

May 25, 1937.

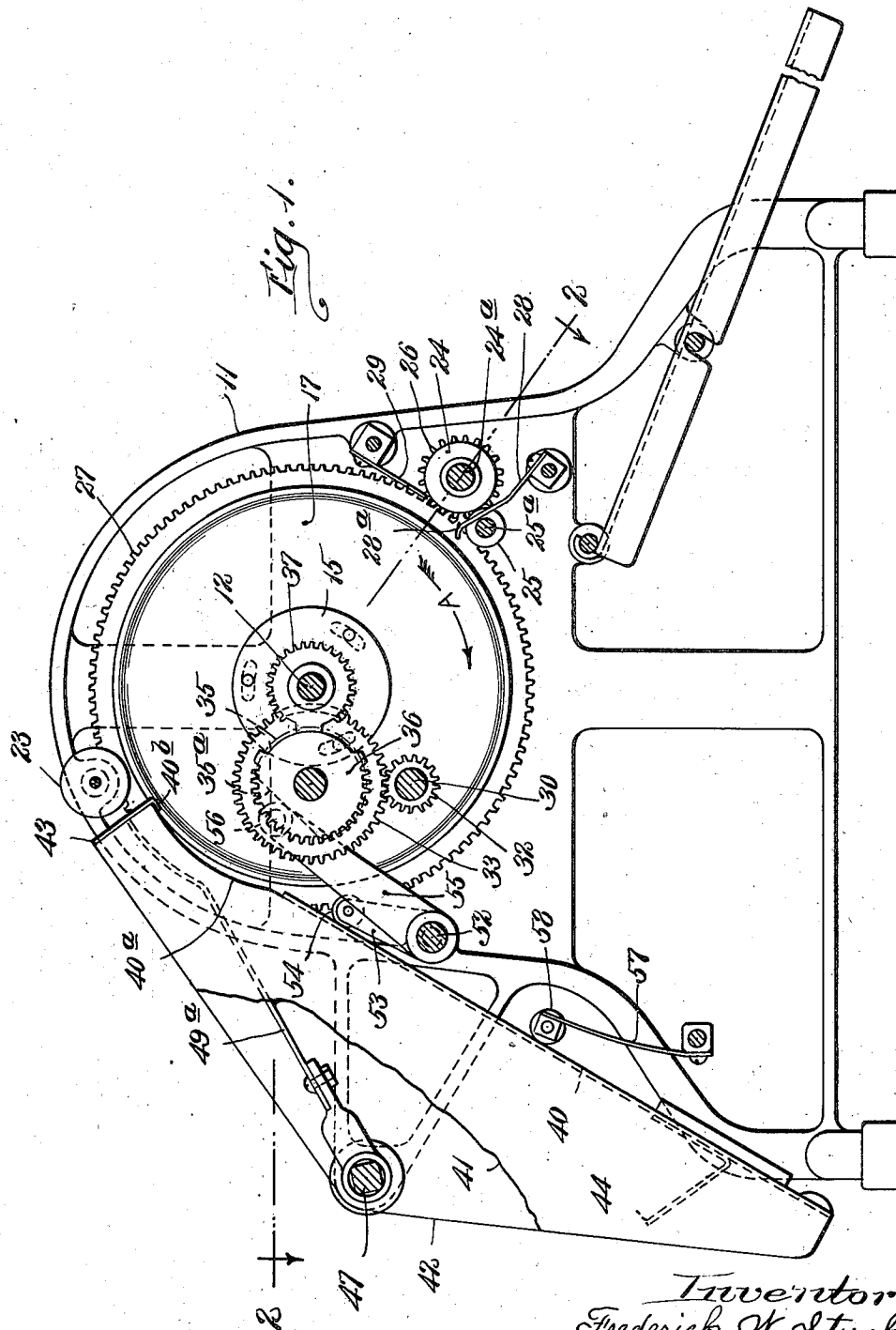
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2,081,386

SHEET FEEDING DEVICE FOR DUPLICATORS

Filed Aug. 28, 1936

4 Sheets-Sheet 1



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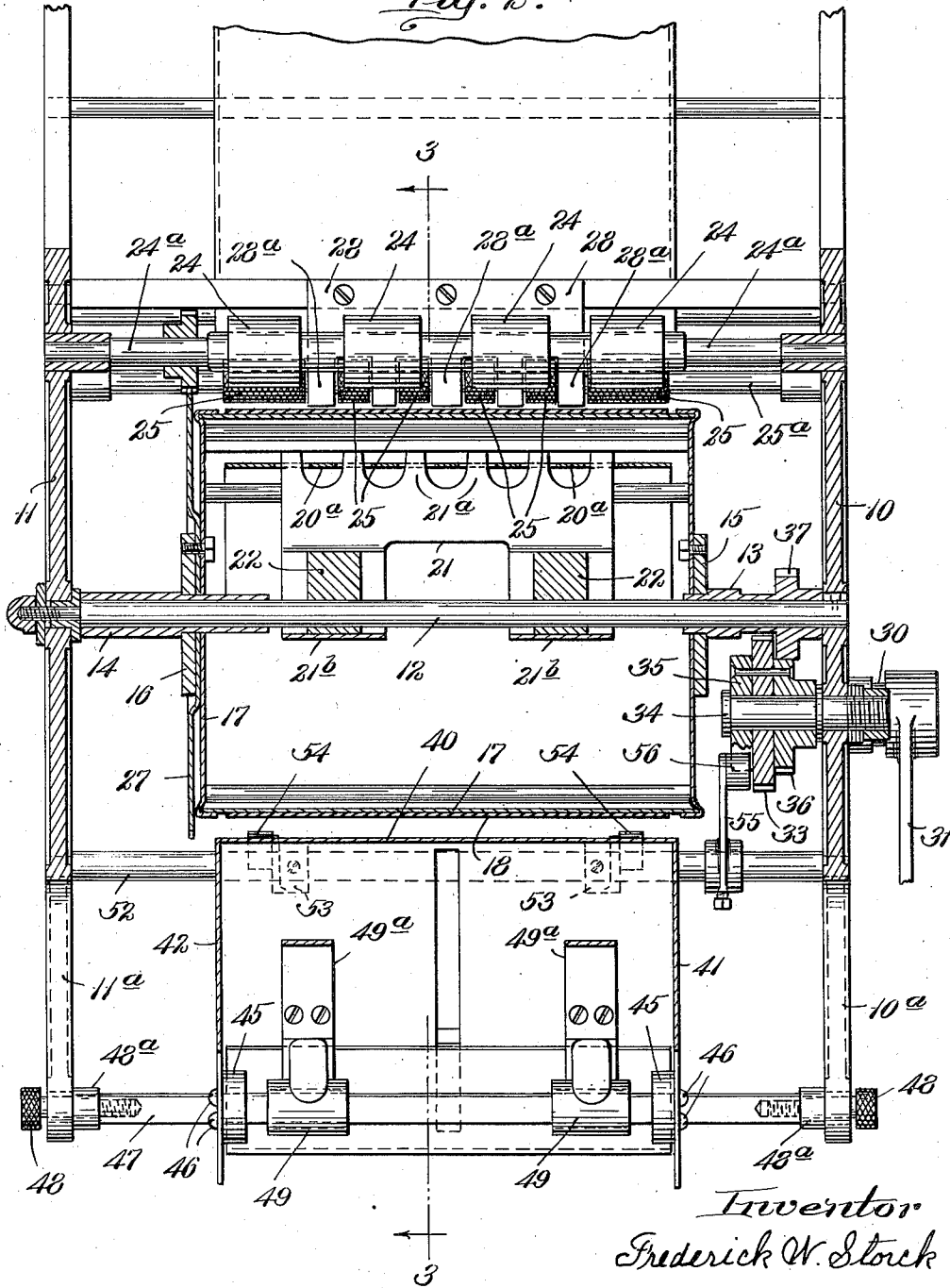
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4 Sheets-Sheet 2

Fig. 2.



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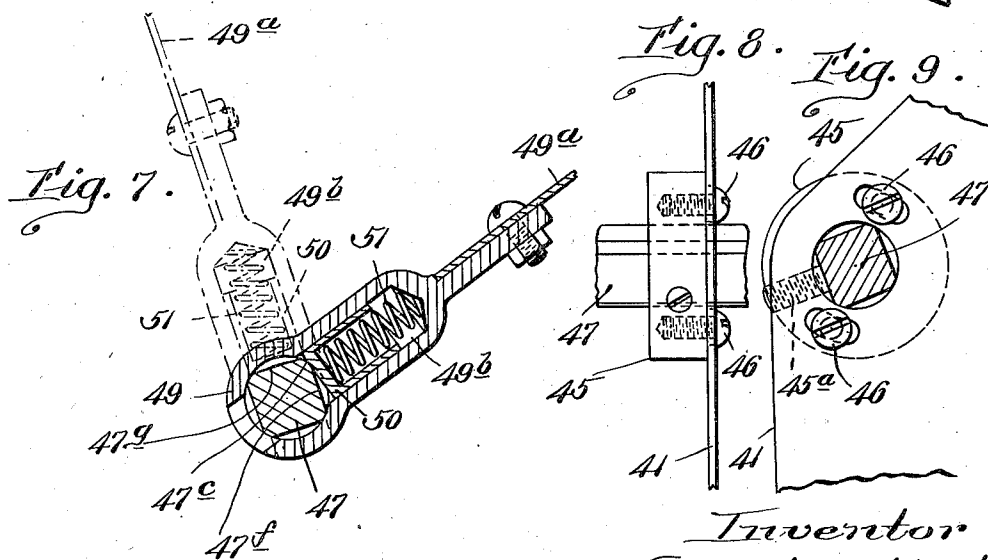
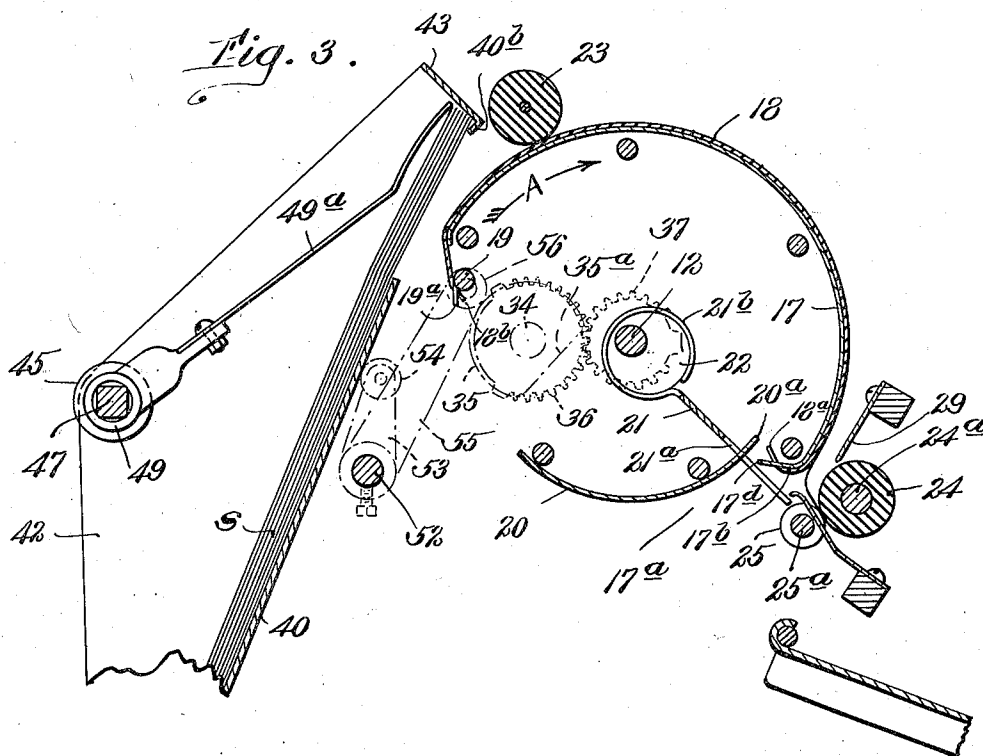
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SHEET FEEDING DEVICE FOR DUPLICATORS

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4 Sheets-Sheet 3



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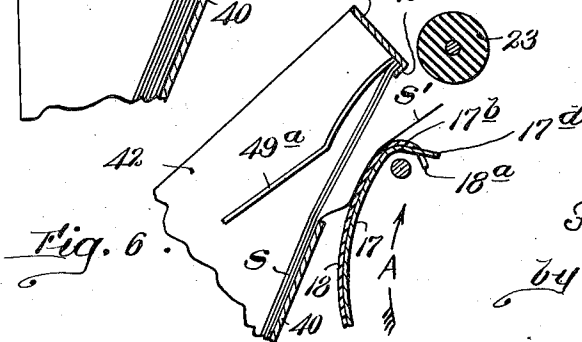
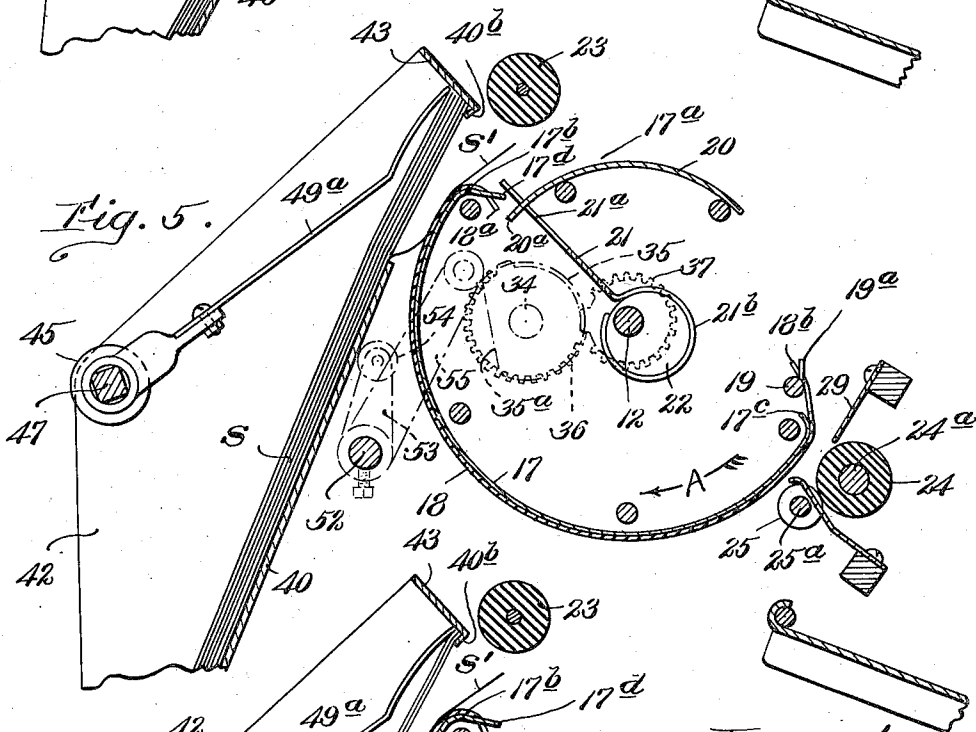
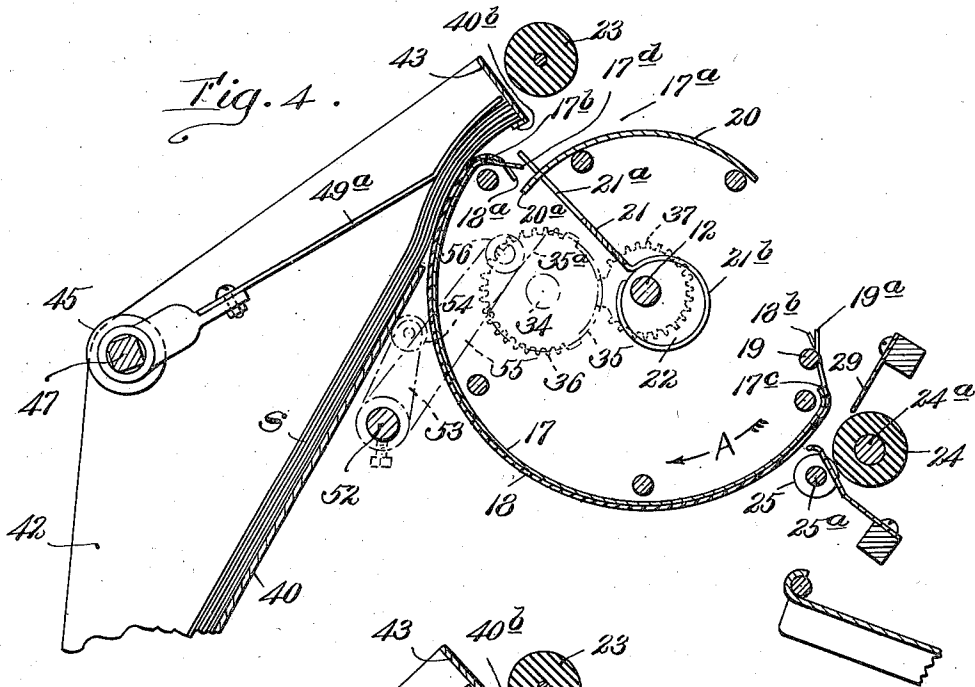
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SHEET FEEDING DEVICE FOR DUPLICATORS

Filed Aug. 28, 1936

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,081,386

SHEET FEEDING DEVICE FOR DUPLICATORS

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Application August 28, 1936, Serial No. 98,317

8 Claims. (Cl. 101—132)

This invention relates to duplicating machines and is particularly adapted to be associated with rotary duplicators of the character which are provided with adhesive gelatin bands to receive impressions from a master copy, which impressions are imparted subsequently to blank sheets of paper, or the like, which are brought into contact under pressure with the gelatin medium, and the invention more particularly relates to an automatic sheet feeding device for singly and excessively engaging sheets, supported in stacked formation, with the adhesive gelatin band with an advance end portion of the sheet free as the engaged sheet is singly withdrawn from the stack and subsequently engaged with the gelatin band to receive an impression therefrom.

The use of a gelatin medium to receive an impression in reverse, or negative, of matter to be copied and a positive copy made therefrom by bringing sheets of paper, or the like, in contact therewith, is common and well known in the duplicating art.

The more common method of utilizing a gelatin medium in duplicating has been associated with the so-called flat bed type of duplicator. Many types of flat bed machines utilize a band or web of a considerable length having a gelatin surface and which band may be wound in a roll formation. These flat bed types of duplicating machines do not readily lend themselves to speedy and efficient operation and numerous difficulties are presented in properly engaging the sheets in registering engagement with the gelatin medium and subsequently stripping the sheets therefrom after completion of the duplicating operation.

These same problems are present in machines which utilize the more recent type of gelatin medium in the form of a so-called single film which is of a limited length and its opposed ends provided with means for securing the film to the duplicator printing cylinder or platen.

To accomplish a more efficient and speedier operation there is now the so-called rotary type of duplicator in which the duplicator is provided with a rotatable drum which is adapted to support the gelatin roller or have the gelatin film secured thereto. Such type of rotary duplicator is illustrated in U. S. Letters Patent No. 1,926,317, issued to Frederick W. Storck. In this type of rotary duplicator, the printing drum or platen is, in the present instance, provided with an opening or space in the peripheral face of the drum which permits positioning the advance end portion of the sheet so that it will be free from engagement when the adhesive gelatin film engages with the sheet, as will be later described in detail.

I am aware that heretofore rotary gelatin duplicators have been provided with automatic or semi-automatic sheet positioning or feeding de-

vices which are arranged for positioning a sheet from a stack for subsequent engagement with a gelatin film or band with an advance end portion of the sheet free for the purpose of stripping the sheet from the gelatin medium by suitable stripping mechanism. Such an arrangement of parts, for example, is illustrated and described in my aforesaid patent. With this arrangement of parts, the operator is required to manually advance a single sheet from a stack to a position against a stop for later feeding of the sheet by its contact with the gelatin. In other known sheet feeding devices for machines of the herein referred to character, additional mechanism has been employed to automatically displace a single sheet from a stack so that it may be subsequently engaged by the adhesive duplicating medium.

A special object of my present invention is to provide an automatic sheet feeding device for rotary duplicators wherein the adhesive duplicating medium is utilized to engage and withdraw sheets singly from a stack and in registration with the duplicating medium without the necessity of additional means or mechanism for operatively feeding or positioning the single sheet from the stack subsequent to its engagement with the duplicating medium.

Another object of my present invention is to provide means for rotating the duplicating cylinder or platen, which supports the gelatin duplicating medium, so as to automatically effect a determinate positioned dwell period in its cycle of rotation, for the purpose of initially engaging a portion of a clear sheet with the gelatin duplicating medium.

Another particular object of my invention is to provide a support, for a stack of sheets to be duplicated upon, of a simple construction with means to move the support in a timed relation relative to the aforesaid dwell period in a manner to engage a portion of the outermost sheet of the stack with the adhesive duplicating medium for the purpose of withdrawing the sheet, so engaged, upon the subsequent rotation of the duplicator cylinder or platen in the performance of its operative cycle and with the advance end portion of the sheet free from engagement with said duplicating medium.

A further object of my invention is to combine and arrange driving elements for a rotary duplicator whereby certain of the driving elements are adapted for continued rotation, while other of the elements automatically effect a determinate dwell period of the duplicator cylinder or platen and wherein the continuously rotating elements actuate a paper support, during said dwell period, to directly engage a portion of a sheet to be duplicated upon in a positioned relation with the adhesive duplicating medium.

With the above and other objects in view my

invention consists of a novel combination and arrangement of parts hereinafter described and more specifically pointed out in the appended claims.

5 In the accompanying drawings I have shown my invention embodied with a rotary duplicator of the referred to character sufficient to enable those skilled in the art to understand the construction and operation thereof.

10 Referring to the drawings:

Fig. 1 is a side elevation of a rotary duplicator with my improvements embodied therewith; in this view the front side frame is omitted and some of the parts are shown in section.

15 Fig. 2 is a sectional plan view taken substantially along line 2—2, Fig. 1.

Fig. 3 is a longitudinal sectional view of a diagrammatic nature taken substantially along line 3—3, Fig. 2.

20 Figs. 4 and 5 are views corresponding substantially to Fig. 3, but show some of the parts in a different position.

Fig. 6 is a fragmentary view corresponding to a portion of Fig. 5, but shows a reduced stack of sheets to be duplicated upon.

Fig. 7 is a detail in section, of my pressure follower for the stack of sheets to be duplicated upon.

30 Fig. 8 is a detail of the adjusting device which is associated with the pressure follower member, and

Fig. 9 is an end view of the parts illustrated at Fig. 8.

The duplicating machine

35 The duplicating machine as illustrated is provided with suitable side frames 10, 11 which support the machine elements. Transversely mounted between the side frames 10, 11 is a fixed shaft 12 which rotatably supports opposed sleeve bearings 13, 14. Each sleeve bearing has secured thereto a disc 15, 16 which, in turn, is secured to the ends of the printing platen or cylinder 17.

40 In the present instance, the printing drum or platen is shown with an opening 17a in the peripheral face thereof, see Figs. 4 and 5. The terminating ends 17b, 17c of the platen face are bent inwardly and form shoulders, the end 17b being provided with a row of projections or studs 17d which are adapted to enter corresponding perforations in one end 18a of a fabric, or the like, band 18, which is provided with a gelatin coating as is now well known. The opposed end 18b of the band is similarly attached to studs 19a of a suitable tensioning device 19 whereby the band is tensioned over the platen face.

45 The drum opening is, in this instance, partially closed by a substantially inset curved plate 20, the radius of curvature of which is less than the radius of curvature of the platen face 17. This plate 20 is provided with guide slots which are positioned adjacent its end 20a. These slots are adapted to receive and guide the fingers 21a which are integral parts of a plate 21. This plate 21 has integral extensions 21b bent into cylindrical form which are adapted to freely engage the periphery of cam blocks 22 which, in turn, are secured in an eccentric position on the fixed shaft 12.

50 Rotatably mounted and extending between the side frames 10, 11 is a pressure roller 23 which is adapted to engage with the face of the gelatin duplicating medium band 18 as the printing platen or drum is operatively rotated in the direction of arrow A. If desired, this pressure

roller may be yieldingly and adjustably mounted in any suitable and well known manner.

5 The stripping rollers 24, 25 are secured on shafts 24a, 25a which, in turn, are rotatably supported in suitable bearings in the side frames. These rollers may be arranged to yieldingly engage one another in any suitable and well known manner. One of the stripping rollers 24 is provided with a pinion 26, which meshes with and is driven by a gear 27 secured to or rotated with the printing platen. The opposed stripping roller 10 25 is provided with a knurled or like peripheral face and is frictionally driven by its coating roller 24. This roller 25 is preferably formed in sections, see Fig. 2, and guide fingers 28a of the plate 28 are disposed between the sections and relative to the bight formed by the stripping rollers 24, 25 for a purpose hereinafter mentioned. A duplicating machine of the above construction is completely shown and described in the 20 aforementioned patent, therefore, further detailed description is thought unnecessary.

The duplicator drive

25 A primary drive shaft 30 is rotatably mounted in a suitable bearing in the side frame 10, said shaft having secured thereto, in this instance, a handle 31 by which the shaft 30 may be rotated. If desired, this shaft 30 may be continuously driven during the operation of the machine by suitable power means such as a motor or the like.

30 The inner portion of the shaft 30 has a pinion 32 secured thereto which meshes with and rotates a full-toothed gear 33 which forms part of a cluster unit rotatably mounted on a stud 34 secured in the side frame 10. This cluster includes a cam 35 and an intermittent gear 36, both of which are secured to the gear 33 to form a unit. The intermittent gear 36 engages with a coating intermittent gear 37 which may be either formed integral with the sleeve 13 or secured thereto in a suitable manner. These intermittent gears 36, 37 are of the usual construction wherein a predetermined portion of the periphery of each 45 is free from teeth and continued rotation of the driving intermittent gear will not rotate the driven gear until the blank space in the driving gear has passed the blank space in the driven gear and the teeth in both enmesh, and thus effecting a determinate positioned dwell period of the driven intermittent gear 37 and the elements attached thereto or affected thereby.

The sheet stack support

55 The stack of sheets S is disposed on a support which is provided with a base 40 having upwardly extending side walls 41, 42 and a front end wall 43. A transverse aperture 40a is formed in the base 40 and extends to each side wall 41, 42 and adjacent the front wall 43, which front wall is provided with a transverse lip 40b adapted to support the front end portion of the stack S and the remainder of the stack supported by the base 40. With this construction a portion of 65 the lowermost sheet of the stack is exposed adjacent the lip 40b for a purpose hereinafter more fully described.

70 While not limited thereto, in my preferred arrangement the stack support is disposed on an inclined plane, as illustrated, and the rear end of the stack is supported by an adjustable plate 44 which retains the front end of the stack in engagement with the end wall 43.

I have provided the side walls 41, 42 of the 75

stack support with bearings 45 which are adjustably secured to said side walls by means of screws 46 that engage in arcuate slots formed in the side walls 41, 42. These bearings 45 are mounted on a transverse rectangular shaft 47 and are secured against rotation thereon by means of set screws 45a. The shaft 47 is pivotally supported by means of screws 48 which threadedly engage in the opposed ends of the shaft and extend through suitable bearing bushings 48a mounted in extensions 10a, 11a of the machine side frames. This aforesaid construction causes the shaft 47 and stack support 40 to be rocked as a unit.

The stack presser

The bearings 49 of the resilient stack presser members 49a are freely mounted on the rectangular shaft 47. These bearings 49 are provided with integral chambers 49b adapted to slidably support a plunger 50 which is urged into contact with the shaft 47 by means of a compression spring 51. The corners of the shaft 47 are preferably rounded in a manner to form a camming action against the end of the plunger 50.

The shaft 47 is so rotatably positioned that one corner 47c thereof acts against the end of the plunger 50 and compresses the spring 51; thus the outer ends of the members 49a are urged, under pressure, into contact with the uppermost sheet of the stack and in an area opposite to the supporting lip 40b.

As the sheet stack is diminished, the front contacting end of the stack presser member 49a is caused to follow the diminishing stack by means of the spring 51 which urges the plunger 50 to move against the camming corner 47c and in a direction to seat against the side face 47f of the rectangular shaft 47, see Fig. 7. The face 47f is so angularly positioned as aforesaid, that the end of the plunger 50 is not completely seated against it when the sheet stack is completely diminished.

For convenience, when positioning a stack of sheets on the support 40, the presser member 49a and its bearing 49 may be rotated around the shaft 47, the end of the plunger 50 will seat squarely against the top face 47g of the shaft and thus the pressure member is retained in an elevated position relative to the stack support, see Fig. 7.

Actuating mechanism for sheet stack support

A transverse shaft 52 is rotatably supported in suitable bearings in the opposed side frames of the machine. This shaft 52 has adjustably secured thereto, in this instance, a pair of levers 53 which rotatably support rollers 54 that are adapted to engage with the under face of the sheet stack support 40. Also secured to the shaft 52 is a lever 55 which rotatably supports a cam roller 56 that engages with the peripheral face of the cluster cam 35.

The under face of the support 40 is urged into contact with the rollers 54 and the roller 56 into contact with the cam 35, in this instance, by means of a leaf spring 57 which is suitably secured to the machine side frame. This spring 57 rotatably supports a roller 58 which engages the under face of the stack support base 40, the spring 57 and roller 58 being disposed in a manner so that the base 40 of the stack support is retained in engagement with the rollers 54 and through the levers 53, 55 the roller 56 is retained in engagement with the actuating cam 35.

Operation

The duplicating band 18 is secured to the printing platen or drum 17 in a suitable manner. The operator rotates the handle 31 and through the pinion 30 the cluster, comprising the full toothed gear 33, cam 35 and intermittent gear 36, is rotated as a unit. Through the intermittent gears 36, 37 an automatic positioned dwell period is occasioned in the cycle of rotation of the printing drum, the cluster, including the cam 35, continuously rotates while the stud 30 is being rotated.

While the printing drum 17 is being rotated, the sheet stack and its support 40 are held in a spaced apart relation, relative to the face of the gelatin film 18, by means of the cam 35 and the coacting levers 53, 55, and rollers 54, 56, see Fig. 3.

The automatic dwell period of the drum 17 is effective to position the drum shoulder 17b relative to the opening 40a in the bottom of the sheet stack support base 40. During this dwell period of the drum 17, and as the cam roller 56 engages with the depressed cam face 35a, and the spring 57 causes the stack support 40 to follow the cam action, thus engaging a marginal portion of the lowermost sheet of the stack with the adhesive gelatin face and in a manner so that an advance marginal end of this lowermost sheet is positioned beyond the shoulder 17b of the drum and into an area of the drum opening 17a, see Fig. 4.

Continued rotation of the cam 35, through its coacting elements, forces the stack support 40 against the action of the spring 57 and into its normal inoperative position, see Fig. 5, with a portion of the lowermost sheet 51 adhering to the adhesive gelatin band at a position adjacent the shoulder portion 17b.

As the stack support 40 is moved from its sheet contacting position, as illustrated at Fig. 4, to its normal inoperative position, illustrated at Fig. 5, the extreme advance end portion of the lowermost sheet is withdrawn from its supporting lip 40b and extends unsupported toward the under face of the pressure roller 23.

When the lowermost sheet is engaged with the gelatin film, as has been stated, the intermittent gears 36, 37 will operatively engage together and rotate the printing platen in the direction of arrow A, thus causing the lowermost sheet to be progressively withdrawn from the stack support 40. As this sheet which is to be operated upon is advanced by the rotation of the printing drum, it will be engaged under pressure by the roller 33 with the face of the gelatin band and the matter carried by the band duplicated upon the sheet, as is known in the art of duplicating from a gelatin surface.

As the aforesaid free advance end of the sheet approaches the stripping rollers 24, 25 it is deflected outwardly and guided by the guide members 28a, 29 into engagement with said rollers for the purpose of stripping the sheet from the adhesive gelatin band as is fully shown and described in the above referred to patent.

While certain embodiments of my invention have been shown and described, 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 the intention to claim all novelty inherent in my inven-

tion as broadly as possible in view of the prior art.

What I claim is:

1. In a duplicator, a frame, an impression drum rotatably mounted in said frame with means for rotating said drum with a dwell period in its cycle of rotation, a duplicating band carried by said drum, and a pressure roller coacting with said drum and band, a movable tray for supporting sheets of paper to be duplicated upon with a portion of the lowermost of said sheets unsupported, together with means for moving said tray in synchronism with the dwell period of said drum and band and whereby said band engages with the unsupported portion for separating the lowermost sheet from the remaining sheets with an advance end portion of said engaged sheet free from contact with said band.

2. In a duplicator, a frame, an impression drum rotatably mounted in said frame with means for rotating said drum with a determinate positioned stop for said drum, a duplicating band carried by the drum, and a pressure roller coacting with said drum and band, a pivotally mounted tray adapted to support front and rear portions of a plurality of sheets of paper or the like, with an intermediate opening in said support, means to actuate said tray in synchronism with the stop position of said drum and whereby, during the arrested rotary movement of said drum, a portion of the lowermost of said sheets is engaged with said band with an advance end portion of said engaged sheet free from engaging relation with said band.

3. In a duplicator, a frame, an impression drum having an opening in the peripheral face thereof, means for rotating said drum with a determinate positioned stop for said drum, a duplicating band carried by said drum, and a pressure roller disposed to coact with said drum and band, a support for sheets of paper or the like to be duplicated upon with a portion of the lowermost of said sheets unsupported, connections for said support which are synchronized for movement relative to the stop position of said drum and band and whereby said support is moved to opposed positions relative to the face of said drum, one of said positions being adapted to engage said lowermost sheet with said band during the arrested rotary movement of said drum and with an advance end portion of said sheet free from said engagement.

4. In a duplicator, a frame, an impression drum and means for rotating said drum with a determinate positioned stop for said drum, a duplicating band carried by said drum and having spaced apart shoulders closely adjacent the peripheral face thereof, a pressure roller disposed to coact with said drum and band, a support for sheets of paper or the like to be duplicated upon with a portion of the lowermost of said sheets unsupported, connections for said support which are synchronized for movement relative to said drum and band and whereby said support is actuated to effect an initial engagement of an adjacent shoulder portion of said band with said lowermost sheet when said drum is in its stop position, with the advance end portion of said sheet free from engagement with said band.

5. In a rotary duplicator, a duplicating cylinder having an opening therein forming spaced apart shoulders and means for securing an adhesive duplicating medium to the face of said cylinder and said shoulders, a pressure roller coacting

with said cylinder and duplicating medium, in combination with intermittent gears for rotating said cylinder and automatically effecting a determinate positioned dwell period in its cycle of rotation, together with means for initially engaging an area of a single sheet to be duplicated upon with said duplicating medium at a point closely adjacent one of said shoulders and during said dwell period and whereby subsequent rotation of said cylinder advances said sheet for complete engagement under pressure with said medium.

6. A rotary duplicator having a duplicating cylinder with means for securing an adhesive duplicating medium to the face of said cylinder and a pressure roller coacting with said cylinder, in combination with means adapted to intermittently rotate said cylinder and effect an automatic dwell period in its cycle of rotation, a support for a plurality of sheets of paper or the like to be duplicated upon, which support is provided with an opening whereby the lowermost of said sheets may engage with said duplicating medium during said dwell period for the purpose of withdrawing said sheet from said support for subsequent registering engagement with said medium with the advance end portion of said sheet free from engagement with said medium.

7. A rotary duplicator having an adhesive duplicating medium, in combination with a sheet feeding device which includes a support for a stack of sheets to be duplicated upon and which has a transverse opening in the bottom thereof adjacent the advance end said support having an integral ledge for supporting a limited advance marginal end of said stack, with means for automatically rocking said support to opposed positions in a timed relation to said duplicating medium, pressure means in engagement with a portion of the uppermost sheet of said stack above said opening, said adhesive means engaging with the normally positioned lowermost sheet of said stack, when said support is in one position, and whereby said lowermost sheet is withdrawn from said stack in a direction of the normal operative rotation of said duplicating medium.

8. In a duplicator, the combination of a rotatable drum the surface of which is provided with an opening, a duplicating band mounted on said drum, a pressure roller rotatably mounted and arranged and located to bear on said drum, means for intermittently rotating said drum in a manner whereby there is effected a dwell period in its motion when the opening in said drum is opposite said pressure roller, a movably mounted support for a stack of sheets of paper, which support is provided with an opening whereby a part of the forward end of the bottom of the lowermost sheet in said stack is exposed and means for imparting a reciprocating movement to said support toward and away from said drum during said dwell period whereby said lowermost sheet, where exposed through said opening in said stack, is made to contact with said duplicating band and adhere thereto with its advance end overlying said openings in said drum when said support is moved toward said drum and to be partly separated from said stack when said support is moved away from said drum, whereby the continued movement of said drum following said dwell period may carry said sheet out of said stack and between said pressure roller and said drum.

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