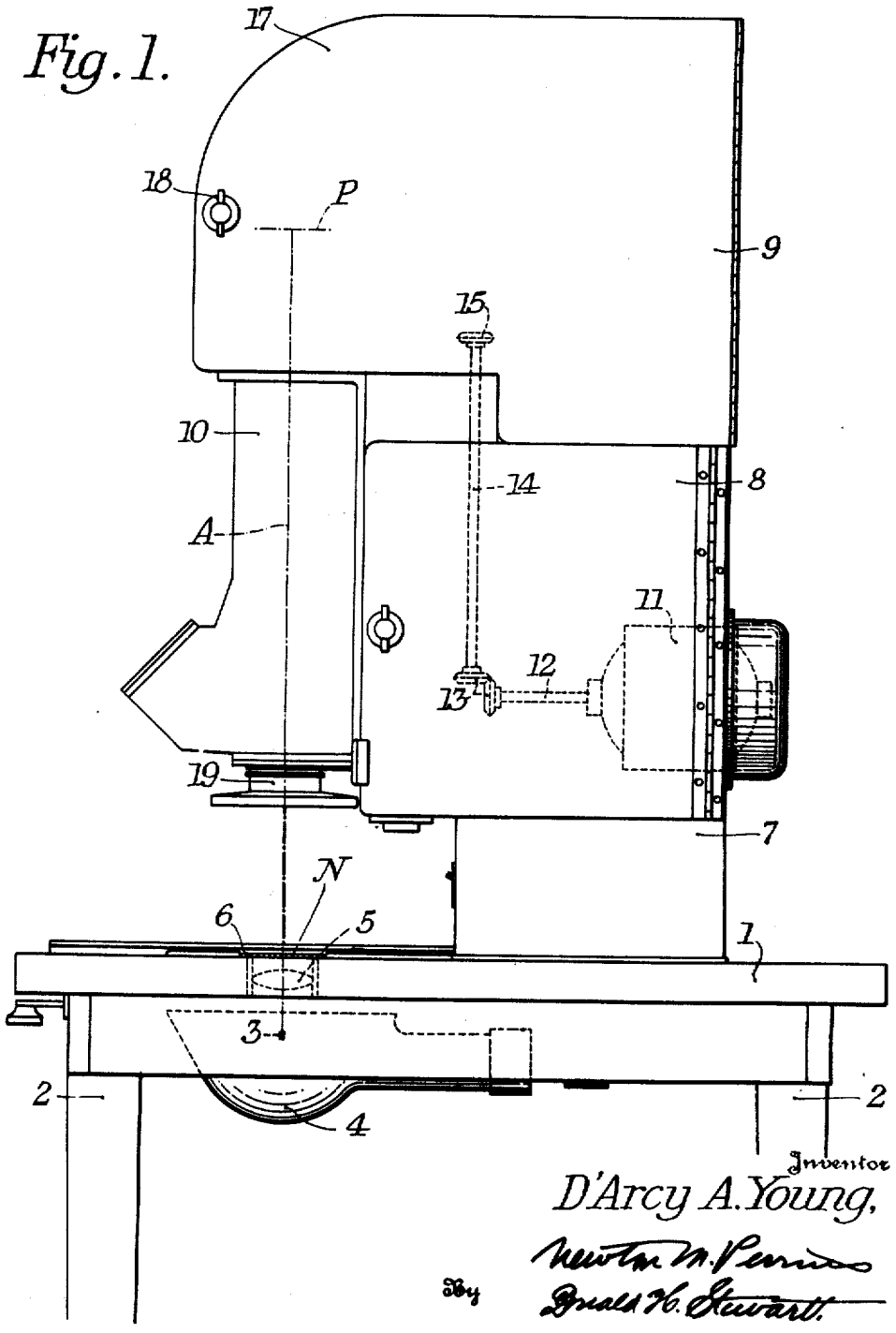
Nov. 20, 1934. D'ARCY A. YOUNG 1,981,406

PAPER FEED FOR AUTOMATIC PROJECTION PRINTERS

Filed June 8, 1933 4 Sheets-Sheet 1

Fig. 1.



Inventor

D'Arcy A. Young,

By Newton M. Perrin

Braid H. Stewart

Attorneys

Nov. 20, 1934. D'ARCY A. YOUNG 1,981,406

PAPER FEED FOR AUTOMATIC PROJECTION PRINTERS

Filed June 8, 1933 4 Sheets-Sheet 2

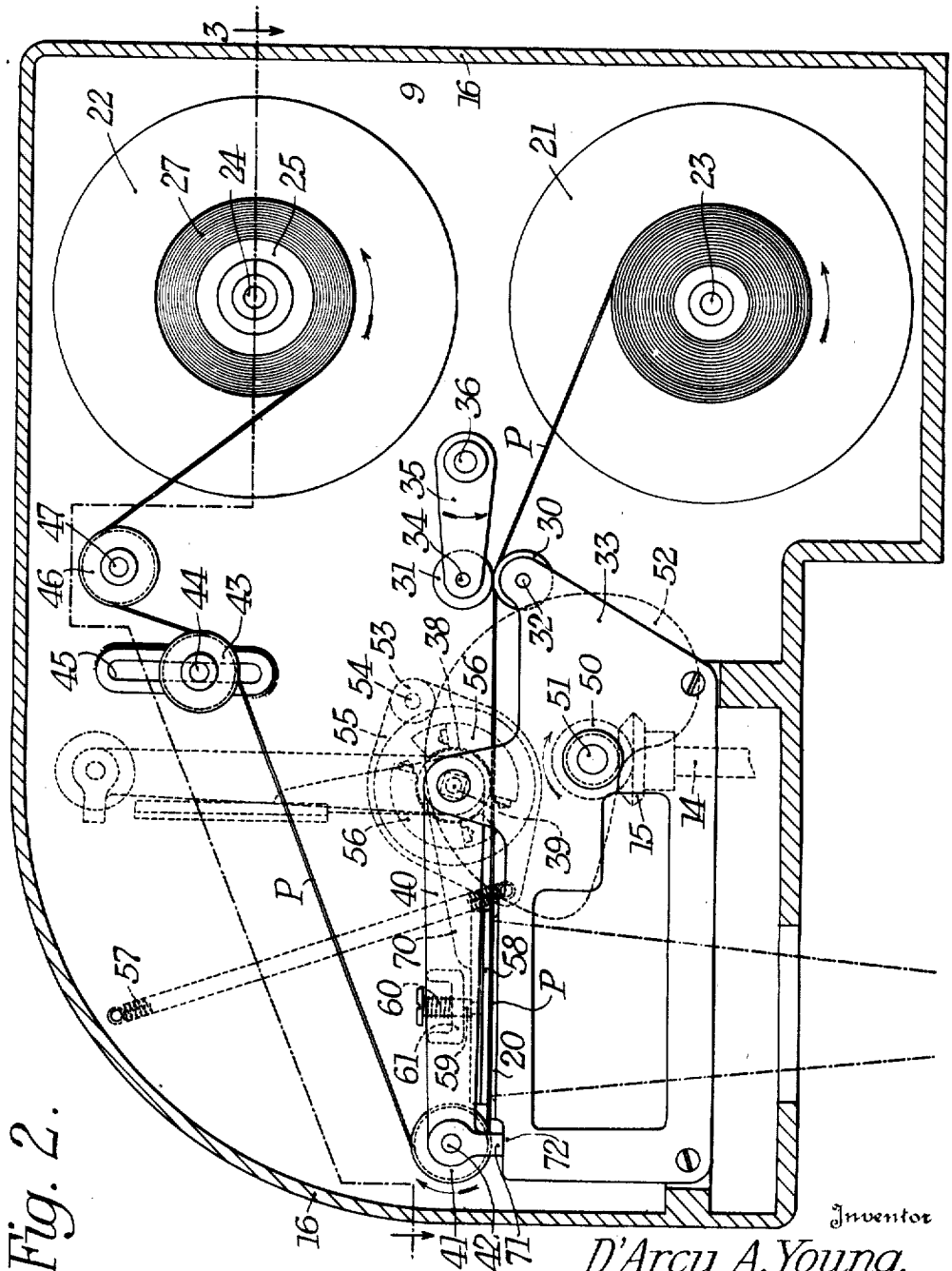


Fig. 2.

Inventor
D'Arcy A. Young,
By Newton M. Parmenter
Donald H. Stewart
Attorneys

Nov. 20, 1934. D'ARCY A. YOUNG 1,981,406

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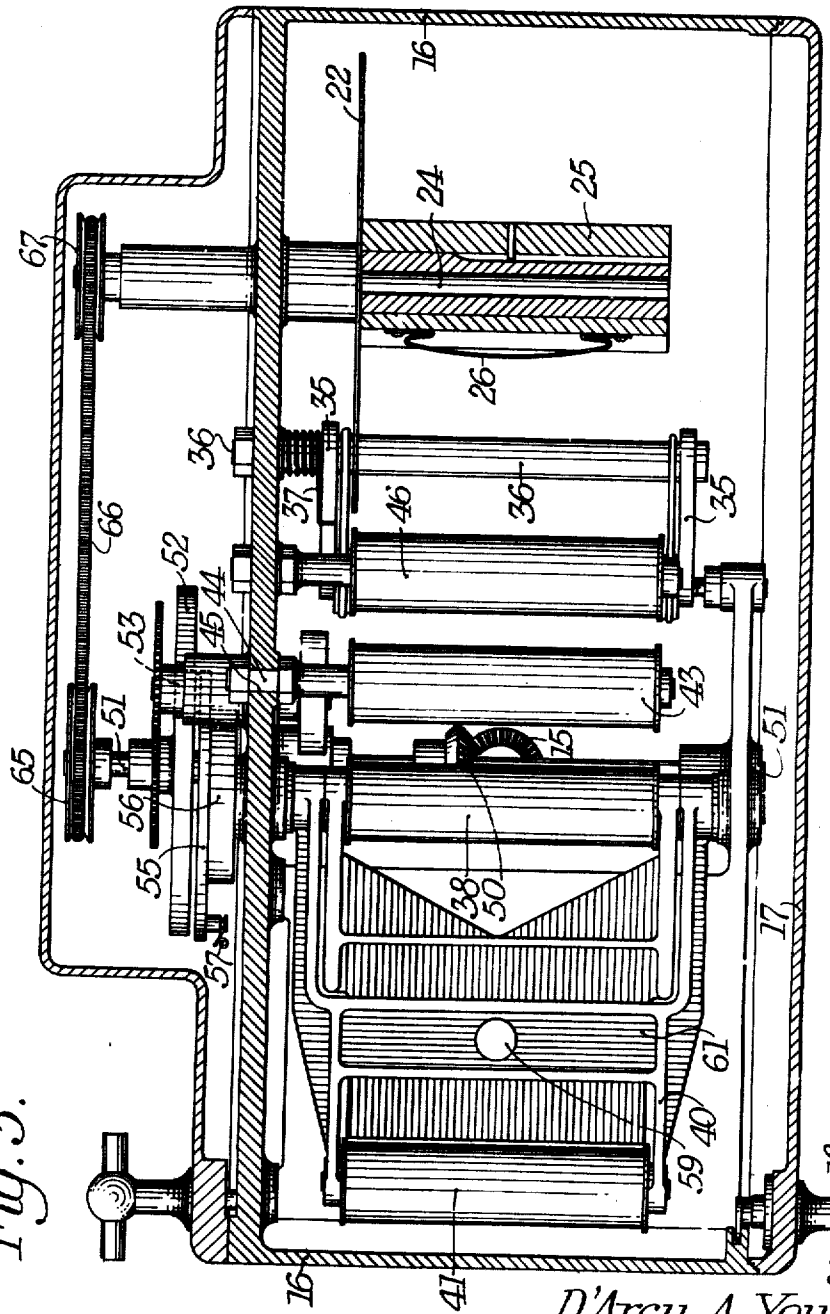


Fig. 3.

Inventor

D'Arcy A. Young,

By Newton N. Fenn

Duell & Stewart,

Attorneys

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PAPER FEED FOR AUTOMATIC PROJECTION PRINTERS

Filed June 8, 1933 4 Sheets-Sheet 4

Fig. 4.

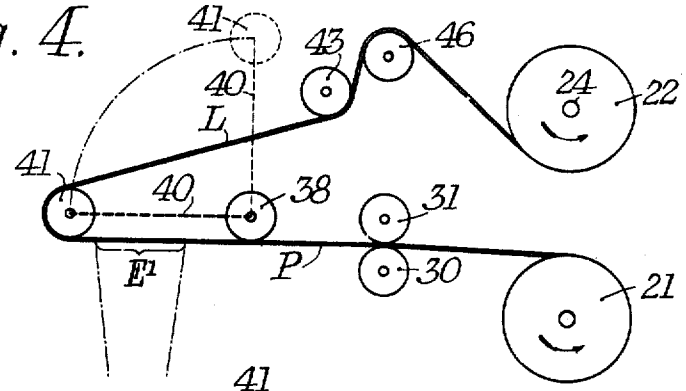


Fig. 5.

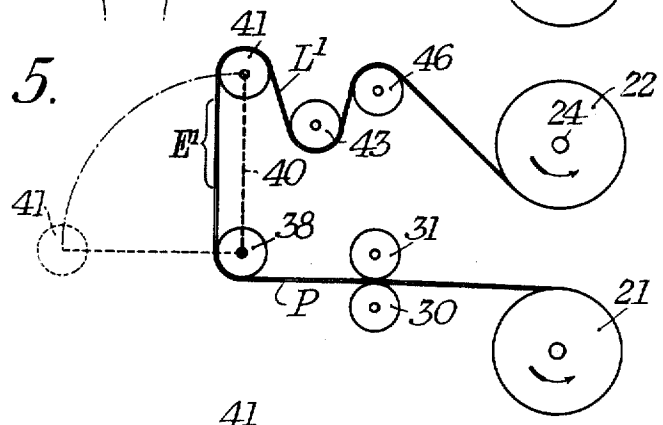
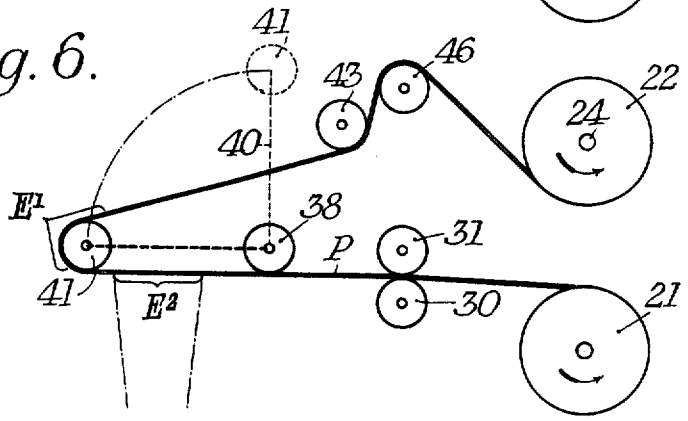


Fig. 6.



Inventor

D'Arcy A. Young,

By Newton N. Perrin
Donald H. Stewart,

Attorneys

Patented Nov. 20, 1934 1,981,406

UNITED STATES PATENT OFFICE

1,981,406

PAPER FEED FOR AUTOMATIC PROJECTION PRINTERS

D'Arcy A. Young, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New York

Application June 8, 1933, Serial No. 674,872

9 Claims. (Cl. 88—24)

This invention relates to photography and more particularly to photographic printing or enlarging machines. One object of my invention is to provide a photographic projection printer with a means for automatically making a series of prints on a strip of paper. Another object of my invention is to provide a means for intermittently moving paper past an exposure frame. Another object of my invention is to provide an exposure frame against which a strip of paper may be held by means of an intermittently operated platen. Another object of my invention is to provide a platen which may be moved by power to and from a paper clamping position, the movement of which platen causes the paper to be intermittently moved past an exposure frame. Still another object of my invention is to provide a series of loops in a strip of paper and to provide an intermittently operating platen in one of the loops with a tendency drive take up for the paper so arranged that the platen itself will move the paper by altering the length of a paper loop, and other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

In the drawings wherein like reference characters denote like parts throughout:

Fig. 1 is a side elevation of an automatic printing machine which may be equipped with a paper feeding mechanism constructed in accordance with and embodying a preferred form of my invention.

Fig. 2 is an enlarged sectional view through that portion of the machine in Fig. 1 which encloses the paper and paper feeding mechanism.

Fig. 3 is a section taken on line 3—3 of Fig. 2.

Figs. 4, 5, and 6 are diagrammatic views illustrating features of the paper feeding mechanism.

In this application and in the claims where I refer to a photographic printing machine I mean a machine which may either print through contact or projection and which may make prints of either the same size as an original negative or a different size.

As a preferred embodiment of my invention, I have shown the paper feeding mechanism as being combined with a photographic printing machine of the type shown in a co-pending application, Serial No. 625,726, Tuttle and Young, filed July 29, 1932 for Photographic printing apparatus. It is obvious that certain features of my invention may be applied to different types of printing machines, and it is to be understood that the drawings are illustrative of only a preferred form of my invention.

In Fig. 1 a printing machine designed for printing by projection is shown. This device may consist of a table 1 supported upon legs 2 and being provided with a light source 3 mounted inside of a suitable reflector 4. This light source may be adjustably mounted, and I prefer to provide a condenser lens 5 for directing parallel light rays to a negative N which may be held in a suitable holder at the opening 6 through which light passes from the light source 3.

Extending upwardly from the table 1 is a housing 7 which in this instance is provided with three sections, 8, 9, and 10.

Section 8 may enclose a power drive such as a motor 11 which through the shaft 12 and the bevel gears 13 transmits motion to a vertical shaft 14 to which is affixed a bevel gear 15.

The housing 9 includes the paper feeding mechanism, which is shown fully in Figs. 2 and 3 of the drawings. This housing preferably consists of side walls 16 which may be closed by a suitable door 17 which is provided with a handle 18 for locking the door in a closed position.

Section 10 forms a closure through which a light beam passes upwardly to the paper P along the axis A of an objective mounted in a suitable holder 19. This objective is intended to focus an image of a negative N placed over the opening 6 upon the paper P in the chamber 9. In the printer illustrated, the prints are being made on an enlarged scale from that of the negative.

Referring to Figs. 2 and 3, the paper P lies upon an exposure frame 20 through which there is an opening to admit the beam of light from the objective mounted in the cell 19. The paper P is looped from a supply reel 21 to a take-up reel 22, the former reel being mounted revolubly upon a shaft 23 and the latter reel being mounted upon a shaft 24. This shaft, as best shown in Fig. 3, is provided with a sleeve 25 and a spring 26 which frictionally drives the convolutions of paper 27 which lie against the reel flange 22. While the shaft 24 is preferably constantly turned, the spring 26 permits the coils of paper 27 to slip, but there is a tendency drive tending to wind paper onto the reel 22 in the direction shown by the arrow in Fig. 2.

Paper is looped from the reel 21 over a series of film guides, some carried by the casing 16 and others by the platen, as will be hereinafter more fully described.

I prefer to form these film guides in the shape of rollers which may have the well-known type of undercut peripheries so as to support the photographic paper by the extreme edges of the sheet. These film guides are useful because the photographically light sensitive emulsions used for high speed printing are usually quite susceptible to abrasion marks, and it is preferable

to have the sensitive surface which is to be printed upon out of contact with all parts of the machine.

The paper being led off the supply reel 21 passes between a pair of guide rolls 30 and 31, the former being revolubly mounted upon a shaft 32 carried by a supporting plate 33, and the latter being revolubly supported upon a shaft 34 carried by the arm 35 hingedly attached to the shaft 36. As will appear from Fig. 3, a spring 37 normally tends to thrust this roller downwardly in the direction shown by the arrow in Fig. 2. Thus, this roller may be raised to facilitate the initial threading of the paper. From rollers 30 and 31, the paper passes underneath the guide roller 38 which may turn freely upon the shaft 39 which also forms a hinge pintle for the platen 40. The platen 40 also supports a second paper guide 41 on a shaft 42. After the paper passes around the platen film guides 38 and 40, it passes around an adjustable guide 43. This guide is carried by a shaft 44 which can be mounted in any desired position in the slot 45 to vary the length of the film loop.

From roller 43 the paper passes over a guide roll 46 mounted to turn upon the shaft 47 and from this roller the paper passes directly onto the take-up reel 22. It will thus be seen that paper is looped in a series of loops from the supply reel 21 to the take-up reel 22, and these loops are defined by a plurality of film guides. By altering the length of the film loops, the total path of the paper can be changed as, for instance, by altering the position of roller 43. By changing the length of the film loops by moving the platen 40 and with it the movable film guide 41, the paper can be made to intermittently advance past the exposure frame.

This is illustrated by the diagrammatic Figs. 4, 5, and 6. In Fig. 4 an exposure E_1 has just been made. The platen 40 is operated to swing upwardly toward the position shown in broken lines in this figure. During this movement the relative location of the exposed area of film E_1 to the platen 40 remains the same. But the loop of paper L is materially altered as the platen moves, the paper being drawn from the loop L by means of the take-up reel 22. Thus, as the platen 40 moves from the position shown in Fig. 4 to that shown in Fig. 5, the reel 22 winds onto the shaft 24 a length of paper corresponding to the difference between the loop L and the loop L_1.

After the platen has reached this position and the reel 22 has coiled the paper from loop L upon the shaft 24, the platen 40 again descends into its operative position in which it clamps a second area E_2 of paper flat in position for exposure. Since the reel 22 always tends to wind paper upon the reel, as the platen descends the platen draws from the supply reel 21 a length of paper sufficient to move the exposure E_1 away from the exposure frame to the position shown in Fig. 6. By continuing the movement of the platen 40 up and down for each exposure, a series of intermittent exposures are made upon the paper P which is intermittently held stationary by means of the platen 42. During the time the paper is held stationary the friction clutch 26 on the take-up shaft 24 permits the take-up reel 22 to momentarily remain idle, but as soon as the platen 40 releases the paper P, the take-up again starts to function and winds up the paper from loop L until it reaches a smaller size indicated at L_1 in Fig. 5.

In order to intermittently move the platen 40 from the position shown in full lines to that shown in broken lines in Fig. 2, the following mechanism is employed. The bevel gear 15, which, as explained above is rotated from the motor 11, meshes with a bevel gear 50 which is carried by a shaft 51 to which a cam 52 is attached. This cam is rotated in the direction shown by the arrow.

Contacting with the cam is a cam follower in the form of a roller 53 carried by a shaft 54 on member 55 which may be attached to shaft 39 to move the presser 59 by means of a shock absorbing unit 56 which may be of any well-known construction and need not be described in further detail here. Each time the cam 52 revolves, since the roller 53 is held in contact with the cam by means of a spring 57, the platen is raised and lowered. The shape of the cam is such that the platen is intermittently moved although the cam is continuously driven. The platen remains stationary in its operative position in which it clamps paper P over the exposure frame 20 during the greater part of the movement to and from the broken line position taking place comparatively rapidly.

In order to clamp the paper P flat upon the printing frame 20, I provide a resilient plate 58 which is mounted upon a post 59 encircled by a spring 60, this post passing through a cross-bar 61 on the platen. The plate 58 can therefore rock upon the post and is normally held toward the platen frame 40 by means of the spring 60.

While the plate 58 is carried by the platen frame 40, it can move separately from the frame as it is carried by means of arms 70 which are affixed to turn with the shaft 39. Thus, when the shaft 39 turns the arms 70, the plate 58 is pressed into contact with the printing frame 20 and the spring 59 passing through the cross-bar 61 draws down the platen frame 40 until the stops 71 on the frame 40 come in contact with the support 72 which limits the downward movement of the platen frame 40.

The shaft 51 which is turned by the gears 15 and 50 turns continuously and this shaft is extended to one side of the mechanism to receive a pulley 65. Pulley 65 is connected by means of a belt 66 to the pulley 67 which is carried to the shaft 24. Thus, power is transmitted from the motor 11 to the shaft 24 which through its friction clutch 26 may drive convolutions of paper wound upon the reel 22.

With a machine constructed as above described, prints can be made rapidly from a single negative and placed on the table 1, or they can be made from a series of different negatives, whichever is desired. It is only necessary for an operator to adjust the negative since the printing takes place entirely automatically when the machine is running. After paper has been threaded up in the compartment 9 and has been looped from the supply reel 21 about the various film guiding rollers to the take-up reel 22, the operation of the machine is continuous, a print being made each time the platen clamps a sheet of paper P upon the printing frame 20, different area being advanced beyond the exposure frame each time the platen is raised and lowered.

While I have described a preferred embodiment of my paper feed for photographic printing machines, it is obvious that certain features

of the invention may be applied to different types of photographic apparatus. Although paper is mentioned throughout the specification, it is understood that film or other flexible material may also be used. I contemplate as within the scope of my invention all such equivalents and modifications as may come within the scope of the appended claims.

What I claim is:

1. In a photographic apparatus, the combination with an exposure frame, of a platen movably mounted with respect thereto adapted to intermittently press a sensitive material flat against said exposure frame, a guide roll carried by and movable with the platen for guiding the sensitive material, a supply and a take-up roll for a strip of such material, and means including a source of power, a drive for said take-up roll, and the movable platen with its guide roll for moving a fresh area of material to the printing frame.

2. In a photographic apparatus, the combination with an exposure frame, of a platen movably mounted with respect thereto adapted to intermittently press a sensitive material flat against said exposure frame, a guide roll carried by and movable with the platen for guiding the sensitive material, a supply and a take-up roll for a strip of sensitive material, a power drive, connections between the power drive and take-up roll to wind the strip thereon, connections between the power drive and platen for intermittently moving the platen and the guide roll thereon toward the exposure frame, and means under the control of the platen for advancing the strip intermittently.

3. In a photographic apparatus, the combination with an exposure frame, of a platen movably mounted with respect thereto adapted to intermittently press a sensitive material flat against said exposure frame, a supply and a take-up roll for a strip of sensitive material, a power drive, connections between the power drive and take-up roll including a friction clutch tending to constantly rotate the take-up roll, connections between the power drive and platen including a cam and cam follower for intermittently moving the platen toward the exposure frame, and guides for the strip carried by the platen for controlling the movement of the strip relative to the exposure frame.

4. In a photographic printing machine, the combination with a printing frame, of a platen movably mounted with respect thereto adapted to intermittently press paper flat against said printing frame, a supply and a take-up roll for paper, a power drive, connections between the power drive and take-up roll including a friction clutch tending to constantly rotate the take-up roll, connections between the power drive and platen including a cam and cam follower for intermittently moving the platen toward the printing frame, and rollers carried by the platen adapted to guide paper relative thereto whereby movement of the platen and take-up may cause a paper to move over the guides on the platen intermittently as said platen is intermittently actuated.

5. In a photographic printing machine, the combination with a printing frame, of a platen hingedly mounted to move to and from the panel, paper guides adapted to guide a strip of paper from a supply reel over the platen, a guide roll for the paper carried by and movable with the hingedly mounted platen, a take-up reel, means including a source of power for moving said take-up reel and for moving said platen and its guide roll in two directions, paper guides for defining a loop of paper between the platen and the take-up reel, said guides and the paper guides on the platen being so positioned that the size of the paper loop is altered each time the platen moves in each direction, whereby fresh areas of paper may be presented at the printing frame.

6. In an automatic photographic printing machine, the combination with a printing panel, of a platen hingedly mounted, power means for moving said platen upon its hinge intermittently to press a sheet of paper against said frame, a plurality of paper guides, a take-up and a supply reel for defining a path for paper, guides for the paper carrier by the platen, a friction clutch and connection between the power means and take-up reel through said friction clutch adapted to move the take-up reel to wind paper thereon, the paper guides on the platen being adapted to draw lengths of paper from the supply reel when the platen is operated by said power drive.

7. In an automatic photographic printing machine, the combination with a printing panel, of a platen hingedly mounted, power means for moving said platen upon its hinge intermittently to press a sheet of paper against said frame, a plurality of paper guides, a take-up and a supply reel for defining a path for paper, guides for the paper carried by the platen, a friction clutch and connection between the power means and take-up reel through said friction clutch adapted to move the take-up reel to wind paper thereon, the paper guides on the platen being adapted to draw lengths of paper from the supply reel when the platen is operated by said power drive, and a paper clamping member carried by the platen and adapted to hold the paper against movement when said platen is moved toward said printing frame.

8. In an automatic photographic printing machine, the combination with a printing frame, of a platen hinged to move to and from said frame, supply and take-up reels for paper, a power operated mechanism tending to turn the take-up reel continuously, said power operated mechanism being connected by a cam and cam follower to said platen to move the same intermittently, a series of guide rollers for the paper for looping it between the supply and take-up reels, some of said rollers being mounted on said platen, whereby the paper path may be altered to move the paper through intermittently moving the platen.

9. In an automatic photographic printing machine, the combination with a printing frame, of a platen hinged to move to and from said frame, supply and take-up reels for paper, a power operated mechanism tending to turn the take-up reel continuously, said power operated mechanism being connected by a cam and cam follower to said platen to move the same intermittently, a series of guide rollers for the paper for looping it between the supply and take-up reels, some of said rollers being mounted on said platen, whereby the paper path may be altered to move the paper through intermittently moving the platen, a movable mount for at least one of said guide rollers for altering the length of the paper looped between the guide and take-up rollers.

D'ARCY A. YOUNG.

CERTIFICATE OF CORRECTION.

Patent No. 1,981,406. November 20, 1934.

D'ARCY A. YOUNG.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 93, claim 6, for "carrier" read carried; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of January, A. D. 1935.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.