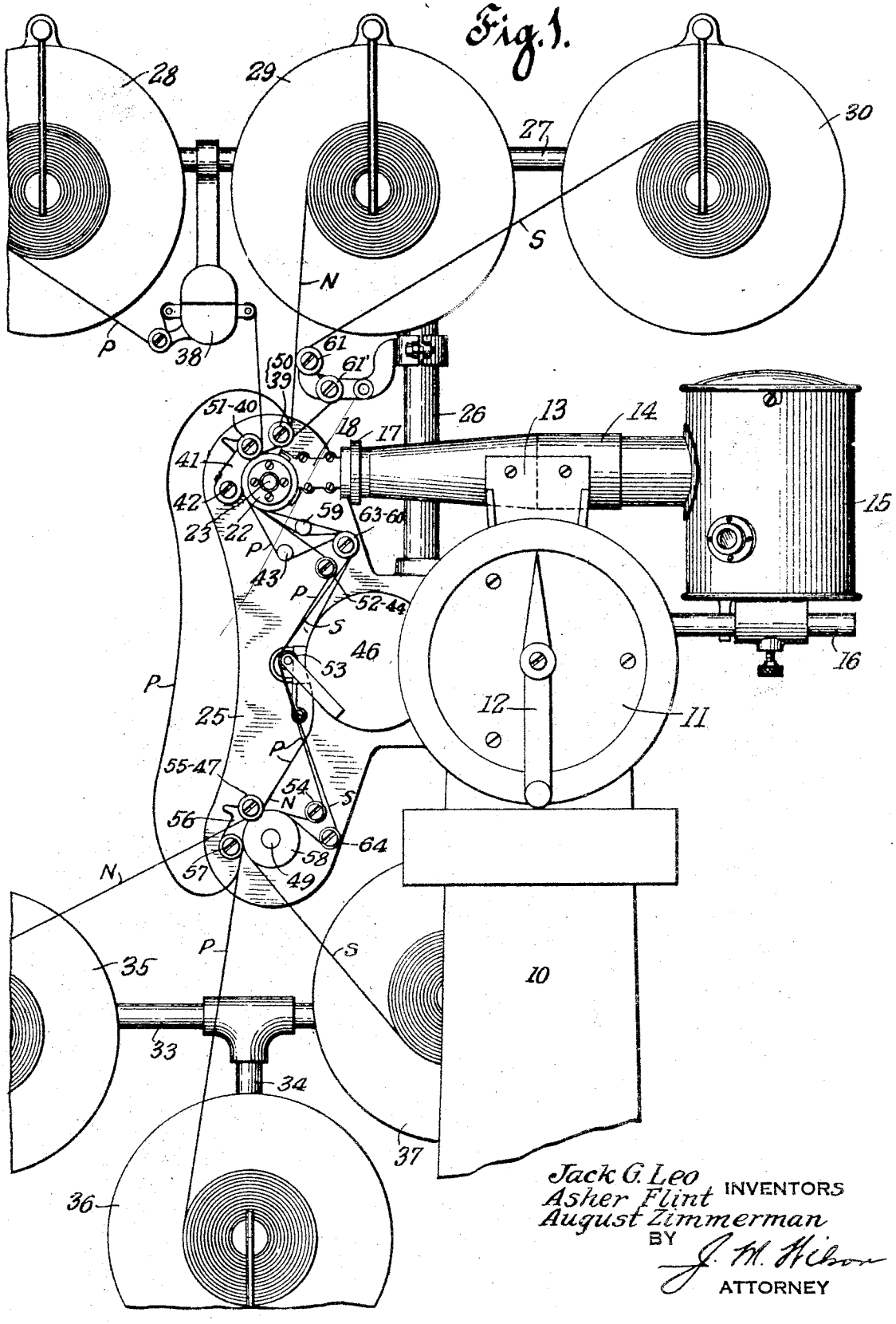
April 26, 1932. A. FLINT ET AL 1,855,827

FILM PRINTING MACHINE

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Fig. 1.




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Fig. 2.

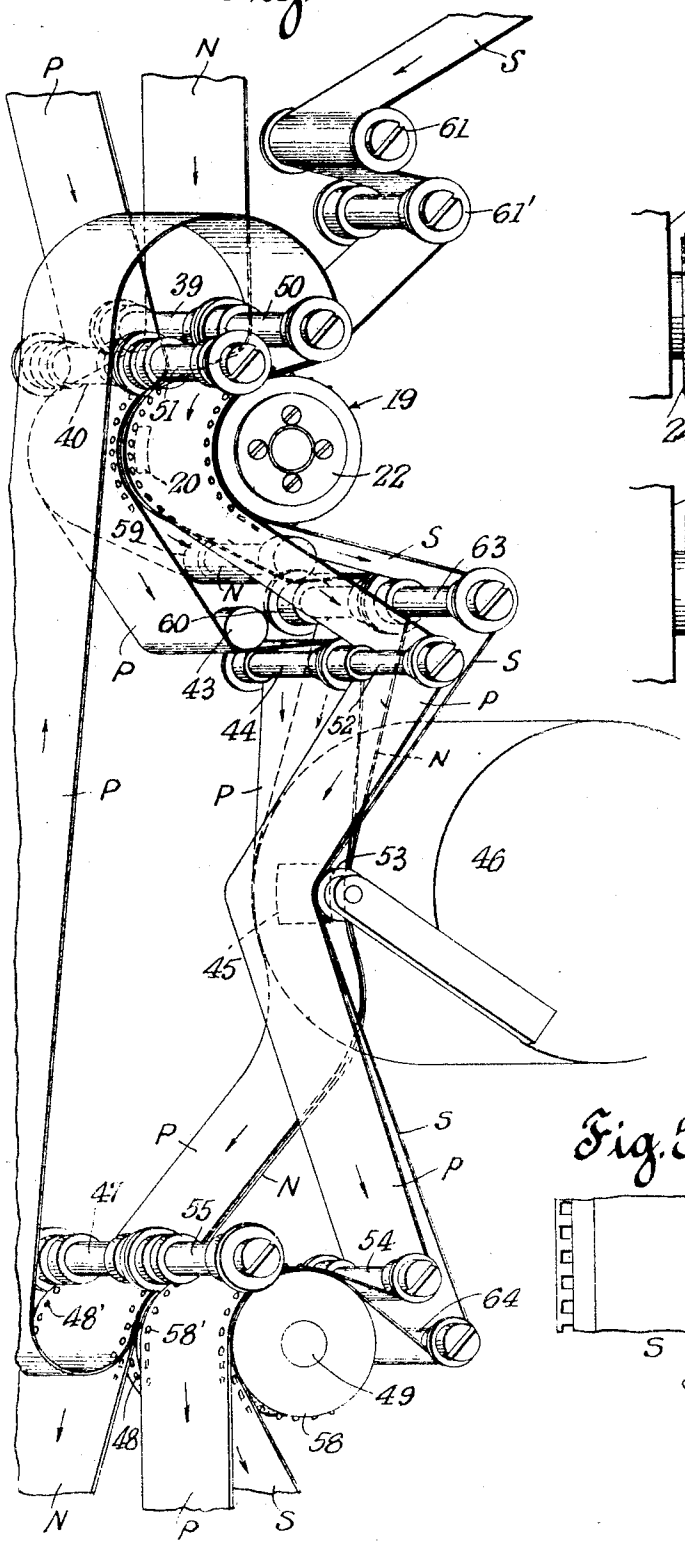



Fig. 3.

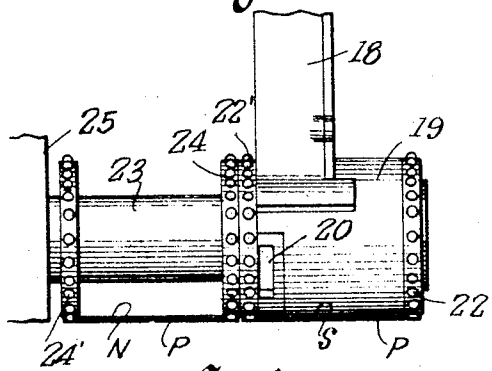



Fig. 4.

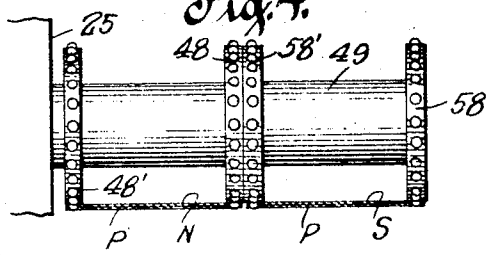
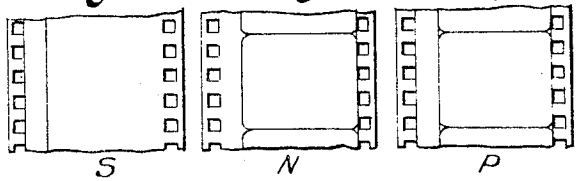



Fig. 5. Fig. 6. Fig. 7.




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# UNITED STATES PATENT OFFICE

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## FILM PRINTING MACHINE

Application filed November 21, 1928. Serial No. 320,964.

This invention relates to film printers and more particularly to mechanism for continuously printing upon a sensitized blank film, pictures from a printed negative film and concurrently, sound producing characters from a printed negative sound film.

Hitherto, so far as known, combined moving picture and sound films have been printed by separate successive runs of the film through the printer entailing considerable loss of time and also incurring possibilities of incorrect registration.

It is therefore an object of this invention to avoid these disadvantages by providing a printing mechanism that will, at one and the same operation, produce both the picture and sound records, the sound record relative to each picture being imprinted adjacently after the picture position in accordance with the difference in speed of light and sound.

A further feature resides in the provision of means for synchronizing a negative picture film with a negative sound film, so that each may be printed upon a sensitized blank or positive simultaneously, but at different time intervals thereon.

These and other purposes, including the development of an essentially simple, efficient and practical device, are attained by the novel construction and combination of parts as hereinafter described and illustrated in the accompanying drawings, forming a material part of this disclosure, and in which:—

Figure 1 is a side elevational view of an embodiment of the film printer showing the paths of the several films.

Figure 2 is a perspective view of the main operative portions of the same and drawn to an enlarged scale.

Figure 3 is a top plan view of the upper feed sprockets and sound printing cylinder.

Figure 4 is a similar view of the lower feed sprockets.

Figure 5 is a fragmentary plan view of a film bearing the sound imprint.

Figure 6 is a fragmentary plan view of a film bearing the picture imprint.

Figure 7 is a similar view of a film bearing both imprints.

In the drawings the machine frame, designated by the numeral 10, is shown as having mounted on it a time regulator dial 11 provided with a setting lever 12, and a bracket 13 extending above the dial to support a horizontal telescopic funnel 14.

A lamp housing 15 is mounted adjustably on rods 16 extending rearwardly from the bracket, above the axis of the dial 11, the housing having direct communication with the funnel 14, which has at its front end an adapter ring 17 receptive of a hollow rectangular throat 18 provided with a removable cover at its side.

The outer portion of the throat 18 is provided with upper and lower flanges to engage a transverse printing cylinder 19, having an opening 20 near one end for light to pass through and provided at its ends with sprockets 22—22′ carried by a spindle 23 journalied in a plate bracket 25 extending outwardly to the front from the frame 10 and driven in the usual manner, not shown.

Also fixed to the spindle 23 are another pair of sprockets 24—24′, the sprockets 22′ and 24 being closely side by side.

A post 26, reaching up from the frame 10, carries at its upper end a horizontal bar 27 on which are mounted, in spaced relation, a series of three film reels 28—29—30 respectively for the sensitized blank positive, printed negative picture, and printed negative sound films P, N and S, all being held at a considerable distance above the center of the machine. Another horizontal bar 33, extending from the frame 10, at a point below the center of the machine is provided with a pendant arm 34, and mounted on the bar and arm are a second series of reels 35—36—37 arranged to be driven by means not shown

and on which the several films are wound after exposure.

The blank positive film P, as uncoiled from the reel 28, is passed through a cleaner 38 carried on an arm depending from the bar 27, adjacent a guide roll 39 at the left hand side of the machine, and under another roll 40 mounted on the free end of a printing gate 41, pivoted at 42 to the bracket 25 and adapted to cause the film to engage the teeth of the sprockets 24—24′.

Continuing, the film P passes under a guide roll 43, over a roll 44, across the light aperture 45 in a light control cylinder 46, the same being part of the machine and thence under a guide roll 47 adjacent a pair of sprockets 48—48′, fixed on a spindle 49 mounted in the bracket 25, all these several elements being in a plane at the left hand side of the machine, as best seen in Figures 2, 3 and 4.

Thereafter, the film P, upon leaving the lower pair of sprockets 48—48′ is directed upwardly and offset edgewise, forming a loose bight or loop, the opposite portion of which is directed to pass under a roll 50 in axial registration with the roll 39, and a similar roll 51, in axial registration with the roll 40, and like it, mounted in the pivoted printing gate 41.

These rolls direct the film P upon the teeth of the upper sprockets 22—22′, causing the film to pass in front of the light aperture 20 in the light control cylinder 19, the film continuing over a guide roll 52, in axial register with the roll 44, thence over a roll 53 carried at the end of an arm fixed on the end of the cylinder 46.

From the roll 53 the film passes under a guide roll 54, and also a roll 55 in axial alignment with the roll 47, both of which are carried on the free end of a printing gate 56, pivoted at 57 on the bracket 25 and causing the film P to engage the teeth of sprockets 58—58′ fixed on the driven spindle 49, and from whence the film is delivered to the take-up reel 36.

The negative picture film N moves directly from the reel 29 under the guide roll 39 to contact the film P, as both pass together under the printing gate roll 40 and engage the sprockets 24—24′.

The film N is then directed under a guide roll 59 and over a roll 60, thence downwardly over the light aperture 45, at which point the pictures borne by the film N are imprinted upon the blank P, both films moving in juxtaposition under the roll 47 and over the sprockets 48—48′, the film N being coiled upon the reel 35 as the film P is directed upwardly as has been described.

It is to be noted that the film N is maintained throughout its course on the left side of the machine at all times.

The sound stripe bearing film S passes from the reel 30 through a tensioning device having rolls 61—61′, carried by an arm adjustably clamped upon the post 26, the film S coming in contact with the blank film P at a point below the roll 50, and continuing with it under the roll 51, to engage the sprockets 22—22′, and, at the light aperture 20, in the cylinder 19, imprint its sound stripe upon the blank P which, as previously described, has already received the picture imprints as it passed downwardly.

Thereafter the film S is directed over a roll 63 in axial registration with the roll 60, thence over the roll 53, under a roll 64, and then together with the film P pass under the roll 55 and over the sprockets 58—58′ to be coiled upon the reel 37.

The sound film S will be seen to move in a plane parallel to that of the film N, but to the right thereof so that no confliction occurs, while the blank film P moves first with the film N at the left and thereafter with the film S at the right.

Obviously the negative films intervene the positive throughout their runs at the several rolls and printing points.

It is to be understood that the continuous film printing machine illustrated is merely conventional and that the invention resides in the attachments and method of use which include an auxiliary lighting means for the sound record, the disposition of more than the usual numbers of reels, arrangements of double guide rolls, looping and angular transposition of the positive film, and other novel features as herein set forth.

Although the improvements have been described with considerable detail and with respect to certain particular forms of the invention, it is not desired to be limited to such details since many changes and modifications may well be made without departing from the spirit and scope of the invention in its broadest aspect.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent, is:—

1. In photo film printing apparatus, the combination with a film printer for imprinting a picture bearing negative film upon a sensitized blank film, of an auxiliary printer above and to one side of the first printer to imprint a sound negative film upon the blank film at a point remote from the point of the picture printing, guide rolls for each film, and means to shift said blank film edgewise during the interval between the printings.

2. In a photo film printing apparatus, having reels for a blank positive film, a printed negative film and a sound negative film, means in said apparatus for printing both of said negative films upon the positive simultaneously and at different intervals therealong, means for registering said blank with the printed negative, and means for looping, rais-

ing, and registering the blank with said sound negative subsequent to the first registration.

3. In photo film printing apparatus the combination with a film printer having means to imprint a picture carrying negative upon a blank positive, of independent printing mechanism to imprint a sound negative upon the same blank positive, means for guiding each film into registration with the printing points, said blank positive passing the first named printing point in coupled relation with the picture negative and independently with the sound negative for spacing the coupled films at such point.

4. In photo film printing apparatus, the combination with a film printer having means to imprint a picture carrying negative upon a blank positive, said means including a pair of driven sprockets to engage the films, of a second printing means entirely independent of the first means including a pair of sprockets, a second pair of sprockets in axial alignment with the first pair, means for training the sound negative and blank positive over the first pair of sprockets, and means for training the picture negative and blank positive over the second pair of sprockets.

5. In photo film printing apparatus, the combination with a film printer having means to imprint a picture negative upon a blank, of an independent auxiliary printer to imprint a sound negative upon the same blank, means including two pairs of film sprockets in axial registration to direct the films past their respective printing points, and means for shifting certain of said films from one pair of said sprockets to the other.

6. In a film printing apparatus, delivering and receiving reels for a sound film, a picture film, and a blank film, means for imprinting the picture film on the blank film at one definite point and plane in their travel, means for carrying the blank film after receiving the picture imprint upwardly above the horizontal plane of the picture printing means and to one side thereof, and means for directing the blank film downwardly past the sound printing means in juxtaposition with the sound film, both being offset from the picture film.

7. In a film printing apparatus, delivering and receiving reels for a sound film, a picture film, and a blank film, means for imprinting the picture film on the blank film at one definite point and plane in their travel, means for looping and offsetting the blank film after receiving the picture imprint, and means for contacting the blank film and sound film at a printing point laterally offset from the picture printing print.

8. A film printing device comprising means for coupling a picture negative with a blank positive film, means for printing said picture negative on said film, means for printing a sound negative on said film and means for positioning said sound negative printing means laterally with respect to said means for printing a picture negative but in axial registration with said coupling means.

9. In a film contact printing device for printing pictures and sound on a blank positive, means for guiding a blank positive film and a first negative into superposition, means for printing said first negative upon said blank positive film, a second printing means in axial registration with said guiding means but laterally off-set therefrom, means for returning said positive film in juxtaposition with said guiding means into printing relation with said second printing means, and means for directing a second negative into superposition with said blank positive film at said second printing means.

10. A film contact printing apparatus comprising a sound printing device, a picture printing device, guide means for causing a sound negative film combined with a blank positive film and a picture negative film combined with said blank positive film to travel in substantial juxtaposition past their respective printing devices, guide means for passing said blank positive film into superposition with said picture negative film and with said sound negative film whereby a combined sound and picture impression is made on said blank positive film simultaneously at different points.

11. In a film printing device, means for guiding a blank positive and picture negative in aligned superposition through a limited path, means for printing said picture negative upon said blank positive during said aligned superposition, means for separating the picture printed positive from said negative, means for guiding said separated positive over a second path parallel to and laterally off-set from a portion of said limited path, means for guiding a sound negative into superposition with said separated positive in said second path and means for printing said sound negative upon said picture printed positive.

12. In a motion picture film printing machine, for printing pictures and a sound track onto a positive, in combination, a printing station having laterally offset non-printing guide means cooperating therewith, a second printing station having laterally offset-non-printing guide means cooperating therewith, means for progressing a positive and negative film over the first non-printing guide means and then into printing relation with the second printing station, and means for then guiding the same positive into printing relationship at the first printing station with a second negative, and means for then guiding said positive and second negative over the second non-printing guide means.

13. A film printing device comprising means for coupling a picture negative with

a blank positive, means for coupling a sound negative with said blank positive, means comprising a printing station for printing one negative upon said positive and means in axial registration for guiding the other negative and said positive adjacent said printing means, means comprising another printing station for printing the other negative upon said positive and having associated therewith means for guiding the first negative in coupled relationship past said second printing means but laterally offset therefrom.

In testimony whereof we have hereunto affixed our signatures.

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