

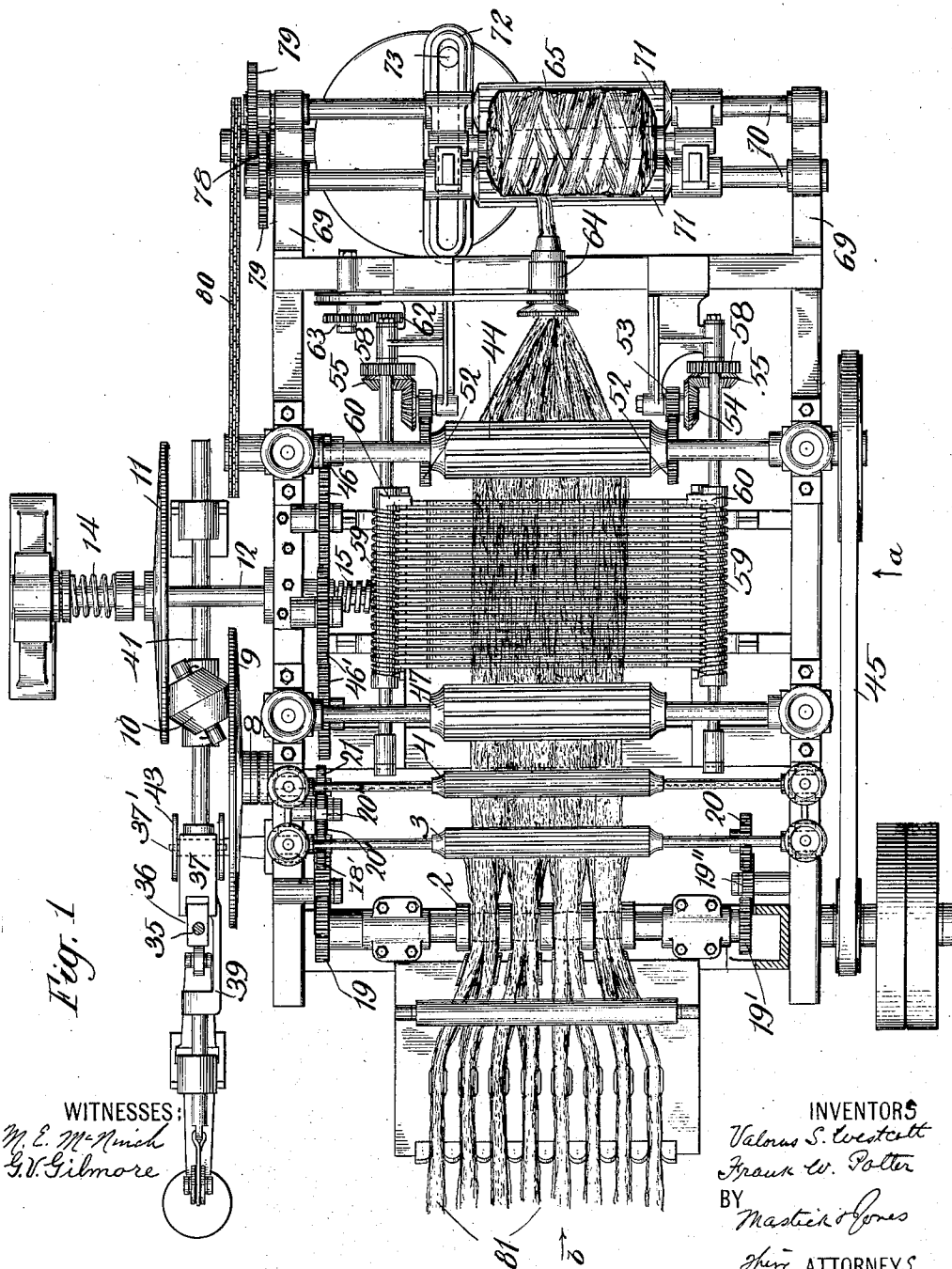
No. 874,715.

PATENTED DEC. 24, 1907.

V. S. WESTCOTT & F. W. POTTER.
WOOL EVENING AND DRAWING MACHINE.

APPLICATION FILED NOV. 14, 1906.

5 SHEETS—SHEET 1.



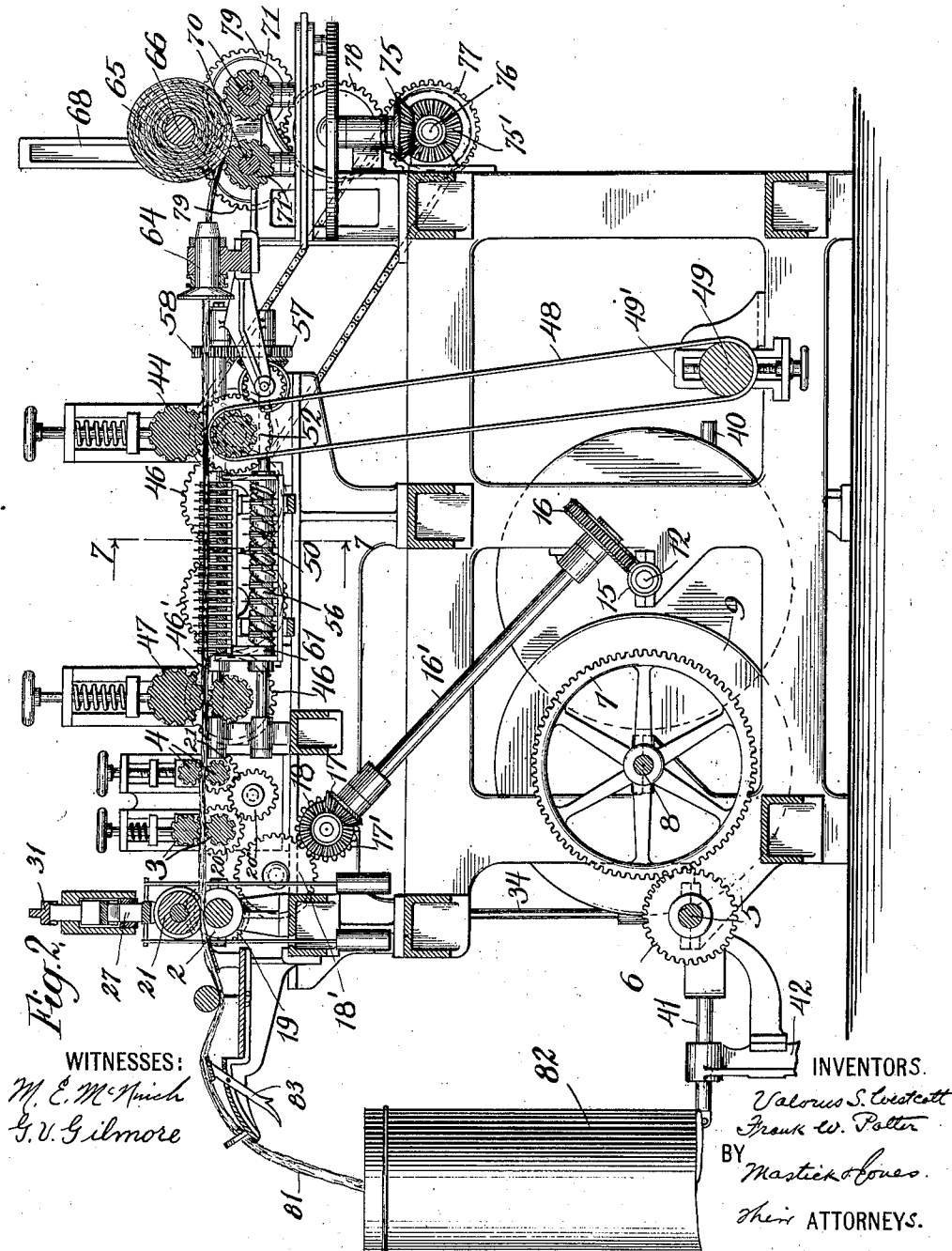
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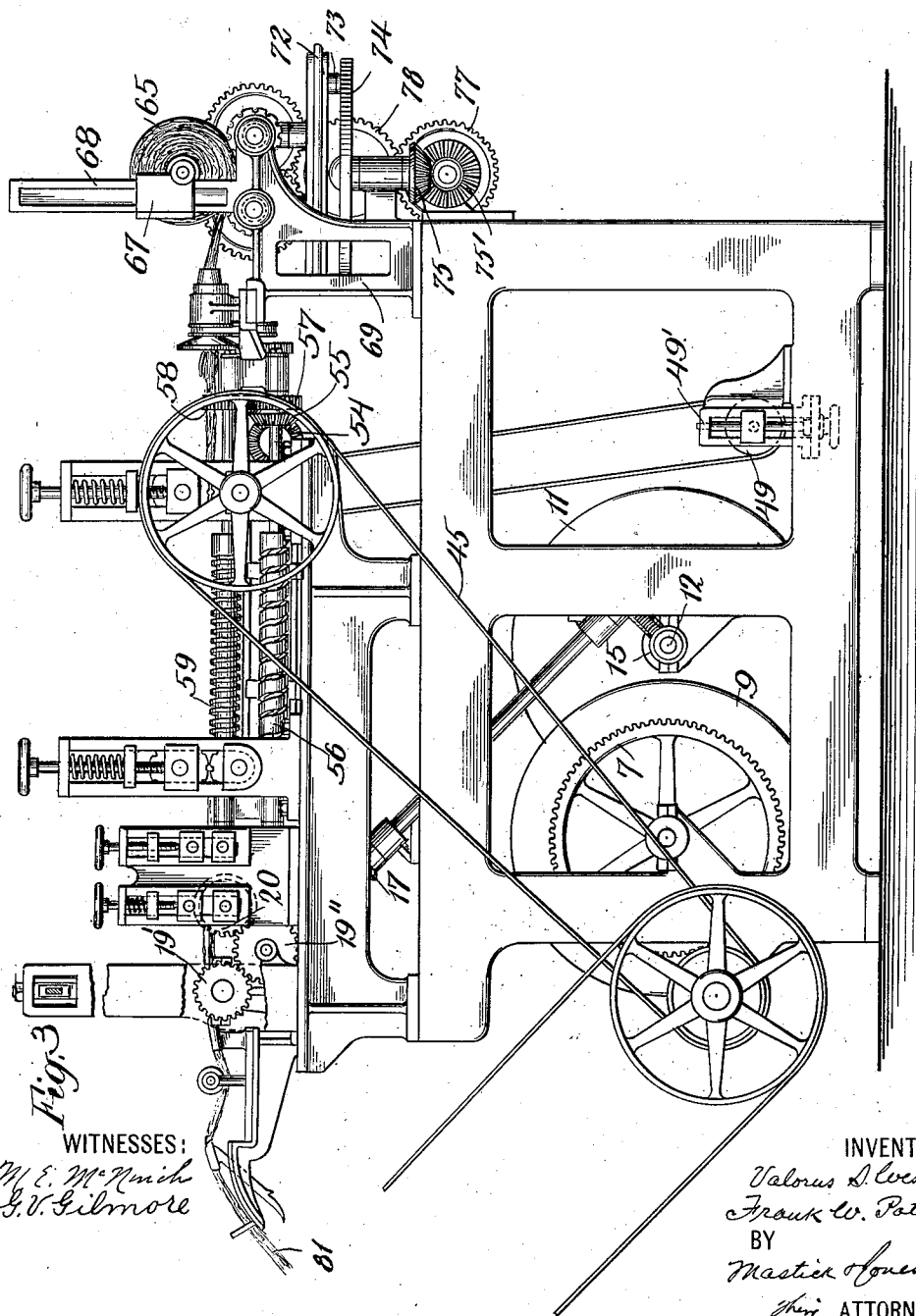
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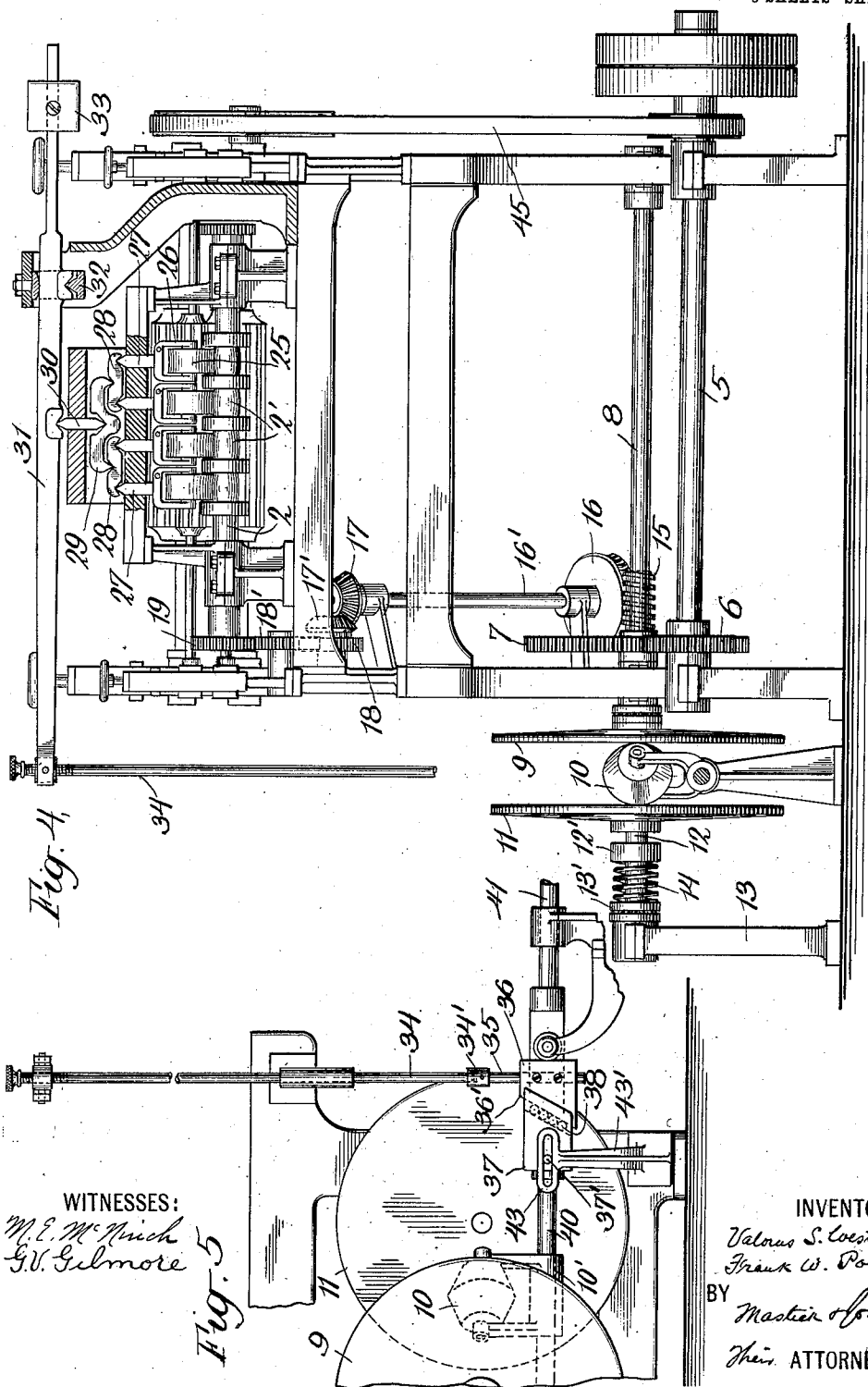
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5 SHEETS—SHEET 4.



WITNESSES:
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G. V. Gilmore

INVENTORS.
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BY
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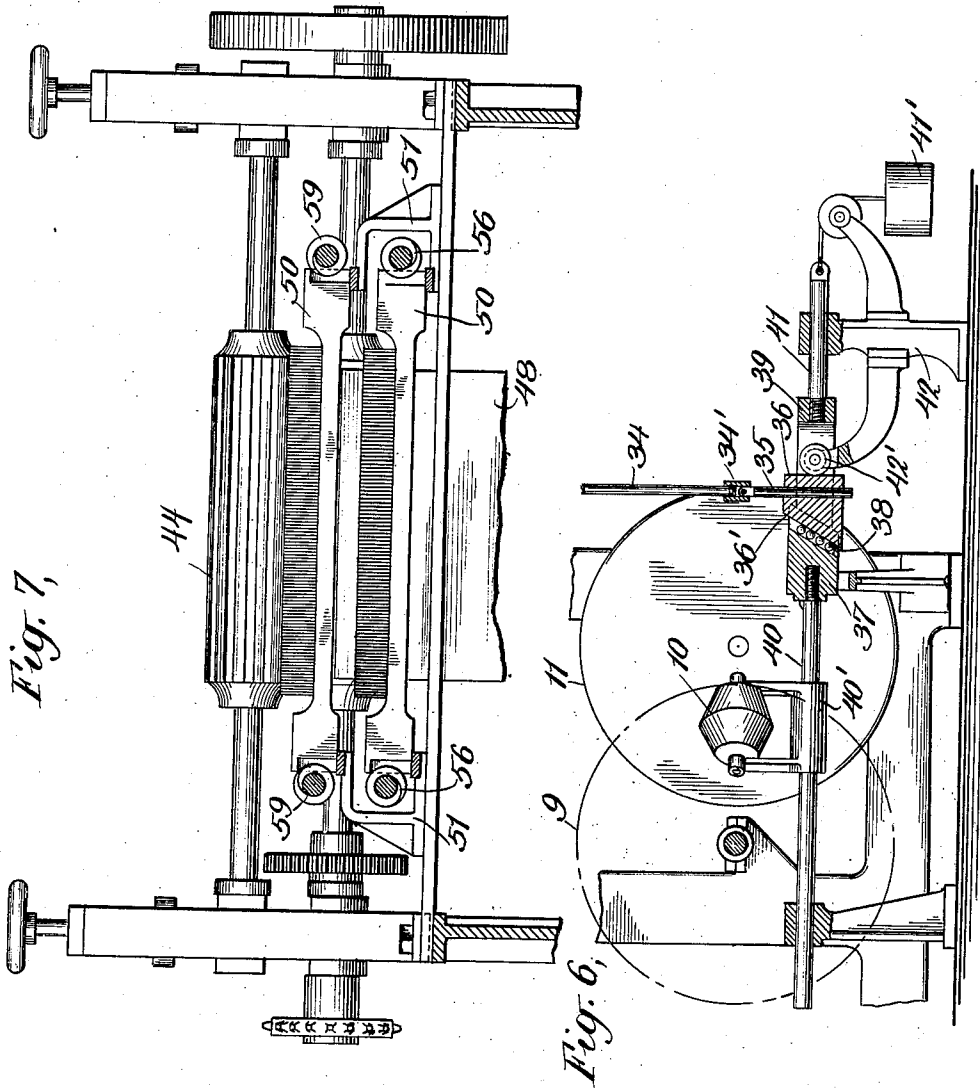
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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RHODE ISLAND.

WOOL EVENING AND DRAWING MACHINE.

No. 874,715.

Specification of Letters Patent.

Patented Dec. 24, 1907.

Application filed November 14, 1906. Serial No. 343,411.

To all whom it may concern:

Be it known that we, VALORUS S. WESTCOTT and FRANK W. POTTER, citizens of the United States, residing at Pawtucket and Central Falls, respectively, in the county of Providence and State of Rhode Island, have invented certain new and useful Wool Evening and Drawing Machines, of which the following is a specification.

In a companion application filed of even date herewith Serial Number 343,410 we have described at length present day methods of producing worsted yarns, and the necessity and importance from a commercial standpoint of making a yarn that shall be of uniform weight for a given count. According to present methods the wool after going through the carding and combing machines is passed through a series of gill boxes the object being to lay the fibers parallel, and by running several ends into one to reduce as much as possible the thick and thin places to produce a level yarn. In a typical worsted mill with which we are familiar four gill boxes are employed through which the wool passes as follows. The first is known as a double-can gill box through which about thirty ends from the combing machine are drawn. Eight or more ends from the first gill box are then drawn through a ball gill box, the resulting single sliver being rolled into a ball. From eight to ten ends from the second gill box are then run into one through what is known as a double-can gill weighing box. The slivers from this gill box are received in cans which are weighed and two ends therefrom, approximating the same weight, are run into one through a two-spindle gill box. The slivers from the last gill box are wound on spools which supply the drawing frames. Variations in weight in a yarn of given count of anywhere between five and fifteen per cent. is the common experience, such variations being due to the fact that dependence is placed upon the skill of an operator to average the slivers as they pass through the third gill box. By close attention to the slivers with respect to thick and thin places and by introducing a greater or less number of ends according to circumstances the operator is enabled to partially equalize the variations in weight of the several slivers and to produce a single sliver which approximates in some degree toward uniformity. Experience is the only guide

and at best the method pursued is mere guess work and wholly unsatisfactory, it being impossible to produce a sliver, and consequently a yarn of uniform weight. Moreover such method followed by two different operators will not be the same within a wide range. The basis of perfect wool spinning is a uniform material upon which to work but heretofore, so far as we are aware, no attempt has been made to even the slivers except by the drawings incident to the gilling, and the averaging of the slivers by an operator as above stated.

The object of the present invention is to construct a machine having the capability of automatically delivering a sliver of substantially uniform weight, thereby lessening the number of gill boxes, or at least if four gilling operations are necessary to properly parallelize the fiber, then doing away with the previous guess work method of averaging the slivers now resorted to.

Briefly stated this machine comprises an evenner roll and back and front drawing rolls, and fallers operating as in previously known gill boxes. The back drawing rolls are divided into three sets one of which is driven at a constant rate of speed, and the others with the evenner roll at varying rates of speed determined by the weight of the entering slivers, all as more fully described herein-after.

The invention will be understood by reference to the accompanying drawings in which

Figure 1 is a top view of the machine certain parts of the sliver evening mechanism being omitted; Fig. 2 a central longitudinal section of the machine of Fig. 1; Fig. 3 a side elevation thereof looking in the direction of the arrow *a* in Fig. 1; Fig. 4 is an end elevation partly in section, in the direction of the arrow *b* in Fig. 1; Fig. 5 a detail elevation of a part of the variable speed motion; Fig. 6 a vertical sectional view of said speed motion; and Fig. 7 a transverse section on the plane of the line 7—7 of Fig. 2.

Similar reference numerals indicate similar parts in the several views.

Referring to the drawings numeral 1 designates a frame of suitable form and proportions adapted to support the several parts of the machine as herein described. Supported in bearings at the back of the frame is an evenner roll 2 and drawing rolls 3 and 4, the speed of rotation of said rolls being auto-

matically varied according to the weight of the entering slivers through the following means.

5 5 designates the power shaft having the usual fast and loose pulleys thereon and adapted to be driven from any convenient source of power. This shaft, as seen in Fig. 4, has bearings in the frame 1 and has keyed thereto a gear wheel 6 which meshes with a similar but larger gear 7 keyed on a shaft 8. 10 The shaft 8 carries on its outer projecting end a disk 9 adapted to transmit its motion through a freely turning friction wheel 10 to an oppositely disposed disk 11, said latter disk being secured to a shaft 12 mounted in bearings in the frame 1 and in a standard 13. 15 The shaft 12 is yieldingly movable in a longitudinal direction by means of a spring 14 surrounding said shaft between a collar 12' secured thereto and a fixed thrust bearing 13'. The speed of shaft 8 is substantially uniform, and the arrangement of disks 9 and 11 such that the driving and driven shafts 8 and 12, respectively, revolve in the same direction. The axis of the three revoluble 25 friction members 9, 10 and 11 are in the same horizontal plane.

On the shaft 8 is keyed a worm 15, shown in dotted lines in Fig. 4, which meshes with a worm wheel 16. The shaft 16' of said worm wheel is mounted in suitable bearings and has keyed thereto at its upper end a bevel gear 17 meshing with a similar gear 17'. The latter is mounted on a stub shaft which has 35 keyed thereto a spur gear 18 which through an intermediate 18' is connected with a gear 19 keyed on the shaft of the evenner roll. On the opposite end of the evenner roll is a gear 19' which, through an intermediate 19'', meshes with a gear 20 (see Fig. 1) on the lower back drawing roll 3. On the opposite end of said roll is a spur gear 20' which, through an intermediate 20'', meshes with a gear 21 on the shaft of the lower back drawing roll 4. 45

As will be readily understood, the speed ratio of the disk 11 to the driving disk 9 is governed by the position relatively thereto of the friction wheel 10; that is, if the axis of the wheel 10 be moved toward the axis of the uniform revolving driving disk 9 the speed of disk 11 and consequently of shaft 12 will be decreased, and if it is moved in the opposite direction the speed of shaft 12 will be increased. This principle of operation is utilized to vary the speed of the evenner roll and the drawing rolls 3 and 4 upon any variation in the weight of the sliver from a normal as will now be described.

60 In order to automatically effect the desired movements of friction wheel 10 we employ a series of detectors which bear directly upon the slivers and which cooperate with the evenner roll 2 to confine the slivers on all 65 sides at all times. These detectors may be

connected in such manner to the wheel 10 that the whole duty of effecting the movements of said wheel is imposed upon the slivers, or we may employ independent power actuated means to perform the actual work of shifting the friction wheel and require of the slivers only the duty of permitting such means to become operative for the desired purpose. It will be understood that the present drawings illustrate only the preferred form of sliver evening mechanism and that any other type is included within the broad scope of our invention when connected with the remaining mechanism as more fully described hereinafter. 70 75 80

The evenner roll 2 has a series of peripheral grooves 2', adapted to receive without binding upon the side walls thereof a corresponding number of detector disks or wheels 25 revolubly supported on studs carried by yokes 26. These yokes are secured to vertical rods 27 the upper ends of which constitute knife edges and support saddles 28, the latter in turn supporting the upper saddle 29 which is in engagement through an intermediate knife edge 30 with the under side of a lever 31. These parts are so constructed and adjusted that in the absence of a sliver a given disk 25 will rest upon the bottom of its groove 2' of the evenner roll, and when a sliver is passing through the evenner roll any variation thereof from a normal weight will be indicated by the rising and falling movements of the disks 25, such movements being communicated to lever 31 through the system just described. Lever 31 is fulcrumed on a knife edge 32 carried by a stirrup attached to a bracket of the frame, and is balanced by an adjustable weight 33. The outer end of the long arm of lever 31 is adapted to support adjustably therein a vertical rod 34, said rod having secured thereto through a connection 34' a link 35. The latter carries a block or shoe 36 having an inclined or wedge face 36'. Co-acting with said block is a complementary block 37 having a channel in the inclined face thereof adapted to receive antifricition balls 38. As shown in Fig. 1 the block 37 is carried by a yoke 39 to one end of which is secured a spindle 40 having bearings in suitable standards, said spindle having mounted thereon a bracket 40' in which is revolubly supported the friction wheel 10. To the outer end of yoke 39 is secured a rod 41 to which is attached a weight 41' the function of which is to maintain the blocks 36 and 37 in frictional engagement with each other. The bracket 42 in which the rod 41 is slidably mounted has an arm carrying a roller 42' which bears against the back of block 36. Block 37 is provided with pins 37' on the side thereof (see Figs. 1 and 5) which engage slots in a forked head 43 of a bracket 43', such means serving to properly guide the block 37 and yoke 39. The mode of operation 130

tion of the sliver evening mechanism will be referred to later after a description to be now given of the other parts of the machine.

At the front of the machine supported in suitable bearings is a set of drawing rolls 44; and at the back is the third set of back drawing rolls 47. Between the rolls 44 and 47 are fallers 50. The lower of the front rolls 44 is connected directly to the main shaft 5 through a belt 45, and through the train of gears 46 and 46' (see Fig. 1). The shaft of said roll is connected to the shaft of the lower one of the back feed rolls 47. The gears 46 and 46' are so proportioned that the speed ratio of the front rolls 44 to that of the back rolls 47 is about 5:1. The drawing rolls have their surfaces corrugated and between the front rolls is passed an endless apron 48 of soft leather which is more or less pressed into the interdental spaces of said rolls as they are rotated. This belt passes around a guide roll 49 adjustably supported in a bearing 49'.

The fallers 50 are of the usual type and are carried on saddles 51 supported upon the frame of the machine. On the shaft of the front lower roll 44 are spur gears 52 (see Figs. 1 and 2) which mesh with similar gears 53 keyed on stub shafts which also carry bevel gears 54. These latter mesh with gears 55 keyed on the shafts of the lower screws 56, said screws being disposed longitudinally of the machine. On the shafts of the screws 56 are keyed spur gears 57 (see Fig. 3) which mesh with similar gears 58 on the shafts of the upper screws 59. The two sets of screws have bearings in the frame of the machine and are engaged by the fallers 50 to effect the forward and backward travel of the latter; the pitch of the lower relatively to that of the upper screws being such as to cause the fallers in their backward movement to travel faster than in their forward movement, as is well understood. The screws 56 and 59 are provided with the usual cams 60 and 61 which act respectively to raise and lower the fallers.

Keyed on the shaft of one of the lower screws 56 is a spur gear 62 (see Fig. 1) meshing with a similar gear on a shaft 63 from which a belt is run to a revoluble trumpet 64, the latter having a bearing in a bracket on the frame of the machine. The single sliver emerging from the trumpet is rolled into a ball 65 at the front of the machine. This ball is wound on a spindle 66 having bearings in blocks 67 (see Fig. 3) slidable vertically in guides 68. Supported in brackets 69 are two shafts 70 on which are splined corrugated rolls 71, the ball 65 resting upon said rolls. The guides 68 and rolls 71 are mounted upon a carriage which comprises a transversely slotted base 72 adapted to be engaged by a crank pin 73 on a disk 74. The latter is carried on a vertical shaft supported

in a bracket and has keyed on its lower end bevel gear 75 meshing with a similar gear 75' on a horizontal shaft 76. Near the outer end of shaft 76 is keyed a spur gear 77 which meshes with a similar gear 78 having a wide face. Gears 79 keyed on the shafts 70 are in mesh with gear 78 so as to rotate said shafts and the rolls 71 in the same direction to effect the winding of the ball 65. Shaft 76 is driven through any suitable means as a chain 80 passing around sprocket wheels keyed on said shaft and the shaft of the lower front drawing roll 44.

The operation of the machine above described is as follows. As many ends 81 as may be necessary are taken from the cans 8 and led through suitable guides into the bite of the evener and detector rolls. They pass thence through the drawing rolls 3, 4 and 47, fallers 50 and front drawing bolts 44 to the balling mechanism. On their way to the evener roll the slivers pass over spoons 83 adapted to actuate a knock-off mechanism upon the exhaustion or breakage of a sliver. In passing through the grooves of the evener roll the slivers are confined on all sides, that is between the bottom and side walls of said grooves and the detectors. The latter bear directly upon the slivers and the latter being yieldingly mounted in a plane transverse to the plane of fixed confinement a detector will respond instantly to any variation in the weight of the corresponding sliver, whether that variation is in a vertical or a transverse direction. The several parts of the machine described are adjusted primarily for a sliver of normal weight. If the weight of a given sliver runs above normal the corresponding detector will rise slightly and through the frame of compound levers described will raise the outer end of lever 31. Should a sliver run below normal the detector will move downwardly and thus effect a lowering of the outer end of lever 31. These movements of lever 31 are transmitted to the rod 34 and block 36 and when said block is raised by an increase in the weight of the sliver it acts on the complementary block 37 moving the latter to the left, and through the described connections will shift friction wheel 10 toward the axis of the driving disk 9 thus effecting a corresponding decrease in the speed of rotation of disk 11 and through the train of gears described the speed of the drawing and evener rolls 3 and 4 will be reduced. A movable block 36 in a downward direction when a sliver runs below normal will effect through weight 41' a movement of yoke 39 and consequently of the friction wheel 10 to the right or toward the periphery of disk 9. This movement will increase the speed of rotation of the evener and drawing rolls. As will be understood by those familiar with the art, the movements of friction wheel 10 are very limited and that practical

conditions deal with variations of a few grains per yard of sliver.

From the foregoing it will be seen that the speed of the rolls 2, 3 and 4 is automatically lessened if a given sliver increases in weight, thereby permitting the uniformly rotating rolls 47 to draw the sliver down to normal weight. If there is a decrease below the normal when a given sliver enters the even-
roll the speed of said roll and of the drawing rolls 3 and 4 will be automatically increased above that of the rolls 47, so that the amount or weight of material entering the rolls 47 is substantially uniform under all conditions.
The sliver which is rolled into the ball 65 is, therefore, of substantially uniform weight for a given unit of length, and if the double-can gill weigh-box is to be retained by reason of the necessity for another gilling operation, the operator is merely called upon to keep that machine supplied with the necessary number of ends, being relieved entirely of the work of averaging the slivers. It follows that the spinning frames will be supplied with spindles from the two-spindle gill box carrying a uniform sliver, and that the rovings from the drawing frames will be of like character as to weight for a given count of yarn.

By reason of the extra drawing through the rolls 3 and 4 of the evenner mechanism it will be possible to omit the third gill box inasmuch as the relation of the drawing rolls 3 and 4 and the evenner roll 2 to the drawing rolls 47 is such that there is "a draft of three", that is a given unit of length of sliver entering the evenner roll is drawn to three times that length by the rolls 47. If the third gill box heretofore used is omitted the slivers will be taken directly from the machine herein described to the two-spindle gill box.

The term "worsted yarn" as used herein is intended to cover not only a yarn made from the wool of the sheep but mohair and kindred yarns requiring a like treatment preparatory to the spinning operation. Believing ourselves to be the first to construct a machine combining an evenner mechanism with a gill box we desire to claim the same broadly without limitation to specific details.

What we claim and desire to secure by Letters Patent is:—

1. A machine of the character described comprising a gill box, and mechanism for delivering thereto a sliver of substantially uniform weight for a given unit of length.

2. A machine of the character described comprising a gill box having back drawing rolls and means for rotating the same, and mechanism for delivering to said rolls a sliver of substantially uniform weight for a given unit of length.

3. A machine of the character described

comprising front and back drawing rolls, means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls, and mechanism for delivering to said back rolls a sliver of substantially uniform weight for a given unit of length.

4. In a machine of the character described the combination of a gill box comprising drawing rolls and means for rotating the same, a sliver evening mechanism comprising evening and drawing rolls, and means for varying the speed of rotation of the rolls of said evening mechanism.

5. In a machine of the character described the combination of a gill box comprising drawing rolls and fallers, means for actuating said rolls and fallers, and means for varying the rate of feed of the sliver entering the gill box as the sliver varies in weight.

6. In a machine of the character described the combination of a gill box comprising drawing rolls and fallers, means for actuating said rolls and fallers, a detector movable in response to variations of the sliver from a normal weight, and means adapted to be set in operation by said detector to vary the rate of feed of the sliver to the gill box.

7. In a machine of the character described the combination of a gill box comprising drawing rolls and fallers, means for confining the sliver, a detector resting or bearing on said sliver and movable in response to variations in the weight of the sliver from a normal, and means adapted to be set in operation by said detector to vary the rate of feed of the sliver to the gill box.

8. In a machine of the character described the combination of a gill box comprising drawing rolls and fallers, a sliver evening mechanism comprising relatively fixed and movable members between which the sliver is at all times confined on all sides, and means actuated by said movable member when the sliver varies from a normal weight to vary the rate of feed of the sliver entering the gill box.

9. In a machine of the character described the combination of a gill box comprising back drawing rolls, means for rotating said rolls at a constant rate of speed, a sliver evening mechanism comprising drawing rolls, and means for varying the speed of rotation of said latter rolls relatively to the former as the sliver varies in weight from a normal.

10. A machine of the character described comprising front and back drawing rolls, means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls and means for actuating the same, means for confining a sliver on all sides comprising a yieldingly mounted detector, and means actuated by said detector when the sliver varies from a normal weight to correspondingly vary the rate of feed of the sliver to said back drawing rolls.

11. A machine of the character described comprising front and back drawing rolls, means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls and means for actuating the same, means to unyieldingly confine a sliver in one direction, a movable detector adapted to bear upon the sliver and operating in a plane transverse to the plane of fixed confinement, and means actuated by said detector when the sliver varies from a normal weight to correspondingly vary the rate of feed of the sliver to said back rolls.

12. A machine of the character described comprising front and back drawing rolls, means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls and means for actuating the same, an evener roll having a groove therein, a movable detector seated within the groove and co-acting with the roll to confine the sliver on all sides, and means actuated by said detector when the sliver varies from a normal weight to correspondingly vary the rate of feed of the sliver to said back rolls.

13. A machine of the character described comprising front and back drawing rolls, means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls and means for actuating the same, an evener roll, drawing rolls geared to said evener roll, a detector adapted to bear upon the sliver, and mechanism actuated by said detector when the sliver varies from a normal weight to correspondingly vary the speed of rotation of said evener roll and the rolls geared thereto, to thereby deliver to said back rolls a sliver of substantially uniform weight for a given unit of length.

14. A machine of the character described comprising front and back drawing rolls,

means for rotating said rolls at different but constant rates of speed, fallers intermediate said rolls and means for actuating the same, an evener roll and back drawing rolls geared thereto, a detector co-acting with said evener roll to confine the sliver on all sides, and means actuated by said detector when the sliver varies from a normal weight to correspondingly vary the speed of rotation of said evener roll and the rolls geared thereto, to thereby deliver to said back drawing rolls a sliver of substantially uniform weight for a given unit of length.

15. A machine of the character described comprising four sets of drawing rolls, two of which are geared together and rotated at different but constant rates of speed, fallers intermediate said two sets of rolls, an evener roll geared with the other two sets of rolls, and means adapted to be set in operation by a sliver when it varies from a normal weight to correspondingly vary the speed of rotation of said evener roll and the drawing rolls geared thereto.

16. A machine of the character described comprising a gill box, and mechanism adapted to be set in operation by a sliver when it varies from a normal weight to correspondingly vary the rate of feed of said sliver to the gill box to thereby deliver to the latter a sliver of substantially uniform weight for a given unit of length.

In testimony whereof we have hereunto signed our names in the presence of two subscribing witnesses.

VALORUS S. WESTCOTT.
FRANK W. POTTER.

Witnesses:

CHAS. H. HYDE,
FRANCIS H. WASHBURN.