.

In my improvement, as in the ordinary evening-mechanism, a driving-cone running at a uniform rate of speed is belted to another cone tapering in the opposite direction from the driving-cone, and the front pair of drawing-rolls are driven from said driven cone, while the other drawing-rolls are driven from the uniformly-rotating main shaft, and the evening mechanism consists of devices to shift the belt along on said cones to increase or diminish the speed of said front rolls according as the sliver is too thick or too thin; but ordinarily the weight which resists the movement of the trumpet in one direction and restores the trumpet to position is constant, and a variation of the weight of the sliver will move the trumpet to its limit in one direction or the other; but in my improvement the amount of movement of the rear trumpet depends on the amount of variation in weight of the sliver, because the movement of the trumpet by the increased friction of an enlargement of the

sliver is in effect resisted by a proportionally-increasing weight, and a diminution of such friction by a diminution of the sliver in effect decreases the resisting weight proportionally, the movement of the belt on the cones from the middle toward the ends of said cones being proportional to the increase or diminution of the resisting weight.

In the accompanying drawings, on four sheets, Figure 1 is a rear elevation of a part of a railway-head provided with my improvement, showing the upper right-hand portion of said head; Fig. 2, an elevation of the right-hand end of a portion of the same; Fig. 3, a similar elevation of the weight-shaft, weight-arm, and weight, showing a modification of the strap-roll shown in Fig. 2; Fig. 4, a rear elevation of the main shaft, the cone-pulleys, connecting-belt, vertical shaft, and parts of the evening mechanism, a part of the frame and parts of the cone-shafts, evener-screw, the trumpet, roll-stand, weight-supporting bracket, and trumpet-weight lever being broken away; Fig. 5, a vertical section on the line $x\,x$ in Fig. 4; Fig. 6, an enlarged plan of the ratchet-gear and pawls and the stop for the ratchet-shield; Fig. 7, an isometric view of the upper part of the trumpet-supporting arm and of the trumpet and its stops and trunnions or ears; Figs. 8 and 9, respectively, right and left side elevations of the drawing-roll stand, drawing-rolls, the gears by which the back and intermediate bottom or fluted drawing-rolls are connected, the gear on the bottom front roll and a part of the intermediate gear which drives said last-named gear, the lower part of the roll-stand being omitted in Fig. 8.

The frame A, the main shaft B, the driving-pulley B′, the gears C, which drive the shaft d of the lower cone, D, the upper cone, D′, its shaft d', the cone-connecting belt D^2, the binder-pulley D^3, the cone-stand D^4, the vertical roll-driving shaft E, provided with the bevel-gear e, which engages the bevel-gear b on the main shaft B to drive said vertical shaft, the bevel-gear e', engaging another bevel-gear, f, on the back fluted roll F, the back top roll, F′, the roll-stand H, the pinion f'' on the fluted back roll, the intermediate pinion, h, supported on a horizontal stud, h', projecting from the roll-stand H and engaging a pinion, h^2, on one of the intermediate drawing-rolls, the other intermediate roll being driven from the back roll by pinions h^3 h^4 h^5, the gear I on the lower front roll, i, the intermediate gear, I′, which drives the gear I and is driven by the intermediate gear, I^2, which in turn is driven by the gear I^3, secured on the shaft d' of the upper cone, the evener-screw J and nut J′, and the guide or fork, J^2, together with other fluted or bottom drawing rolls and top rolls, calender-rolls, and front trumpet (not shown) are all of the usual construction and operation, except that whereas the front trumpet is usually vibratory and connected with the evening mechanism I use simply a stationary front guide-trumpet, and except, also, that the bevel-gear e is somewhat smaller in proportion to the gear b than usual to partly overcome the friction of the sliver on the back trumpet.

The customary means of introducing the sliver of the cotton to the feed-rolls is over a half-round horizontal bar, called the "back bar," provided with upwardly-projecting sliver-guides to prevent the slivers coming from the railway-box spreading out wider than the boss of the rear fluted roll, and the sliver after leaving the rolls passes through a trumpet pivoted to the frame of the head and connected by intermediate mechanism to a shield which allows one or neither of two oppositely-working constantly-reciprocating pawls to engage the teeth of a ratchet secured to the evener-screw, and to shift the belt-guide surrounding the belt and secured to a nut on the evener-screw by turning said screw.

I use the evener-screw J, the belt-guide J^2, and nut J′, as heretofore, but do not attach the ratchet L directly to said screw, but arrange the same to turn upon a horizontal stud, l, which is supported by a bracket, a, secured to the frame A in any convenient manner, said ratchet engaging a pinion, j, secured to said evener-screw. I find it desirable to make the ratchet L much larger than the ratchet usually secured to the evener-screw and between five and six times as large as the pinion j, to make the evening devices more rapid in their operation.

The three-armed pawl-lever L′ turns on the hub l' of the ratchet L, one arm, l^3, of said lever being pivoted at m to the upper end of the eccentric-rod M, the lower end of said rod surrounding an eccentric, N, secured to the shaft of the lower cone, whereby a reciprocating motion is given to said pawl-lever. The other arms of the pawl-lever each carry a pawl, l^4 l^5, these pawls pointing in opposite directions and turning, when allowed to do so, the ratchet L in opposite directions, the pawls being held in engagement with the ratchet by wire springs l^6 l^7. When the work is running properly—that is, when the required weight of sliver per yard is entering the trumpet—both pawls are held out of engagement with the ratchet by an arc-shaped shield, O, of sheet metal, arranged concentrically with the ratchet L, and having a little larger radius than said ratchet, each pawl being wide enough to extend over the ratchet and onto the shield. The shield is supported by radial arms o o', secured to the hub P or sleeve, which turns freely on the stud l, the motion of the shield being limited by a stop, o^2, secured to the stud l, rigidly extending between said arms o o', and the weight of the shield being counterbalanced by a weight, o^3, secured to a radial arm, o^4, projecting from the sleeve P on the opposite side thereof from said shield. Secured to the sleeve P, concentrically therewith, is a pinion, Q, which engages a rack, q, and another pinion Q, of the same size and number of teeth, is secured to the hub of the ratchet L and engages another

rack, q', these racks $q\ q'$ being at their upper ends bent, the one, q, forward, and the other, q', backward to bring them in the vertical plane of the axis of the stud l, said upper ends being forked at $q^2\ q^3$, to receive the ends of a horizontal rack-lever, q^4, to which they are pivoted at $q^6\ q^7$.

The rack-lever is pivoted at its middle to the lower end of the connecting-rod r, the upper end of which connecting-rod r is pivoted to the front end of the trumpet-shaft lever r'. The rear end of the trumpet-shaft lever is rigidly secured to the trumpet-shaft r^2, which turns freely in brackets $a'\ a^2$, secured to the frame A, and supports the back trumpet, R. The trumpet R is somewhat similar to the pivoted trumpet commonly used at the front of the machine; but the opening or throat r^3 of the trumpet, instead of being less than an inch wide, is of a proper width—say three or four inches—to receive the undrawn slivers as they come from the railway-box, and confine them to a less width than that of the boss of the back fluted drawing-roll. In practice I prefer to narrow the opening or throat r^3 to about half the width of the sliver, to condense the sliver and produce friction on the trumpet and rock the trumpet-shaft by drawing the end of the trumpet or trumpet proper forward.

The trumpet-weight lever r^{15} is rigidly secured to the trumpet-shaft in a nearly-vertical position, but inclined forward sufficiently to be out of contact with the strap-roll r^4, in front of which its upper end is placed. The strap-roll r^4 is secured on the weight-shaft r^5, which turns on horizontal centers in the upper end of the weight-shaft bracket r^6. The strap-roll r^4 is connected by a metallic ribbon or strap, r^7, to the trumpet-weight lever r^{15}, near the upper end of said lever, the front end of said strap entering a clasp, r^8, which surrounds said lever, and is held in place by a screw, r^9, which turns in said clasp and pinches the strap between the rear side of said lever and the inside of said clasp. The weight-arm r^{10} is provided with a hub or collar, r^{11}, which surrounds the weight-shaft, and is held by a set-screw, r^{12}, turning in said hub and thrusting against said shaft. The vertical bracket r^6 is held in a hole in the bent upper end of the bracket a' by a set-screw, r^{13}, which turns in said bracket and thrusts against said bracket r^6, so that the last-named bracket and the clasp may be adjusted vertically to vary the efficiency of the weight. The higher the weight is raised the greater the effect of the weight on the weight-lever. The weight r^{10} is adjustable on the weight-arm for the same purpose by means of a set-screw which turns in the weight and thrusts against said arm.

The weight-arm occupies a position about half-way between a horizontal line drawn through the axis of the weight-shaft and a vertical line extending downward from said axis when the sliver entering the trumpet is of the proper weight, so that any increase of thickness in the sliver will produce an increased friction of the sliver on the trumpet and draw the upper end of the trumpet forward, thereby throwing the upper end of the trumpet-weight lever forward, unwinding the strap from the strap-roll, bringing the weight-arm more nearly into a horizontal position, and thereby increasing the leverage of the weight and weight-arm and the resistance of the trumpet to further motion in a forward direction, while, on the other hand, a diminution of thickness in the sliver, and a consequent diminution of friction, will allow the trumpet to be drawn backward by the falling of the weight and the consequent winding of the strap upon the strap-roll and the drawing backward of the trumpet-weight lever until the leverage of the weight and the weight-arm just balances the friction of the sliver. When the friction of the sliver is sufficient to balance or equal the resistance of the weight and the weight-arm, no motion of the trumpet takes place and the speed of the front drawing-rolls is constant. The range of motion of the trumpet and weight-arm is sufficient to allow a movement of the belt upon the cones corresponding to all variations in the thickness of the sliver within the capacity of the cones.

In Fig. 3 the strap-roll is represented as a cam, r^{14}, so arranged that the strap r^7 draws from the greatest diameter of said cam when the weight-arm occupies the position about half-way between its lowest or nearly-vertical position and its highest or nearly-horizontal position, so that a slight variation of the weight of the sliver will move the trumpet; but the farther the trumpet is moved forward the more the weight will resist further motion, and the farther backward the trumpet is moved the less power the weight has to turn the strap-roll still farther.

The operation of the evening mechanism is as follows: The weight being half-way between its highest and lowest positions, the cone-connecting belt being half-way between the ends of the cones, and the sliver entering the trumpet being of the proper weight, an increased weight of sliver—that is, a larger quantity of cotton entering the trumpet—will draw the trumpet forward, rock the trumpet-shaft, and throw the upper end of the trumpet-weight lever forward, partially revolving the strap-roll and raising the weight until it balances the friction of the sliver on the trumpet, whereupon the trumpet will remain stationary as long as this friction remains constant. At the same time that the trumpet-shaft is rocked by the forward movement of the trumpet the front end of the trumpet-shaft lever is depressed, pushing down the rack-lever and (owing to the fact that the rack-bar q operates only its pinion and the balanced shield, while movement of the other rack-bar, q', is resisted by the ratchet-gear, evener-screw, belt-shipping mechanism, and cone-connecting belt) depresses the rack-bar q, throws the shield downward, and allows the upper pawl to engage the ratchet-gear, and, through the pinion secured

to the hub of said ratchet-gear, to rotate the evener-screw and carry the cone-connecting belt to the left of the machine—that is, to the right in Fig. 4—onto a smaller circumference of the driven cone and a larger circumference of the driving-cone, thereby increasing the speed of the front drawing-rolls and drawing the thick sliver down to the proper size and weight. When the sliver within the trumpet again diminishes to the proper size, the trumpet swings backward, and the shield is raised by the lifting of the rack-bar q and holds the upper pawl out of engagement with the ratchet-gear. In the meantime, however, the rack-bar q' has been drawn down by the pinion secured to the ratchet-gear, so that when the lower end of the connecting-rod—or, in other words, the fulcrum of the lever q^4—has been raised to its original position the rack-bar q (more easily moved than the rack-bar q', for reasons above stated) has been raised above its normal position, and has, through the pinion connected to the shield, raised said shield far enough to allow the lower pawl to engage the ratchet-gear and to reverse the motion of said ratchet-gear and of the evener-screw, bringing the belt back to the middle of the cones, and raising the rack-bar q', thereby turning the rack-lever q^4 to a horizontal position and causing the rack-bar q to be lowered and the shield to be restored to its position between the ratchet-gear and both pawls. Evidently when the sliver is deficient in thickness the trumpet will be moved backward by the weight, the rack-lever will be raised, raising the fulcrum of the rack-lever, lifting the shield, allowing the lower pawl to engage the ratchet-gear, drawing the belt to the right of the machine, and raising the rack-bar q' until the thickness of the sliver within the trumpet becomes normal, and the trumpet being restored to its proper position by the increasing friction of the sliver will cause the fulcrum of the rack-lever to be restored to its proper position, lowering the shield until the lower pawl is out of engagement and the upper pawl is allowed to fall into engagement with the ratchet-gear, with the effect of lowering the rack-bar q', bringing the rack-lever to a horizontal position, and thereby depressing the rack-bar q and moving the shield under both pawls. The racks of the rack-bars q q' are held in engagement with their pinions by metallic straps q^8 q^9, secured to the stud l, and extending beyond and across the untoothed surfaces of said bars, as shown in Figs. 4, 5, and 6. The rack-lever q^4 is guided by a rectangular vertically-slotted guide-bracket, D^5, secured to the cone-stand D^4, and the friction on the connecting-rod r of a spring, q^{11}, secured to said guide-bracket, prevents a spasmodic action of the evening mechanism.

I claim as my invention—

1. The combination of the frame, the intermediate and back drawing-rolls, means of driving the same at a constant rate of speed, a trumpet, a rock-shaft or trumpet-shaft supporting said trumpet and provided with a weight-lever, a weight-shaft having a radial weight-arm, a weight supported on said arm, a strap-roll and a strap connecting said roll and said lever, the front drawing-rolls, means of driving said front rolls, and means of varying the speed of said front rolls by the movement of said trumpet, as and for the purpose specified.

2. The combination of the frame, the intermediate and back drawing-rolls, means of driving the same at a constant rate of speed, a trumpet pivoted behind said back drawing-rolls, a rock-shaft or trumpet-shaft supporting said trumpet, a pivoted weighted arm, means of connecting said weighted arm and said trumpet-shaft, said trumpet and trumpet-shaft adapted to be turned in one direction by a constantly-diminishing leverage of said weighted arm, and in the other direction by the friction of a sliver running through said trumpet in opposition to a constantly-increasing leverage of said weighted arm, the trumpet-shaft lever projecting from said trumpet-shaft, the rack-lever, a rod connecting said two last-named levers, a horizontal stud, a ratchet-gear turning freely on said stud, a shield extending over a portion of the periphery of said ratchet-gear and provided with a hub which turns freely on said stud, and provided with radial arms which support said shield upon said hub, a ratchet-lever provided with oppositely-engaging pawls, a pinion secured to said hub, a rack-bar pivoted at one end of said rack-lever and having a rack which engages said pinion, another pinion secured to said ratchet-gear concentrically therewith, another rack-bar pivoted at the other end of said rack-lever and having a rack to engage said last-named pinion, an evener-screw provided with a gear which engages said ratchet-gear, a nut engaging said screw and provided with a belt-shipping fork, a uniformly-rotating driving-cone, an oppositely-arranged driven cone, a belt connecting said cones and embraced by said belt-shipping fork, the front drawing-rolls, and mechanism, substantially as described, for connecting said front drawing-rolls and said driven cone, as and for the purpose specified.

3. The combination of the frame, the intermediate and back drawing-rolls, means of driving the same at a constant rate of speed, a trumpet, a rock-shaft or trumpet-shaft supporting said trumpet and provided with a weight-lever, a weight-shaft having a radial weight-arm, a weight on said arm, a strap-roll secured on said weight-shaft, a strap secured at one end to said weight-lever and at the other end to said roll and wound partly around said roll, the trumpet-shaft lever projecting from said trumpet-shaft, the rack-lever, a rod connecting said two last-named levers, a horizontal stud, a ratchet-gear turning freely on said stud, a shield extending over a portion of the periphery of said ratchet-gear and provided with a hub which turns freely on said stud, and

provided with radial arms which support said shield upon said hub, a ratchet-lever provided with oppositely-engaging pawls, a pinion secured to said hub, a rack-bar pivoted at one end of said rack-lever and having a rack which engages said pinion, another pinion secured to said ratchet-gear concentrically therewith, another rack-bar pivoted at the other end of said rack-lever and having a rack to engage said last-named pinion, an evener-screw provided with a gear which engages said ratchet-gear, a nut engaging said screw and provided with a belt-shipping fork, a uniformly-rotating driving-cone, an oppositely-arranged driven cone, a belt connecting said cones and embraced by said belt-shipping fork, the front drawing-rolls, and mechanism, substantially as described, for connecting said front drawing-rolls and said driven cone, as and for the purpose specified.

In witness whereof I have signed this specification, in the presence of two attesting witnesses, this 1st day of March, A. D. 1888.

CHARLES E. WILKINS.

Witnesses:
ALBERT M. MOORE,
KIRKLEY HYDE.