J. J. WALSER.

VARIABLE SPEED DRIVING MECHANISM.

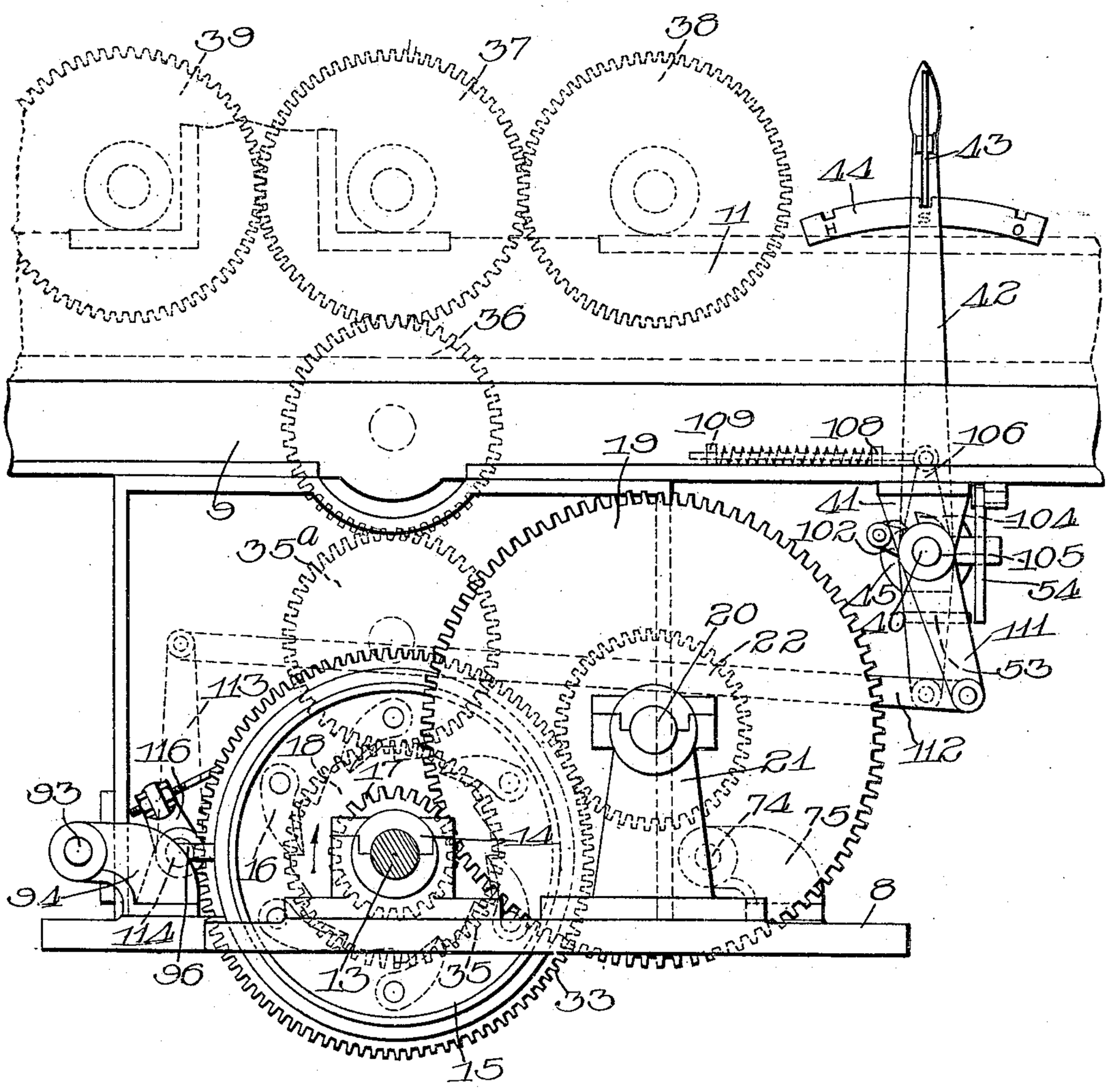
APPLICATION FILED JAN. 9, 1909.

940,096.

Patented Nov. 16, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Ira D. Perry
F. C. Dorsey Jr.

Inventor:
Joseph J. Walser.
By Bond, Adams, Pierce & Johnson
Attys

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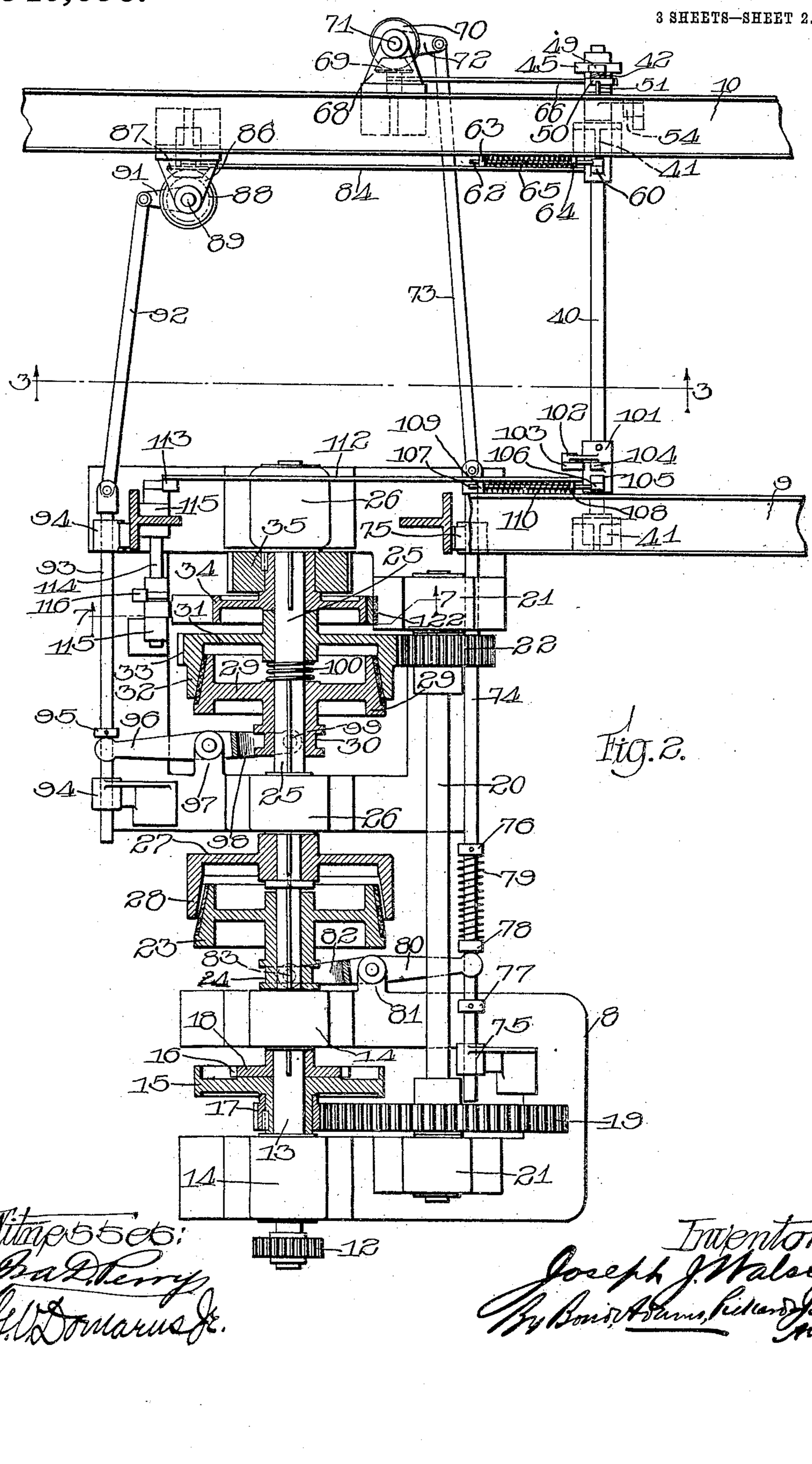

Fig. 2.

Witnesses:
Ira D. Perry
G. W. Dorsey Jr.

Inventor:
Joseph J. Walser.
By Bond, Adams, Pollard & Jackson
Attys

J. J. WALSER.

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Fig. 3.

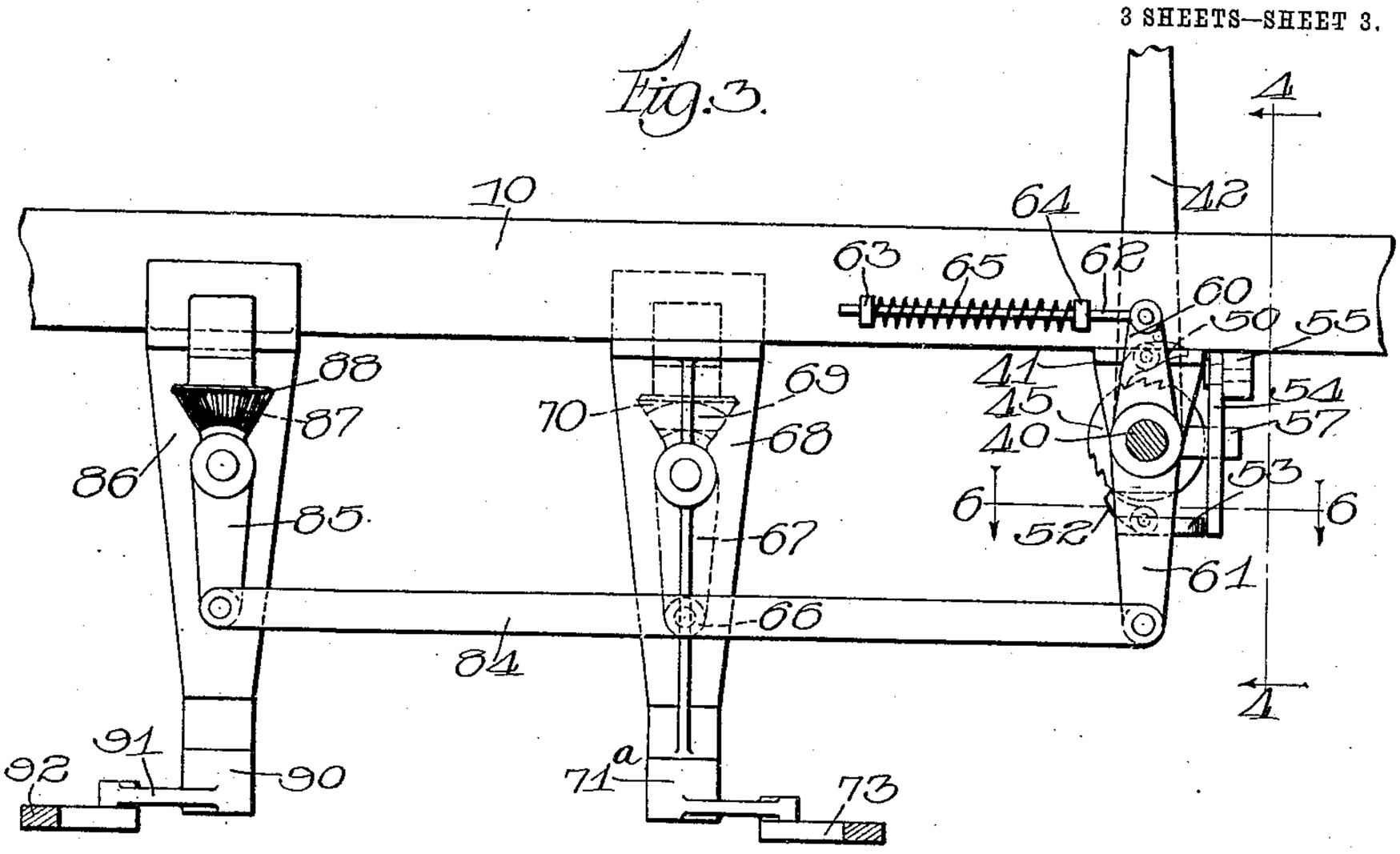


Fig. 4.

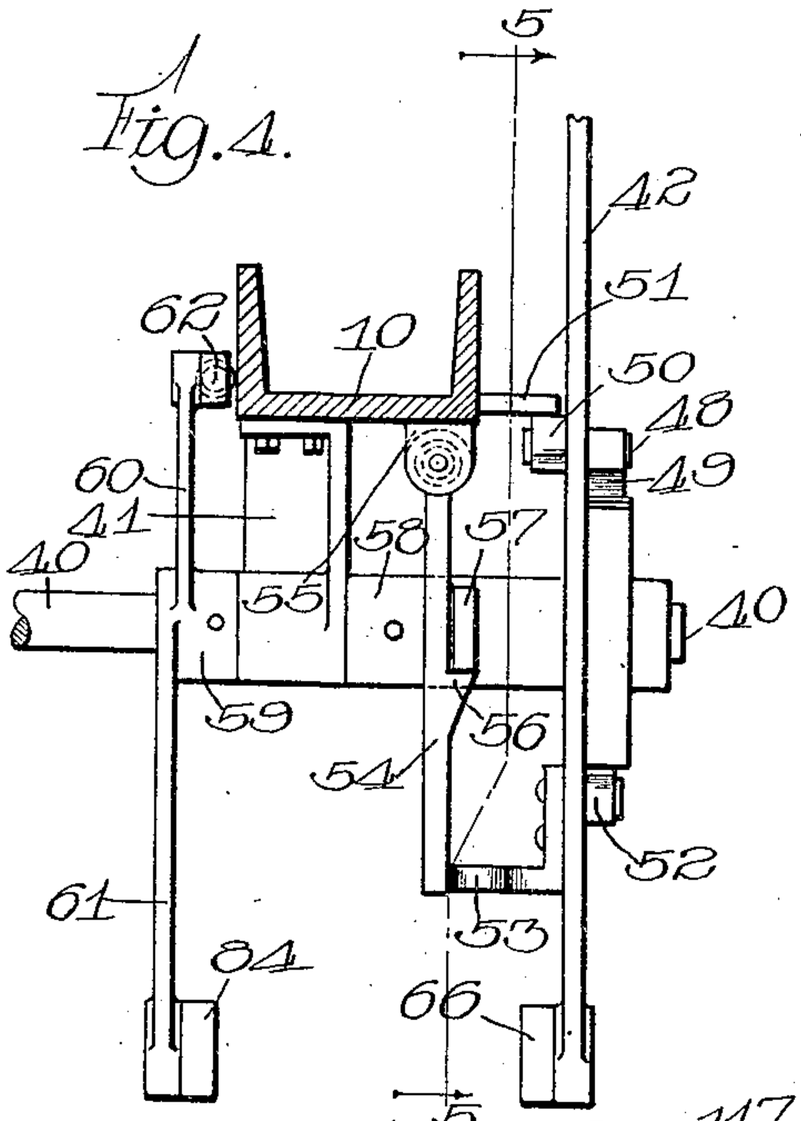


Fig. 5.

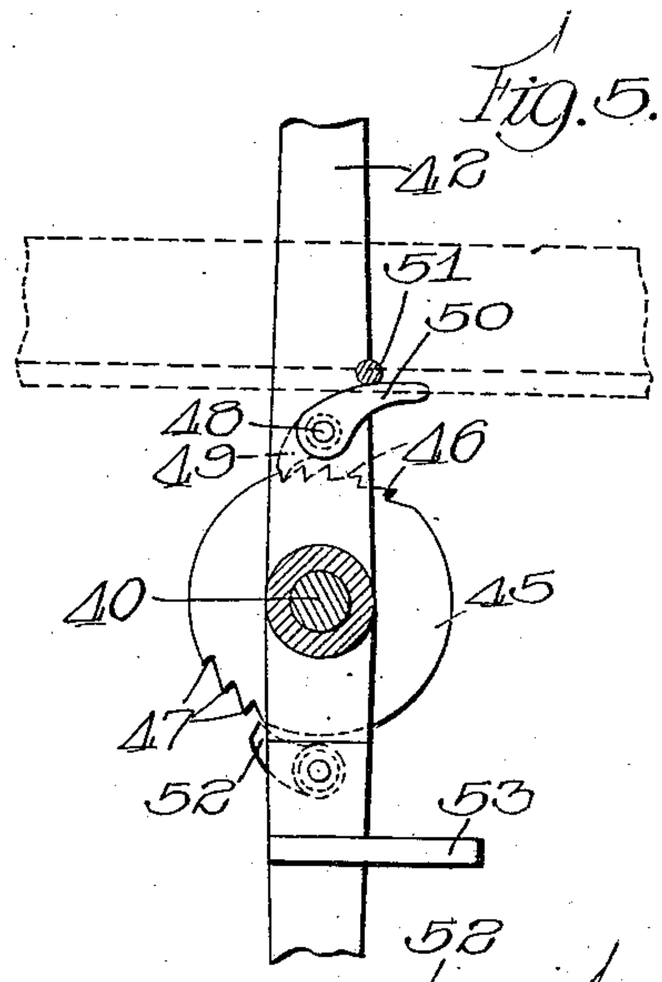


Fig. 6.

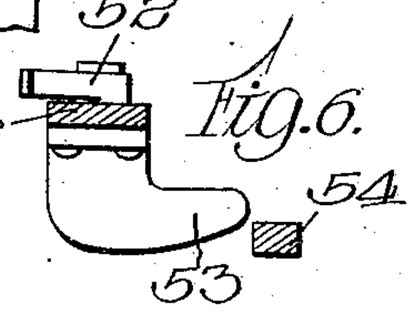
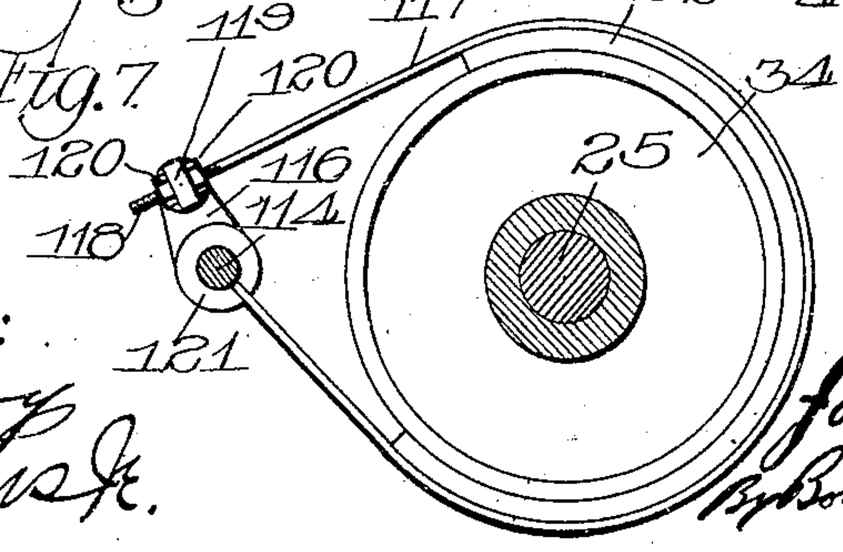


Fig. 7.



Witnesses:
Chas. D. Perry
G. W. Dorsey Jr.

Inventor:
Joseph J. Walser.
By Bond, Adams, Pickard & Jackson
Attys

UNITED STATES PATENT OFFICE.

JOSEPH J. WALSER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

VARIABLE-SPEED DRIVING MECHANISM.

940,096. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed January 9, 1909. Serial No. 471,452.

To all whom it may concern:

Be it known that I, JOSEPH J. WALSER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Variable-Speed Driving Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to driving mechanism especially adapted for printing presses, and its object is to provide a new and improved driving mechanism by which, driven at a constant speed by a suitable prime mover such as a high speed motor, the press may be given a slow and full speed movement, and in which the fast speed drive may be thrown into operation simultaneously with the throwing off of the slow speed so that the engagement of one being simultaneously with the throwing off of the other there may not be any period of time elapsing between the throwing off of the slow speed and the throwing in of the high speed during which the press not being positively driven might slow down somewhat and cause a sudden start up when the high speed is thrown in, causing breakage of the web.

My invention further relates to improvements in variable speed driving mechanism in printing presses in sundry details hereinafter pointed out.

In the drawings,—Figure 1 is an end elevation showing a portion of the framework of the press and some of the driving gears in dotted lines; Fig. 2 is a plan view, partly in horizontal cross-section; Fig. 3 is a detail, being a view of the lever and the operating mechanism by which the driving clutches are thrown into and out of operation; Fig. 4 is a detail, being a section on line 4—4 of Fig. 3; Fig. 5 is a detail, being a section on line 5—5 of Fig. 4; Fig. 6 is a detail, being a section on line 6—6 of Fig. 3; and Fig. 7 is a detail, being a view of the brake-wheel and brake-band.

Referring to the drawings,—8—8 indicate bed-plates, upon which the several parts hereinafter described are mounted.

9—10 indicate bars supported on a portion of the frame 11 of the press, shown in dotted lines in Fig. 1.

12 indicates a driving pinion, which is adapted to be driven at a constant speed by any suitable prime mover, preferably a high speed motor (not shown), and which may be, of course, of any well-known type. The pinion 12 is secured to a shaft 13 which is journaled in suitable bearings 14 on the bed-plate 8.

15 indicates a drum, which is loosely mounted upon the shaft 13 and is provided with a plurality of pawls 16 on its inner surface.

17 indicates a pinion, which is secured to the hub of the drum 15.

18 indicates a ratchet-wheel, which is keyed upon the shaft 13 against the inner face of the drum 15 and adapted to be engaged by the pawls 16.

19 indicates a gear, which meshes with the pinion 17 and is keyed, or otherwise secured, to a shaft 20 which is journaled in suitable bearings, as 21, on the bed-plates 8.

22 indicates a gear, which is keyed, or otherwise secured, to the shaft 20.

23 indicates a drum, which forms one member of a clutch mechanism and which is feathered upon the inner end of the shaft 13. The hub of the clutch-member 23 is provided with a peripheral groove 24 which is adapted to be engaged by a shifting lever hereinafter described.

25 indicates a shaft, which is journaled in suitable bearings 26 on the bed-plate 8.

27 indicates a clutch-member in the form of a drum provided with a peripheral flange 28 which is adapted to engage with the clutch-member 23 when the two members are slid into engagement with each other, as hereinafter described. The inner surface of the flange 28 and the outer surface of the clutch drum 23 are correspondingly beveled to form a clutch when brought into engagement, as hereinafter described.

29 indicates a clutch drum, which is feathered upon the shaft 25 and has its hub provided with a peripheral groove 30 adapted to be engaged by a shifting lever hereinafter described to slide the clutch drum 29 longitudinally of the shaft 25.

31 indicates a clutch drum, which is rotatably mounted upon the shaft 25 and is provided with a clutch flange 32. The inner periphery of the flange 32 and the outer periphery of the clutch drum 29 are correspondingly beveled so as to form a clutch

when the two members are thrown into engagement as hereinafter described. The outer periphery of the clutch drum 31 is provided with a gear 33 adapted to mesh with the gear 22.

34 indicates a brake-drum, which is keyed upon the shaft 25.

35 indicates a driving pinion, which is secured to or formed integral with the hub of the brake-drum 34 and which meshes with a gear 35ª, which in turn meshes with gear 36 on the press frame through which in turn press gears, as 37, 38 and 39, are driven.

40 indicates a rock-shaft, which is journaled in suitable bearings, as 41, in the side-bars 9—10.

42 indicates a lever, which is rotatably mounted near the end of the rock-shaft 40, and is provided at its upper end with the usual spring-latch 43 which is adapted to engage with notches O—S—H in a curved rack-bar 44. The notch marked O is engaged by the spring-dog when the press is stopped; the notch marked S by the dog when the press is running at slow speed; and the notch marked H when the press is running at full speed.

45 indicates a disk, which is keyed, or otherwise secured, to the outer end of the rock-shaft 40 against the outer surface of the lever 42 and is provided on its periphery with two sets of ratchet-teeth 46—47.

48 indicates a pin, which is journaled in the lever 42 above the disk 45 and passes through said lever, extending beyond it on either side. 49 indicates a pawl upon the outer end of said pin 48, which is adapted to engage the ratchet-teeth 46 on the disk 45. 50 indicates an arm secured to the other end of said pin 48 upon the inner surface of the lever 42.

51 indicates a pin, which is mounted on the outer surface of the frame-bar 10 and which is adapted to contact the arm 50 on the rock-shaft 48 after the lever has moved out of slow speed position and to free the pawl 49 from the ratchet-teeth 46 in the manner hereinafter described.

52 indicates a pawl, which is pivoted upon the outer surface of the lever 42 and is adapted to engage with the ratchet-teeth 47 on the disk 45 as the lever is swung.

53 indicates a cam secured upon the inner surface of the lever 42 below the pawl 52.

54 indicates a swinging arm, which is pivoted at its upper end to a suitable bearing, as 55, on the under side of the frame-bar 10 and, depending downward therefrom, is adapted to be swung backward out of its normal position by the action of the cam 53, as hereinafter described. The lever 54 is provided with a latch 56 which is adapted to engage a lug 57 mounted upon a collar 58 keyed to the rock-shaft 40 in such a way that when the parts are in the position shown in Fig. 4 the latch 56, swung in under the lug 57, will prevent the backward rotation of the rock-shaft 40—that is to say, rotation which will carry the lug 57 downward until free to rotate. When the lever 54 is swung outward by the cam 53, as hereinafter described, the latch is released from the lug.

59 indicates a collar secured to the rock-shaft 40 and provided with an upward-extending arm 60 and a downward-extending arm 61.

62 indicates a rod, which is pivotally connected at its outer end with the upper end of the arm 60, and at its inner end passes through a lug 63 on the inner surface of the side-bar 10 and provided with a suitable opening through which the rod passes so that said rod 62 will move longitudinally of itself therein. 64 indicates a stop on said rod 62. 65 indicates a spiral spring on said rod 62 bearing against the lug 63, the stop 64 tending to normally throw the arm 60 toward the right in Fig. 3 when left free to act.

66 indicates a link, which is pivotally connected at its outer end with the lower end of the lever 42.

67 (best shown in dotted lines in Fig. 3) indicates a lever, which is journaled in a hanger 68 secured to the under side of the side-bar 10. The lower end of the lever 67 is pivotally connected with the inner end of the link 66 and at its upper end is provided with a segmental beveled rack 69 (shown in dotted lines in Figs. 2 and 3).

70 indicates a beveled gear secured to a suitable shaft 71 (Fig. 2) which is journaled in the hanger 68. The beveled gear 70 is adapted to be geared with the segmental beveled rack 69 and to be rotated thereby as said lever swings to and fro.

71ª indicates a collar, which is keyed, or otherwise secured, to the lower end of the shaft 71 and is provided with an arm 72 preferably made integral therewith.

73 indicates a link, one end of which is pivotally connected with the arm 72 and the other end pivotally connected with a slide-rod 74 which is slidingly mounted in suitable bearings, as 75, on the bed-plate of the machine.

76—77 indicate collars which are pinned, or otherwise secured, to the slide-rod 74 a suitable distance apart.

78 indicates a collar, which is slidingly mounted on the rod 74.

79 indicates a spiral spring interposed between the collars 76 and 78.

80 indicates a shifting lever, which is journaled in a suitable bearing, as 81, on the bed-plate 8. One end of the lever lies above the rod 74 and is adapted to be engaged by the collars 77 and 78 to shift the lever in one direction or the other. The other end of the lever is provided with a

fork 82 which embraces the hub on the clutch drum 23 and is provided with bearing rollers 83 which engage the circumferential groove 24 and operate as said lever 80 is shifted by the movement of the slide-bar 74 to slide the clutch drum 23 to and fro upon the shaft 13 and into and out of engagement with the clutch drum 27.

84 indicates a link, one end of which is pivotally connected with the end of the arm 61 on collar 59 and the other end pivotally connected with the lower end of a lever 85 journaled upon a suitable hanger, as 86, secured to and depending from the side-bar 10. The other end of the lever 85 is provided with a segmental beveled rack 87 which is adapted to engage with a beveled gear 88 that is secured to a shaft 89 journaled in the hanger 86.

90 indicates a collar upon the lower end of the shaft 89 secured thereto in any preferable manner and provided with an arm 91.

92 indicates a link, one end of which is pivotally connected with the arm 91 and the other end pivotally connected with one end of a slide-bar 93 mounted in suitable bearings, as 94, on the bed-plate 8 so as to slide longitudinally of itself therein.

9 indicates a collar, which is pinned, or otherwise suitably adjustably secured, upon the slide-bar 93.

96 indicates a shifting-lever, which is journaled in a suitable bearing, as 97, on the bed-plate 8. The outer end of the shifting lever overlies the slide-bar 93 and is adapted to be engaged by the collar 95 when said slide-bar 93 is pushed to the left in Fig. 2. The other end of the lever 96 is provided with a fork 98 which embraces the hub of the clutch drum 29 and is provided with rollers 99 which engage the peripheral groove 30 on the hub of said clutch drum so that when said slide-bar 93 is moved to the left in Fig. 2 the clutch members 29—31 may be moved into engagement.

100 indicates a compression spring interposed upon the shaft 25 between the hubs of the two clutch members 29—31 and operates normally to force them apart and out of engagement.

101 indicates a collar, which is keyed, or otherwise secured, upon the rock-shaft 40 near the side-bar 9 and is provided with an arm 102 preferably formed integral therewith.

103 indicates a pawl, which is carried by the arm 101 and is adapted to engage a lug 104 on a collar 105 which is rotatably mounted on the shaft 40 adjacent to the collar 101 and between it and the frame-bar 9. 106 indicates an arm on said collar 105 projecting upward therefrom.

107 indicates a rod, which is pivotally connected at its outer end with the arm 106 and passes through a lug 108 on the inner surface of the side-bar 9 and is provided with a suitable opening in which the rod 107 may slide longitudinally of itself.

109 indicates a stop secured to the rod 107.

110 indicates a spiral spring interposed between the stop 109 and the lug 108 and operates to throw the parts back to original position when they have been moved by the rocking of the shaft 40 through the engagement of the pawl 103 with the lug 104.

111 indicates an arm, which is secured to and depends downward from and is preferably integral with the collar 105.

112 indicates a link, which is pivotally connected at one end with the lower end of the arm 111 and at its other end with an arm 113 on a rock-shaft 114 journaled in suitable bearings, as 115, on the bed-plate.

116 indicates an arm on the rock-shaft 114 opposite the brake-disk 34.

117 indicates a flexible brake-band, one end of which is adjustably mounted in the outer end of the arm 116 as by a narrow screw-threaded portion 118 passing through suitable lugs 119 with adjusting nuts 120. The other end of the flexible brake-band is secured in the collar 121 on which the arm 116 is formed.

122 indicates a brake-member, which is located between the flexible brake-band 117 and the brake 34 and is adapted when the brake is operated, as hereinafter described, to bear upon the brake-wheel 34 and brake the wheel and stop the press.

The operation of the above-described devices is as follows: In the drawings the parts are shown in the position which they assume when running at slow speed with the clutch-members 29—31 engaged. In this position the shaft 13 being driven by the driving pinion 12 carries the ratchet-wheel 18 around with it. The teeth of the ratchet-wheel move in the direction indicated by the arrows in Fig. 1. The ratchet-teeth engaging the pawl 16 drive the drum 15. The engagement of the pinion 17 fast on the hub of the drum 15 drives the gear 19 at a speed depending upon the relative number of the gear teeth on the pinion 17 and the gear 19. This drives the shaft 20 at slow speed, and the gear 22 engaging with the gear 33 on the clutch drum 31, which is loose upon the shaft 25, drives it, and the clutch members being in engagement the clutch 29 is driven thus driving the shaft 25, and the movement is communicated to the press by the pinion 35 communicating with the press gears. The brake, as hereinafter more fully described, is, of course, off so as to permit the press to run. It being now desired to move the press to full speed, the handle of the lever is moved to the left to the high speed notch H. As this movement begins the arm 50 on the pin 48 begins to bear upon the pin 51, and as the movement of the lever pro-

ceeds the arm 50 is forced downward so as to shortly release the pawl 49 from the ratchet-teeth 46. The same movement of the lever carries its lower end, of course, in the opposite direction and the cam 53 engages the swinging arm 54 moving it to the left in Fig. 4, freeing the latch 56 from the lug 57 and leaving the rock-shaft 40 free to move. Thereupon the rock-shaft is thrown in a clockwise direction in Figs. 3 and 5 by the action of the spring 65 upon the arm 60. This rocking of the rock-shaft throws the arm 61 to the left in Fig. 3, moving the link 84 from right to left and through the medium of the lever and beveled rock segment 87 and the beveled gear 88 moving the arm 91 toward the side-frame 10 and carrying in the same direction the link 92 and slide-bar 93, which, moving the collar 95 with it, causes the disengagement of the same from the shifting lever 96 and leaves the same free to move. The spring 100 thereupon, which has been compressed by the bringing of the two clutch members 31 and 29 into engagement, is left free to act, and the clutch members 31 and 29 are thereupon separated. While this is going on the movement of the lever 42 to the high speed notch swings the lower arm of the lever from left to right in Figs. 3 and 5, moving, of course, in the same direction the link 66, which, rocking the lever 67 rotates the beveled gear 69 in a clockwise direction in Fig. 2, moving the arms 72 in the same direction, moving the link 73 toward the driving mechanism and the shift bar 74 in the same direction. The spring-seated collar 78 being at the beginning of the movement in engagement with the end of the lever 80, this movement of the shift bar rocks the shift lever 80, and by means of the fork 82 and its roller 83 engaging the peripheral groove 24 the clutch member 23 is moved into engagement with the clutch member 27. The clutch member 23 being feathered upon the shaft 13 is, of course, driven at the same speed, and as the clutch member 27 is keyed upon the shaft 25 this causes the shaft 25 to rotate in the same direction as the shaft 13 and at the same speed, thus driving the pinion 35 at the same speed and driving the press at high speed. The parts are so positioned that the clutch members 29—31 are not separated in the manner above described until the clutch members 23 and 27 move into engagement. This, of course, will momentarily drive the pinion 22 at an increased speed, which will be communicated by means of the gear 19 and pinion 17 to the drum 15 which is loose upon the shaft 13 and will move it temporarily at a highly increased speed, which, however, is taken care of by the moving of the pawls 16 away from the ratchet-wheel at a much higher speed allowing the pawls to slip over the ratchet-wheel. The higher speed by reason of the beveled engaging surfaces of the clutch members 23 and 27 is not, of course, taken up instantly, the clutch members slipping over one another as the engagement is effected until the complete and tight engagement is made. By this time the clutch members 31 and 29 have been completely separated in the manner above described, and the excess speed temporarily given to the shaft 20 and thereby to the drum 15 will run down until the parts run with the main driving shaft. At the same time that the lever moves to the left to the high speed position the lower end of the lever is, of course, carried in the opposite direction, and the cam 53 bearing upon the lower end of the swinging arm 54 swings it out to the left in Fig. 4 releasing the latch from the lug 51 and leaving the rock-shaft 40 free to turn,—the pawl 49 having, as has been said above, moved out of engagement with the teeth 46 of the disk 45 by the action of the pin 51 on the arm 50. The press is then, of course, running at full speed, the shaft 25 being driven through the engagement of the clutch members 23 and 27 at the speed of the driving shaft 13.

When it is desired to stop the press, the lever 42 is moved to the off position. The pawl 49 thereupon slips backward over the teeth 46 and the arm 50 is ultimately released from the pin 51 allowing the pawl to bear upon the periphery of the disk 45. As the lever approaches the off position the pawl 52 engages with one or the other of the teeth 47 on the disk 45 and this engagement by the movement of the lever causes a partial rotation of the disk 45 in the clockwise direction in Figs. 3 and 5. This rocking of the rock-shaft 40 in the same direction finally just before the shut-off position is reached brings the pawl 103 on the arm 102 on the collar 101, which is fixed as has been said, to the shaft 40, into engagement with the lug 104 on the collar 105, rocking it in the same direction against the action of the spring 110, and moving thereby the arm 111 to the left in Fig. 1 moves the link 112 in the same direction, moves the arm 113, rocks the shaft 114 in the contra-clockwise direction and tightens the brake-band 117 upon the brake-disk 34, stopping the machine. This same movement of the rock-shaft 40, it will be understood, has also moved the link 84 to the left in Fig. 3, and rocking the arm 91 by means of the beveled segment 87 and beveled gear 88 moves the slide-bar 93 by means of the link 92 still farther toward the frame-bar 9 and moves the collar 95 farther away from the arm 96,—a sufficient play being allowed for this purpose. The same movement of the upper arm of the lever 42 to the right—that is into shut-off position—of course moves its lower arm to the left. This, through the medium of the

link 66, rocks the shaft 71 so as to move the arm 72 outward from the frame-bar 10, carrying with it the link 73 and slide-bar 74, ultimately bringing the collar 77 to bear upon the end of the shifting lever 80. The collar 77 is so placed upon the slide-bar 74 that before the brake is tightened, as above described, the collar 77 bears upon the end of the arm 80 and moving it in the same direction with the slide-bar 74 separates the clutch members 23 and 27. The clutch members, therefore, being disconnected, the press is free to stop and is stopped by the operation of the brake above described. This same movement of the lever has moved the cam 53 out of engagement with the lower end of the arm 54 leaving it free to drop under the lug 57 as soon as the same is moved upward into slow speed position. The press being thus stopped, if it is desired to throw it into slow speed position the lever 42 is thrown into slow speed position. As it is thus thrown into slow speed position, the dog 49 engages one of the teeth 46 on the disk 45 and gives it a partial rotation contra-clockwise, rocking the shaft 40 in the same direction. It will be readily understood from the description of the operation above that this movement of the lever swinging the lever 67 will rotate the beveled gear 70 in a clockwise direction in Fig. 2, and moving the arm 73 and the slide-bar 74 downward in Fig. 2 will free the collar 77 from the shifting lever 80 and move the collar 78 toward it. The rocking of the rock-shaft through the link 84 will similarly operate the arm 91 on the shaft 89 through the action of the lever 85 and beveled gear 88, and moving the links 92 and 93 will cause the collar 95 to engage the end of the shifting lever 96 throwing the clutch-members 29 and 31 into engagement and compressing the spring 100 between them. The parts are so related to one another that the clutch members 29 and 31 are thrown into full engagement by the time the lever has been moved to the slow speed notch, and this movement, as has been said above, while it moves the rod 74 toward the arm 80 has moved it only far enough for the collar 78 to be in position against the end of the arm 80, but not far enough to move it so as to throw the high speed clutch members into engagement,—this being accomplished, as has already been described, by the further movement of the lever. The movement of the lever to the slow speed engagement has by the rocking of the shaft 40 so moved the lug 57 that by the time the lever has reached the slow speed notch the lug 57 is in the position shown in Figs. 3 and 4, thus permitting the swinging arm 54, which has been freed from engagement with the cam 53, to fall to a vertical position so that the latch 56 moves below the lug 57 and thus locks the shaft against backward rotation until the further movement of the lever, as above described, moves the cam 53 to push the arm 54 out and free the lug 57. The object of this is to prevent the immediate return of the rock-shaft 40 by the spring 65 as soon as the dog 49 has been freed from the teeth 46, thus preventing the throwing apart of the slow speed clutch members 31 and 29 until after the high speed clutch members 23 and 27 have been brought into at least partial engagement in the manner above described. The engaging of the fast speed clutch members before the slow speed clutch members are disengaged causes the press to be positively driven during the entire shifting from slow to high speed, thus preventing the intervention between the throwing off of the slow speed and the throwing in of the high speed of a short interval of time during which the press not being positively driven would be likely to slow down to cause sudden breakage of the web upon the throwing in of the high speed.

That which I claim as my invention and desire to secure by Letters Patent is,—

1. In combination, a driving-shaft, a pinion rotatably mounted on said driving-shaft, means adapted to drive said pinion from said shaft in one direction but allow it to rotate free of said shaft when traveling at a greater speed, a counter-shaft, a large gear on said counter-shaft meshing with the pinion on said driving-shaft, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, and means for bringing said slow-speed clutch-members into engagement, disconnecting them and bringing said high-speed clutch-members into engagement.

2. In combination, a driving-shaft, a pinion rotatably mounted on said shaft, pawl and ratchet mechanism connecting said pinion with said shaft, a counter-shaft, a gear on said counter-shaft meshing with said pinion, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, and means for bringing said slow-speed clutch-members into engagement, disconnecting them and bringing said high-speed clutch-members into engagement.

3. In combination, a driving-shaft, a

drum rotatably mounted on said shaft, means for rotating said drum from said driving-shaft in one direction only and adapted to permit said drum to rotate freely on said driving shaft in the same direction, a counter-shaft, a pinion on said drum, a gear on said counter-shaft meshing therewith, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, and means for bringing said slow-speed clutch-members into engagement, disconnecting them and bringing said high-speed clutch-members into engagement.

4. In combination, a driving-shaft, a drum rotatably mounted on said driving-shaft, pawl and ratchet connections between said drum and said driving-shaft, a counter-shaft, a pinion on said drum, a gear on said counter-shaft meshing therewith, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, and means for bringing said slow-speed clutch-members into engagement, disconnecting them and bringing said high-speed clutch-members into engagement.

5. In combination, a driving shaft, a drum rotatably mounted on said shaft, means for rotating said drum from said driving-shaft in one direction, a counter-shaft, a pinion on said drum, a gear on said counter-shaft meshing therewith, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, a lever, connections between said lever and said clutches adapted as said lever is moved in one direction to first move said slow-speed clutch-members into engagement, then, as said lever is moved farther in the same direction, to bring said fast-speed clutch-members into engagement, and, after said high-speed clutch-members are brought into engagement, to separate said slow-speed clutch-members.

6. The combination with a driving-shaft, a drum rotatably mounted on said shaft, pawl and ratchet connections between said drum and said driving-shaft, a counter-shaft, a pinion on said drum, a gear on said counter-shaft meshing therewith, a second shaft, a driving gear secured to said second shaft, a slow-speed clutch-member rotatably mounted on said second shaft, gearing connecting the same with said counter-shaft, a second slow-speed clutch-member slidingly mounted on said second shaft, a fast-speed clutch-member keyed to said second shaft, a second high-speed clutch-member slidingly mounted on said first shaft, a brake, a lever, connections between said lever and said clutches adapted as said lever is moved in one direction to first move said slow-speed clutch-members into engagement, then, as said lever is moved farther in the same direction, to bring said fast-speed clutch-members into engagement, and after said high-speed clutch-members are brought into engagement to separate said slow-speed clutch-members, said connections being further adapted when said lever is swung into the other direction to disengage said high-speed clutch-members and connections between said lever and said brake adapted by the further movement of the lever to automatically operate said brake.

JOSEPH J. WALSER.

Witnesses:
C. E. PICKARD,
MINNIE A. HUNTER.