June 19, 1934. J. K. DUNCAN ET AL 1,963,120

DUPLICATING MACHINE

Filed June 20, 1932 3 Sheets-Sheet 1

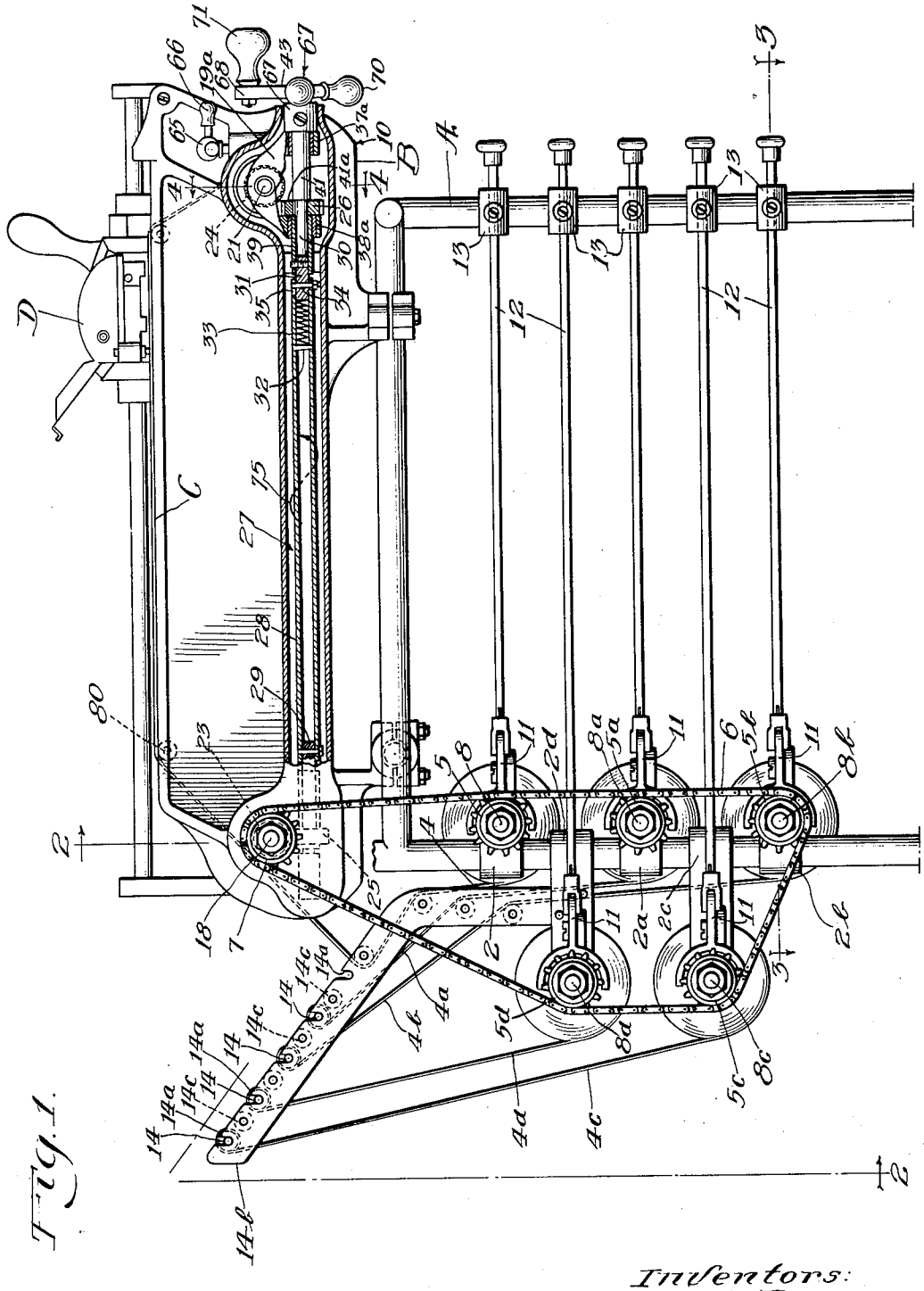


Fig. 1.

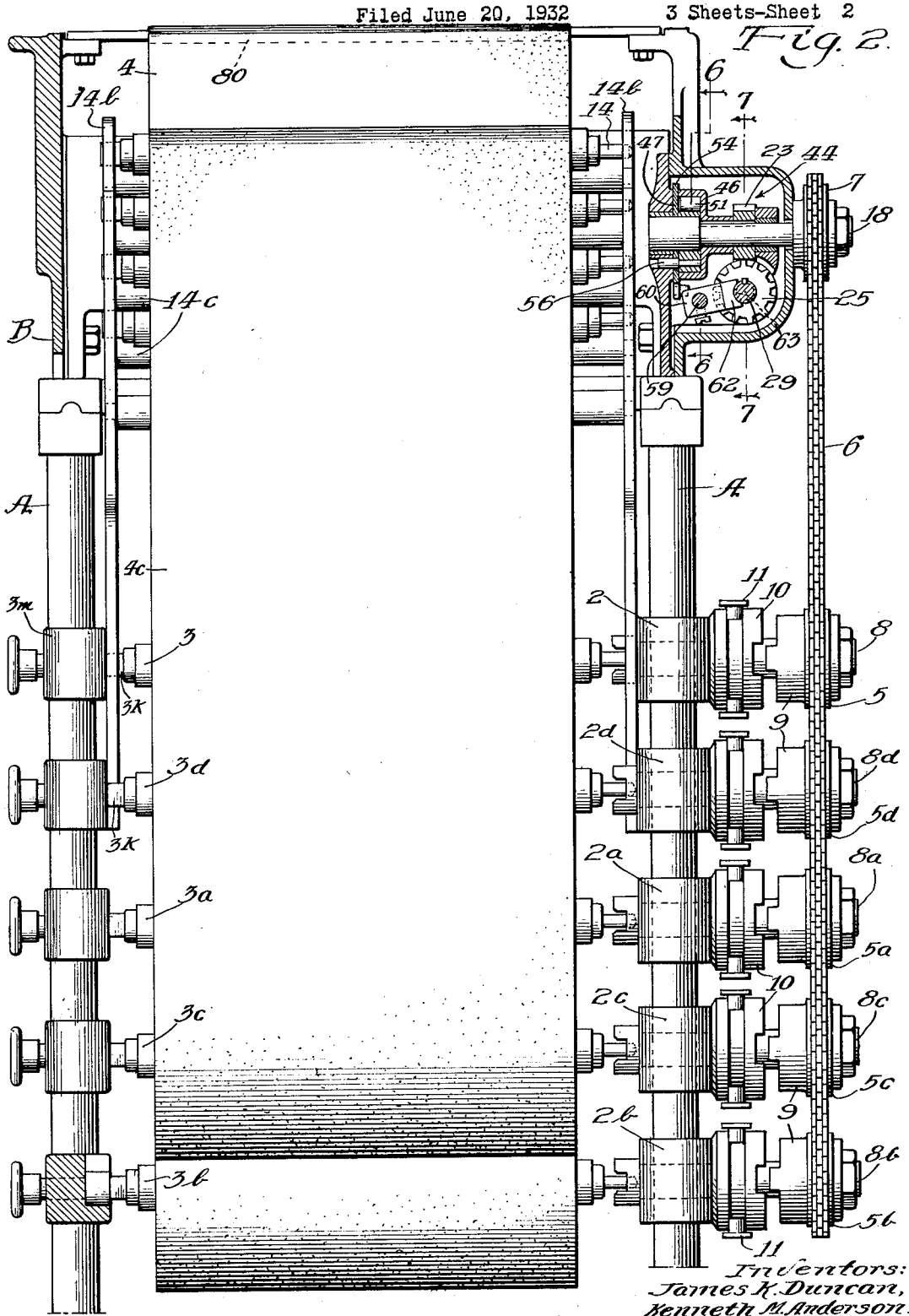
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DUPLICATING MACHINE

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Fig. 2.



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DUPLICATING MACHINE

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Fig. 3.

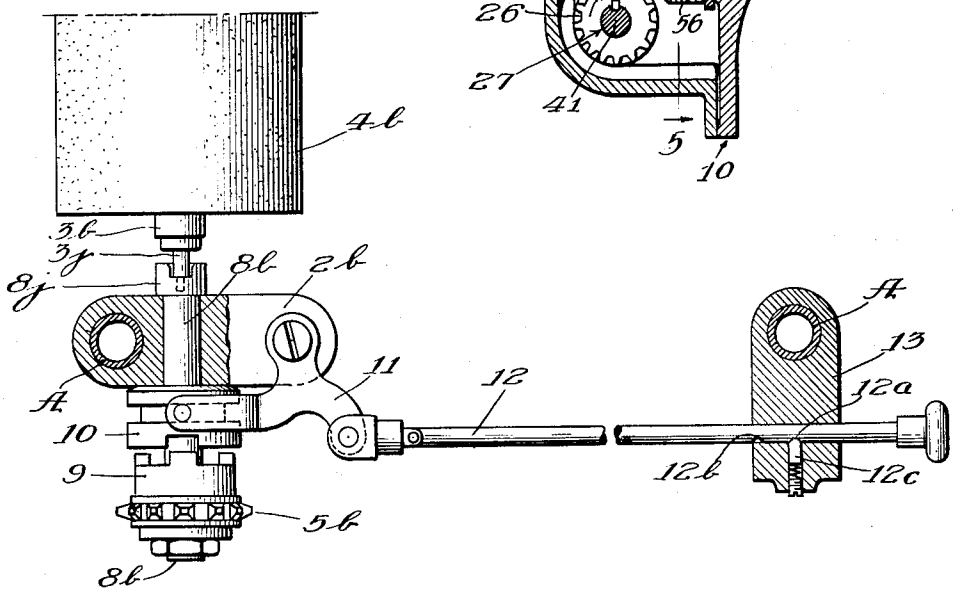


Fig. 4.

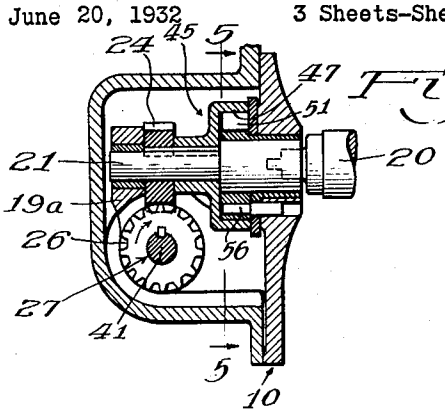


Fig. 6.

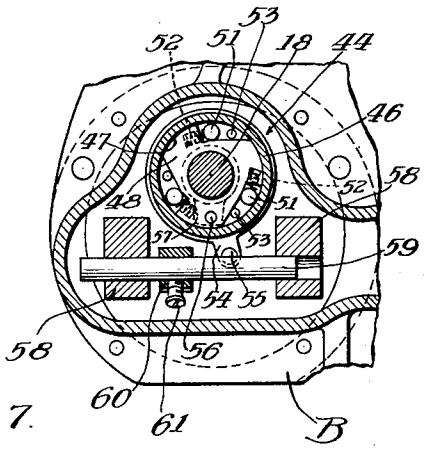


Fig. 5.

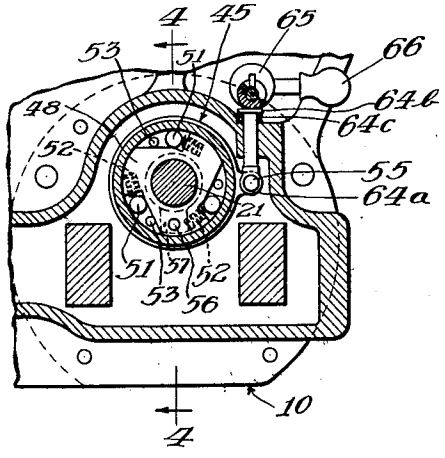
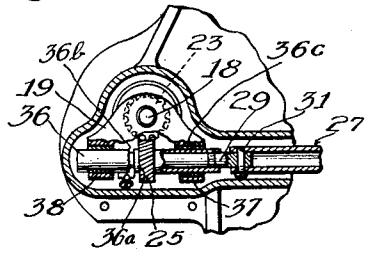


Fig. 7.



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1,963,120

UNITED STATES PATENT OFFICE

1,963,120

DUPLICATING MACHINE

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Application June 20, 1932, Serial No. 618,350

20 Claims. (Cl. 101—133)

The invention relates to duplicating machines and is particularly adapted to be embodied in machines of the kind described which employ duplicating bands of the hectograph type.

The primary object of the invention is to provide improved means for handling the duplicating bands of duplicating machines.

Another object of the invention is to provide improved means whereby any one of a plurality of duplicating bands may be brought into its functionally operative position in a duplicating machine.

Another object of the invention is to provide improved means in a duplicating machine for storing a plurality of duplicating bands which may be brought into their functionally operative positions in the machine.

Still another object of the invention is to provide an improved duplicating machine provided with a plurality of duplicating bands which are stored on spindles and may be unwound therefrom to draw them across the platen of the machine.

Other objects and advantages will become apparent as the following description progresses, reference being had to the accompanying drawings, wherein—

Figure 1 is a side elevation, partly in section, of a duplicating machine which embodies the invention.

Figure 2 is a rear elevation of the improved machine, the view being partly broken away as indicated by the section line 2—2 in Figure 1.

Figure 3 is a section taken on line 3—3 of Figure 1.

Figure 4 is a section taken on line 4—4 of Figure 1.

Figure 5 is a section taken on line 5—5 of Figure 4.

Figure 6 is a section taken on line 6—6 of Figure 2, and

Figure 7 is a section taken on line 7—7 of Figure 2.

Referring to the drawings wherein a preferred embodiment of the invention is illustrated, A designates a stand preferably formed from tubing, B designates a frame adjustably secured to the stand A, C designates a flat platen mounted in the frame B, and D designates a carriage which is slidably mounted in the frame B and is adapted to apply a sheet to be duplicated to a gelatine or duplicating band extending over the platen C.

The construction of the carriage D is well known to those skilled in the art and as its details do not form a part of this invention, they will not be illustrated or described.

Mounted as hereinafter described in the stand A are spindles 3, 3*a*, 3*b*, 3*c* and 3*d*, which carry gelatine or duplicating bands 4, 4*a*, 4*b*, 4*c* and 4*d*, respectively, the gelatine bands being wound around the spindles. Sprockets 5, 5*a*, 5*b*, 5*c* and 5*d*, are rotatably journaled on shafts 8, 8*a*, 8*b*, 8*c* and 8*d*, respectively, and mesh with a sprocket chain 6 which also meshes with a sprocket wheel 7 fixed to a stub shaft 18 rotatably journaled in the frame B. The axes of the shafts 8, 8*a*, 8*b*, 8*c* and 8*d* are coincident with the axes of the spindles 3, 3*a*, 3*b*, 3*c* and 3*d*, respectively, the shafts 8, 8*a*, 8*b*, 8*c* and 8*d* being rotatably journaled in brackets 2, 2*a*, 2*b*, 2*c* and 2*d* secured to the stand A.

As best illustrated in Figures 1, 2 and 3, each of the sprockets 5, 5*a*, 5*b*, 5*c* and 5*d* has a clutch member 9 formed integral with it, the clutch member 9 being engageable with a clutch member 10 journaled on the associated shaft 8, 8*a*, 8*b*, 8*c* or 8*d*. Each clutch member 10 is controlled by a bell crank lever 11 which is connected to a push rod 12 slidably journaled in one of a plurality of bracket members 13 mounted on the stand A. The push rods may be reciprocated to bring the clutch members 10 into and out of effective engagement with the clutch members 9. Each of the rods 12 is preferably provided with notches 12*a* and 12*b* which are engageable by a spring pressed pin 12*c* slidably mounted in the associated bracket member 13. The construction is such that when the pin 12*c* associated with one of the rods 12 engages the notch 12*a* thereof, the associated clutch members 9 and 10 are disengaged but when the pin engages the notch 12*b*, the associated clutch member 10 engages the corresponding clutch member 9. In other words, the pin 12*c* insures that the clutch members 9 and 10 associated with it will not be engaged with or disengaged from each other accidentally.

As best shown in Figures 2 and 3, the spindles 3, 3*a*, 3*b*, 3*c* and 3*d* are each provided with an end piece 3*j* detachably mounted in a chuck-like member 8*j* provided on the inner end of the associated shaft 8, 8*a*, 8*b*, 8*c* or 8*d*. The other ends of the spindles 3, 3*a*, 3*b*, 3*c* and 3*d* are rotatably mounted on the inner ends of pins 3*k* screw threaded in brackets 3*m* fixed to the stand B. It will be readily understood that the spindles are detachably and rotatably mounted in the stand A and that they may be rotated through the medium of the shafts 8, 8*a*, 8*b*, 8*c* and 8*d* when the clutch members mounted on these shafts are functionally operative.

The outer ends of the duplicating or gelatine bands 4, 4a, 4b, 4c and 4d are secured to spindles 14 which, when the duplicating or gelatin bands are not in use, are mounted detachably in slots 14a formed in bracket members 14b, the bracket members 14b being mounted on the bracket member 2d and one of the bracket members 3m.

Mounted in the bracket members 14b are a plurality of rollers 14c, a roller 14c being provided for each of the spindles 14 and being disposed in front of the slots 14a in which that spindle is held when its duplicating or gelatin band is not in use.

Rotatably mounted in the forward end of the frame B is a stub shaft 21. The stub shafts 18 and 21 are provided with spiral gears 23 and 24, respectively, which co-operate with spiral gears 25 and 26, respectively, fixed to a fabricated shaft identified as a whole by the reference character 27. The shaft 27 is mounted for axial movement and comprises a tubular member 28 which houses at its rear extremity the shaft 29, the shaft 29 being pinned to the tubular member 28. At its forward end the tubular member 28 is provided with an abutment 32 against which one end of a spring 33 abuts, the spring being disposed within the tubular member 28. The other end of said spring 33 abuts a shaft 30 provided with a pin 34 which rides in a slot 35 formed in the tubular member 28. The shaft 30 is therefore constrained to rotate with the tubular member 28 but may be displaced longitudinally thereof. It will be noted that the spiral gears 25 and 26 are mounted on the shafts 29 and 30, respectively. The shaft 29 is provided with an enlarged portion 36 which forms a shoulder 36a. At the inner end of the enlarged portion 36 is an annular groove 36b. The spiral gear 25 abuts against the shoulder 36a. A sleeve 36c pinned upon the shaft 29 abuts the other side of the spiral gear 25. The sleeve 36c and the enlarged portion 36 of the shaft 29 are supported within bifurcations 37 and 38 of an arm 19. The shaft 30 is provided with a sleeve 39 adapted to slide within a bifurcation 38a of an arm 19a, the sleeve 39 being disposed against one side of the spiral gear 26. Disposed upon the other side of the spiral gear 26 is an enlarged portion 41 of the shaft 30 which provides a shoulder 41a abutting against the spiral gear 26. The enlarged portion 41 is slidably mounted in the bifurcation 37a of the arm 19a. A crank 43 provides means whereby the shaft 27 may be rotated in either direction.

It will be noted that the spiral gears 25 and 26 are spaced apart a distance less than the spacing of the axes of the stub shafts 18 and 21. This construction permits the spiral gear 25 to engage the gear 23 while the gear 26 is disengaged from the gear 24. It also permits the gear 26 to engage the gear 24 when the spiral gear 25 is disengaged from the gear 23. The spacing between the spiral gears 25 and 26 is such that when the shaft 27 is displaced angularly, one of the gears 25 or 26 will engage its associated gear 23 or 24 before the other of said gears 25 and 26 is disengaged from its associated gear 23 or 24.

If the shaft 27 is rotated when the spiral gears associated with either the stub shaft 18 or the stub shaft 21 are engaged and if that stub shaft should be held against rotation, the meshing gears will cause the shaft 27 to be displaced axially.

The stub shaft 18 is provided with an overrunning clutch or brake designated generally by the reference character 44. The stub shaft 21 is provided with an overrunning clutch or brake which is designated generally by the reference character 45. (See Figs. 2, 4, 5 and 6.) The clutches 44 and 45 are similar in construction and a description of the clutch 44 will be sufficient for the purposes of this disclosure. Thus, the stub shaft 18 has fixed thereto the housing 46. (See Figs. 2 and 6.) The housing 46 has a smooth inner cylindrical surface 47. Mounted on the stub shaft 18 is a wedging member 48 provided with tapering recesses in which rollers 51 are disposed. Each of said rollers 51 is free to roll within the large portion of its recess but it is urged by a spring 52 toward the small extremity of the recess. Also disposed within each recess is a pin 53, the pins 53 being carried by a rotary plate 54, which plate is rotatably carried by the stub shaft 18. The rotary plate 54 is provided with a pin 55 adapted to be engaged by certain mechanism to be described presently.

If the plate 54 is rotated in a counterclockwise direction (Fig. 6) the pins 53 will engage the rollers 51 and hold them out of the smaller portions of the recesses in which they are disposed. The rollers 51 will then be ineffective to control the connection between the wedging member 48 and the housing 46. It will be noted that the wedging member 48 is secured to the frame B by a pin 56. The rotary plate 54 is provided with a notch 57 to provide clearance for the pin 56 thereby permitting the necessary rocking movement of the plate 54.

The mechanisms for controlling the overrunning clutches 44 and 45 will now be described.

Referring to Figure 6, it will be noted that the frame B is provided with a pair of posts 58 which slidably journal a short shaft 59. An abutment member 60 is secured to the shaft 59 by a screw 61. The abutment member 60 is provided with a relatively narrow outer edge 62 having an arcuate outer face 63. The narrow edge 62 rides in a groove 36b and the arcuate face 63 contacts with the bottom of the groove. By reason of the engagement between the outer face of the abutment member 60 and the bottom of the groove 36b, the abutment member 60 is positioned parallel relative to the portion 30 of the shaft 27. Obviously, if the shaft 27 is moved axially, the sides of the groove 36b will co-operate with the abutment member 60 to cause a like movement of the shaft 59. The abutment member 60 is adapted to engage the pin 55 as the shaft 59 is moved toward the right (Fig. 6) thereby moving the pins 53 into engagement with the rollers 51 and urging them toward the large portions of the recesses in which they are disposed, this displacement of the pins 53 being against the action of the springs 52. When the shaft 59 is in such a position that the abutment member 60 does not engage the pin 55, the springs 52 will be operative to urge the rollers 51 toward the small portions of the recesses in which the pins 53 are disposed. Such displacement of the rollers 51 will lock the member 46 against rotation relative to the wedging member 48 in a clockwise direction (Fig. 6).

Slidably mounted in the frame B at the forward end thereof, is a pin 64 having an eye 64a into which the pin 55 of the overrunning clutch or brake 45 projects. The upper end of the pin 64 is provided with a head 64b. A spring 64c yieldingly holds the pin 64 in its uppermost position, the pin being controlled by an eccentric 65 provided with a handle 66. When the handle

66 is in the position illustrated in Fig. 5, the pins 53 of the overrunning clutch or brake 45 do not compress the springs 52 thereof. When, however, the handle is turned in a counterclockwise direction (Fig. 5), the pins 53 will be displaced in a clockwise direction and will hold the rollers 51 in the larger ends of the recesses in which they are disposed thereby rendering ineffective any locking relationship between the member 46 and the fixed wedging member 48.

A crank 43 for operating the drive shaft will now be described. The crank 43 comprises a hub 67 rotatably connected to the stub shaft 30. Extending radially from the hub 67 are three arms 68, 69 and 70, the arms being disposed at angles of 120° relative to each other. The arms 69 and 70 comprise radial handles. The arm 68 is provided with a handle 71 extending in a direction parallel with the axis of the drive shaft 27.

Rotably journaled in the back end of the frame B is a roller 80, the roller 80 being alined with the back end of the platen C. It will be readily understood by those skilled in the art that any one of the spindles 14 may be brought forwardly into a position wherein its axis is coincident with the axis of rotation of the stub shaft 21 and that the spindle 14 may be detachably secured between the stub shaft 21 and a pin (not shown) mounted in the frame B. This construction is conventional and need not be illustrated as substantially all hectograph machines of the flat platen type embody this construction. When one of the spindles 14 is connected operatively to the stub shaft in this manner, its associated gelatine or duplicating band 4, 4*a*, 4*b*, 4*c* or 4*d* will be trained over the roller 80. Thus, in Figure 1, the gelatine or duplicating band 4 is shown trained over the roller 80. As hereinafter explained, the crank 43 may be rotated to effect rotation of the stub shaft 21 and the spindle 14 in a clockwise direction (Fig. 1) to wind the gelatine or duplicating band 4 around the spindle so as to present a fresh surface of the duplicating band above the platen C whenever a new impression is to be made on the duplicating band for the purpose of providing duplicate copies. Also, as hereinafter explained, the crank 43 may be rotated to effect rotation of the spindle 18 in a counter-clockwise direction (Fig. 1) so that the sprocket chain 6 will rotate the sprocket 5, 5*a*, 5*b*, 5*c* and 5*d* in the same direction. The clutch members 9 and 10 associated with the particular duplicating band then in use may be brought into effective engagement through the medium of the associated push rod 12 so that the duplicating band in use will be rewound upon its spindle 3, 3*a*, 3*b*, 3*c* or 3*d*. Thus, if the apparatus is adjusted as illustrated in Figure 1 with the duplicating band 4 in use, the clutch members 9 and 10 associated with the shaft 8 may be brought into effective engagement to rewind the duplicating band 4 on the spindle 3 when the stub shaft 18 is rotated in a counter-clockwise direction (Fig. 1). It will be noted that the rollers 14*c* constitute means over which the duplicating bands are trained when they are in use.

The operation of the mechanism for driving the stub shafts 18 and 21 will now be described. The description may be started with the parts as they are located in Figure 1, with the spiral gear 25 at the rear of the machine in meshing relationship with the mating spiral gear 23. This position is assumed in a tightening operation or a rewinding operation upon the gelatin band. Assuming that the operator desires to move the gelatin band forward, he will apply a turning force to the crank 43 to turn the shaft 27 in the direction of the arrow 75 in Figure 1. At this time (see Figures 1, 2 and 5) the abutment member 61 is out of engagement with the extension pin 55 of the overrunning clutch 44 at the rear of the machine and said overrunning clutch is operative to prevent clockwise movement of the member 46 as the parts are viewed in Figure 6. Turning movement of the shaft 27 will, by reason of the initial reaction of the spiral gears 25 and 23, result in axial movement of said shaft 27 in a forward direction, that is, to the right, (Figure 1). This forward movement will continue until spiral gear 26 at the forward end of the machine partly meshes with spiral gear 24. After partial meshing of the spiral gears 26 and 24 at the forward end of the machine, the abutment member 60 will engage the extension pin 55 of the rear overrunning clutch 44, moving the pins 53, 53 in a counter-clockwise direction, as the parts are viewed in Figure 6, to hold the rollers 51 in the large portions of their corresponding tapering recesses. The rear clutch 44 will therefore be rendered inoperative to prevent rotation of the member 46 and the stub shaft 18 fast therewith. Continued turning of the crank 43 to cause rotation of the shaft 27 in the direction of the arrow 75 (Figure 1) will cause continued forward movement of the shaft 27, that is, to the right, as the parts are viewed in Figure 1. This will result in the complete meshing of the spiral gear 26 with the spiral gear 24 and the demeshing of spiral gear 25 from spiral gear 23. Forward movement of the shaft 27 will be limited by engagement of the spiral gear 25 at the rear of the machine with the bifurcation 37 (Figure 1). Continued rotation of the crank 43 will result in the positive driving of the forward shaft 21. It may be explained at this point, reference being had to Figure 5, that clockwise rotation of the member 46, forming part of the forward overrunning clutch 45, is not interfered with, inasmuch as such clockwise rotation merely tends to move the rollers 51 toward the large portions of their corresponding tapering recesses 49.

When the operator has moved the gelatin band forward to the extent desired he may render said gelatin band taut by the simple expedient of reversing rotation of the handle 43, thereby turning the drive shaft 27 in the direction opposite to the arrow 75 (Figure 1). The first effect of such counter-rotation of the shaft 47 is, through the reaction of the spiral gears 26 and 24, to cause axial movement of the shaft 27 toward the rear, that is, toward the left, as the parts are viewed in Figure 1. This rearward movement of the shaft 27 will continue until intermeshing relationship is set up between the spiral gears 25 and 23 at the rear of the machine, which intermeshing relationship, as indicated hereinbefore, will be inaugurated before intermeshing relationship between the spiral gears 26 and 24 at the forward end of the machine is interrupted. Rearward movement of the shaft 27 will continue until the spiral gear 26 is in abutting relationship with the bifurcation 38 at which time the spiral gear 25 will be in full meshing relationship with the spiral gear 23. At this time a slight further counter-turning movement of the handle 43 to turn the shaft 27 in the direction opposite to the arrow 75 will, through the spiral gears 25 and 23, turn the stub shaft 18 in a counter direction. In other words, the member 46 of the rear

overrunning clutch 44 will move in a counter-clockwise direction, as the parts are viewed in Figure 6, the rollers 51 having no effect in stopping such counter-clockwise rotation of the member 46. However, at the forward end of the machine the rollers 51, forming part of overrunning clutch 45, prevent the counter-clockwise rotation of the member 46 forming part of said overrunning clutch 45. Of course, when a duplicating band is being tightened, the clutch members 9 and 10 associated with its spindle 3, 3*a*, 3*b*, 3*c* or 3*d* are engaged to each other so that the counter-clockwise rotation of the stub shaft 18 will be imparted to the spindle in question through the medium of the sprocket chain 6. At this time the overrunning clutch 44 at the rear of the machine and the overrunning clutch 45 at the forward end of the machine hold fast against the tension set up by the duplicating band, whereby the duplicating band is held taut.

When the duplicating band is to be rewound upon its spindle 3, 3*a*, 3*b*, 3*c* or 3*d* or when a short section of its length is to be rewound upon its spindle 3, 3*a*, 3*b*, 3*c* or 3*d*, the handle 66 is turned in a counter clockwise direction (Figs. 1 and 5) to present the longer radius of the eccentric 65 to the pin 64 so that the member 54 of the overrunning clutch 45 is displaced angularly in a clockwise direction (Fig. 5). This movement will cause engagement between the pins 53 and the rollers 51 to hold the rollers in the large portions of the recesses in which they are positioned. This renders the forward overrunning clutch inoperative. Under these conditions rotation of the crank 43 to turn the shaft 27 in the direction opposite to the arrow 75 will communicate a turning movement to the stub shaft 18 as there will be no resistance to the rotation of the shaft 21 inasmuch as the forward clutch 45 is functionally inoperative, as immediately above described. This rotation of the shaft 27 may be continued until the duplicating band in use is completely rewound upon its spindle 3, 3*a*, 3*b*, 3*c*, or 3*d* as the case may be, it being understood that it will be necessary to lift the spindle 14 of the duplicating band out of engagement with the stub shaft 21 when the last portion of the band is to be rewound upon its spindle 3, 3*a*, 3*b*, 3*c* or 3*d*. In the event the operator does not wish to rewind the entire band upon its spindle 3, 3*a*, 3*b*, 3*c* or 3*d* but simply wishes to rewind a portion of the band, he may tension any desired portion of the band over the platen C by moving the handle 66 to the position wherein it is illustrated in Figs. 1 and 5, allowing the pin 64, under the action of the spring 64*c* to hold the pins 53 out of co-operative relationship with the rollers 51 in the clutch 45 at the forward end of the machine, whereby a counter-clockwise rotation of the member 46 will be prevented. The overrunning clutch 44 and the overrunning clutch 45 will therefore both resist the tension of the gelatin band 15 whereby said gelatin band will be maintained taut.

It will be readily understood that whenever the duplicating band in use is to be drawn taut by rotation of the stub shaft 18 in a counter-clockwise direction or whenever the duplicating band in use is to be rewound upon its spindle 3, 3*a*, 3*b*, 3*c* and 3*d*, as the case may be, it is necessary to engage the clutch members 9 and 10 associated with that particular duplicating band. Otherwise, the clutch members associated with the spindles 3, 3*a*, 3*b*, 3*c* and 3*d* are functionally inoperative.

Briefly, if all of the spindles 14 are resting in their notches 14*a* in the bracket members 14*b*, it will be readily understood that any one of these spindles may be lifted from the notches 14*a* and brought forwardly into engagement with the stub shaft 21 and the pin (not shown) aligned with the stub shaft 21 in the frame B. The crank 43 is then manipulated as described above to wind the duplicating band in use on its spindle 14 to the extent desired. The handle 43 is then manipulated to draw the band taut across the platen C, the clutch members 9 and 10 associated with the band being functionally operative at this time. When the band is to be rewound, the crank 43 is rotated as described above while the clutch members 9 and 10 associated with the band in use are functionally operative.

The provision of a plurality of duplicating bands in a machine of the type described is advantageous as it permits the operator to quickly change from one band to the other. The particular construction shown in the drawings is advantageous as it does not require the operator to handle the rolls of duplicating band whenever one duplicating band is substituted for another.

As stated above, the invention is particularly adapted to be embodied in machines of the hectograph type. When hectograph duplicating bands are employed in the improved machine and one of them is drawn across the surface of the platen C, an impression may be made thereon in the usual manner with a master sheet. The sheets of paper on which the duplicate copies are to be made are applied to the band, one by one, through the medium of the carriage D which may be of conventional construction so that each sheet is applied to the duplicating band during movement of the carriage D to the left (Fig. 1), and is stripped from the band during movement of the carriage D to the right (Fig. 1).

While we have shown and described certain embodiments of our invention, it is to be understood that it is capable of many modifications. Changes, therefore in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is our intention to claim all novelty inherent in our invention as broadly as possible, in view of the prior art.

We claim:

1. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said band being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism for rotating said shaft to draw said bands across said platen and unwind them from said spindles, said mechanism including means for stretching said bands taut on said platen.

2. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said band being adapted to be secured to said shaft with said spindles remaining in said fixed positions, mechanism for rotating said shaft to draw said bands across said platen and unwind them from said spindles, and means operatively

connected to said mechanism for rewinding said bands on said spindles.

3. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said bands being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism to rotate said shaft and said spindles to advance or retract said bands across said platen.

4. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said bands being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism including a clutch device for each spindle to rotate said shaft and said spindles to advance or retract said bands across said platen.

5. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said bands being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism for rotating said spindles to rewind said bands on said spindles.

6. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said band being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism for rotating said shaft to draw said bands across said platen and unwind them from said spindles, said mechanism including means to lock said shaft against rotation in one direction.

7. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said bands being adapted to be secured to said shaft with said spindles remaining in said fixed positions, and mechanism to rotate said spindles to rewind said bands thereon, said mechanism including means for locking said shaft against rotation in one direction.

8. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a third shaft rotatably mounted in said frame-work, means driven by said second shaft for driving said third shaft, a spindle, a duplicating band wound on said spindle, the outer end of said duplicating band being adapted to be attached to the first mentioned shaft, and mechanism for rotating the first mentioned shaft and said second shaft in opposite directions.

9. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a third shaft rotatably mounted in said frame-work, means driven by said second shaft for driving said third shaft, a spindle driven by said third shaft, a duplicating band wound on said spindle, the outer end of said duplicating band being adapted to be attached to the first mentioned shaft, mechanism for rotating the first mentioned shaft and said second shaft in opposite directions, means associated with the first mentioned shaft for holding it against rotation in one direction, and means associated with said second shaft for holding it against rotation in the opposite direction.

10. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a third shaft rotatably mounted in said frame-work, means including a clutch device driven by said second shaft for driving said third shaft, a spindle driven by said third shaft, a duplicating band wound on said spindle, the outer end of said duplicating band being adapted to be attached to the first mentioned shaft, and mechanism for rotating the first mentioned shaft and said second shaft in opposite directions.

11. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first mentioned shaft, means driven by said second shaft for driving said spindles, and mechanism for driving the first mentioned shaft and said second shaft in opposite directions.

12. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first mentioned shaft, means driven by said second shaft for driving said spindles, mechanism for driving the first mentioned shaft and said second shaft in opposite directions, means associated with the first mentioned shaft for preventing rotation thereof in one direction, and means associated with said second shaft for preventing rotation thereof in the opposite direction.

13. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in said frame-work, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first mentioned shaft, means including a clutch device for each of said spindles driven by said second shaft to drive said spindles, and mechanism for selectively driving the first mentioned shaft and said second shaft.

14. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in said frame-work, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first

mentioned shaft, means including a clutch device for each of said spindles driven by said second shaft to drive said spindles, and mechanism for selectively driving the first mentioned shaft and said second shaft, said mechanism including means for preventing rotation of the first mentioned shaft in one direction and means for preventing rotation of said second shaft in the opposite direction.

15. A duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in said frame-work, a sprocket alined with each of said spindles, a clutch device for each of said spindles, said clutch device being adapted to connect its spindle to the corresponding sprocket, a sprocket operatively connected to said second shaft, a sprocket chain operatively connecting the last mentioned sprocket to the sprockets alined with said spindles, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first mentioned shaft, and mechanism for selectively driving the first mentioned shaft and the second shaft.

16. A duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at the other end of said platen, a plurality of spindles rotatably mounted in said frame-work, a sprocket alined with each of said spindles, a clutch device for each of said spindles, said clutch device being adapted to connect its spindle to the corresponding sprocket, a sprocket operatively connected to said second shaft, a sprocket chain operatively connecting the last mentioned sprocket to the sprockets alined with said spindles, a duplicating band wound around each of said spindles, the forward ends of said duplicating bands being adapted to be attached to the first mentioned shaft, and mechanism for selectively driving the first mentioned shaft and the second shaft, said mechanism including means for preventing rotation of the first mentioned shaft in one direction and means for preventing rotation of said second shaft in the opposite direction.

17. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a set of spindles rotatably mounted in said frame-work, a duplicating band wound around each of said spindles, a second set of spindles attached to the outer ends of said duplicating bands, said second set of spindles being adapted to be detachably secured to the first mentioned shaft, means driven by said second shaft for driving the first set of spindles, and mechanism for selectively driving the first mentioned shaft and said second shaft in opposite directions.

18. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a set of spindles rotatably mounted in said frame-work, a duplicating band wound around each of said spindles, a second set of spindles attached to the outer ends of said duplicating bands, said second set of spindles being adapted to be detachably secured to the first mentioned shaft, a sprocket for each spindle of the first mentioned set thereof, a clutch device for each of said sprockets to connect it to its spindle, means driven by said second shaft for driving the first mentioned set of spindles, and mechanism for selectively driving the first mentioned shaft and said second shaft.

19. In a duplicating machine, a frame-work, a platen mounted in said frame-work, a rotatable shaft at one end of said platen, a second rotatable shaft at the other end of said platen, a set of spindles rotatably mounted in said frame-work, a duplicating band wound around each of said spindles, a second set of spindles attached to the outer ends of said duplicating bands, said second set of spindles being adapted to be detachably secured to the first mentioned shaft, a sprocket for each spindle of the first mentioned set thereof, a clutch device for each of said sprockets to connect it to its spindle, means driven by said second shaft for driving the first mentioned set of spindles, and mechanism for selectively driving the first mentioned shaft and said second shaft, said mechanism including means for preventing rotation of the first mentioned shaft in one direction and means for preventing rotation of said second shaft in the opposite direction.

20. In a duplicating machine, a frame-work, a platen, a rotatable shaft at one end of said platen, a plurality of spindles rotatably journaled in fixed positions in said frame-work, a duplicating band wound around each of said spindles, the outer ends of said bands being adapted to be secured to said shaft with said spindles remaining in said fixed positions, mechanism for rotating said shaft to draw said bands across said platen and unwind them from said spindles, said mechanism including clutches controlling the individual spindles and including means for stretching said bands taut on said platen.

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