

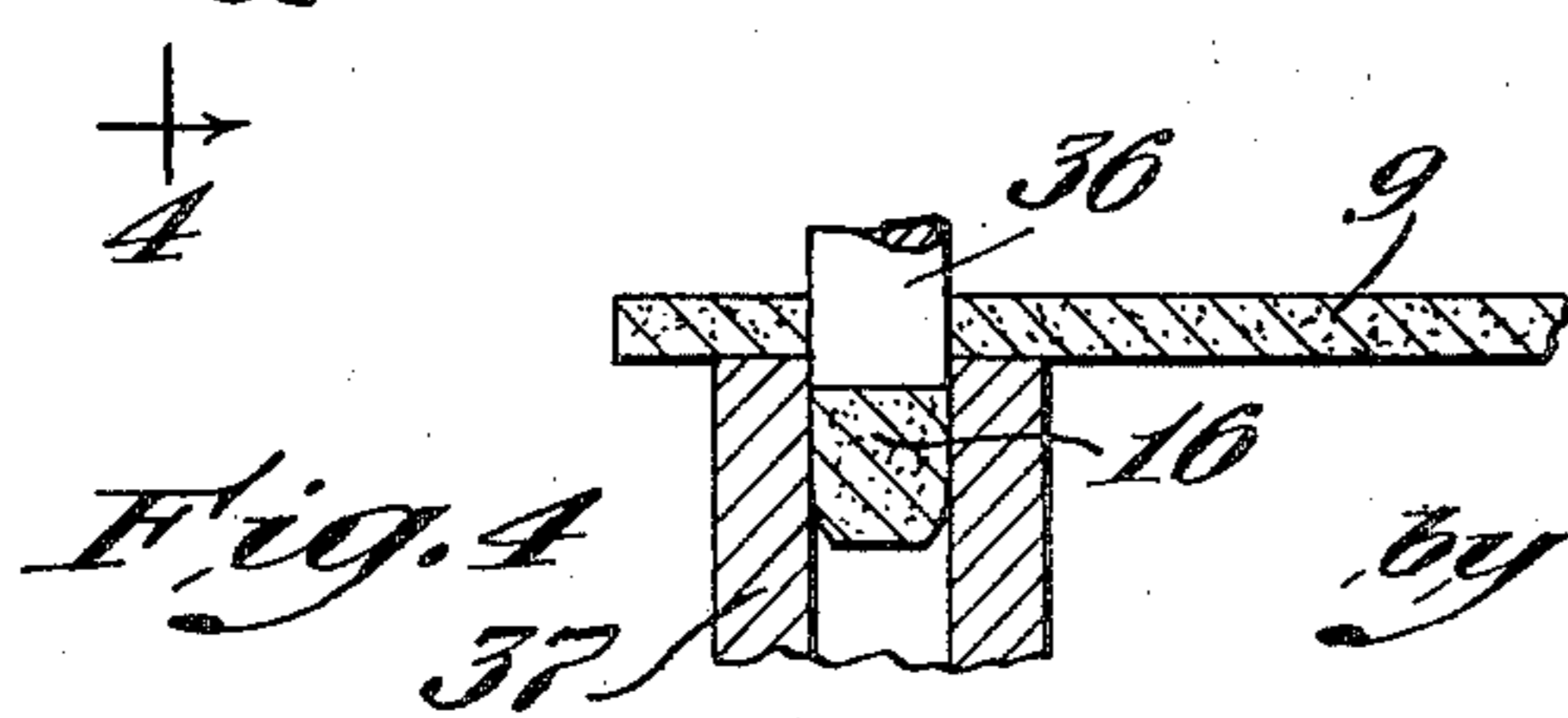
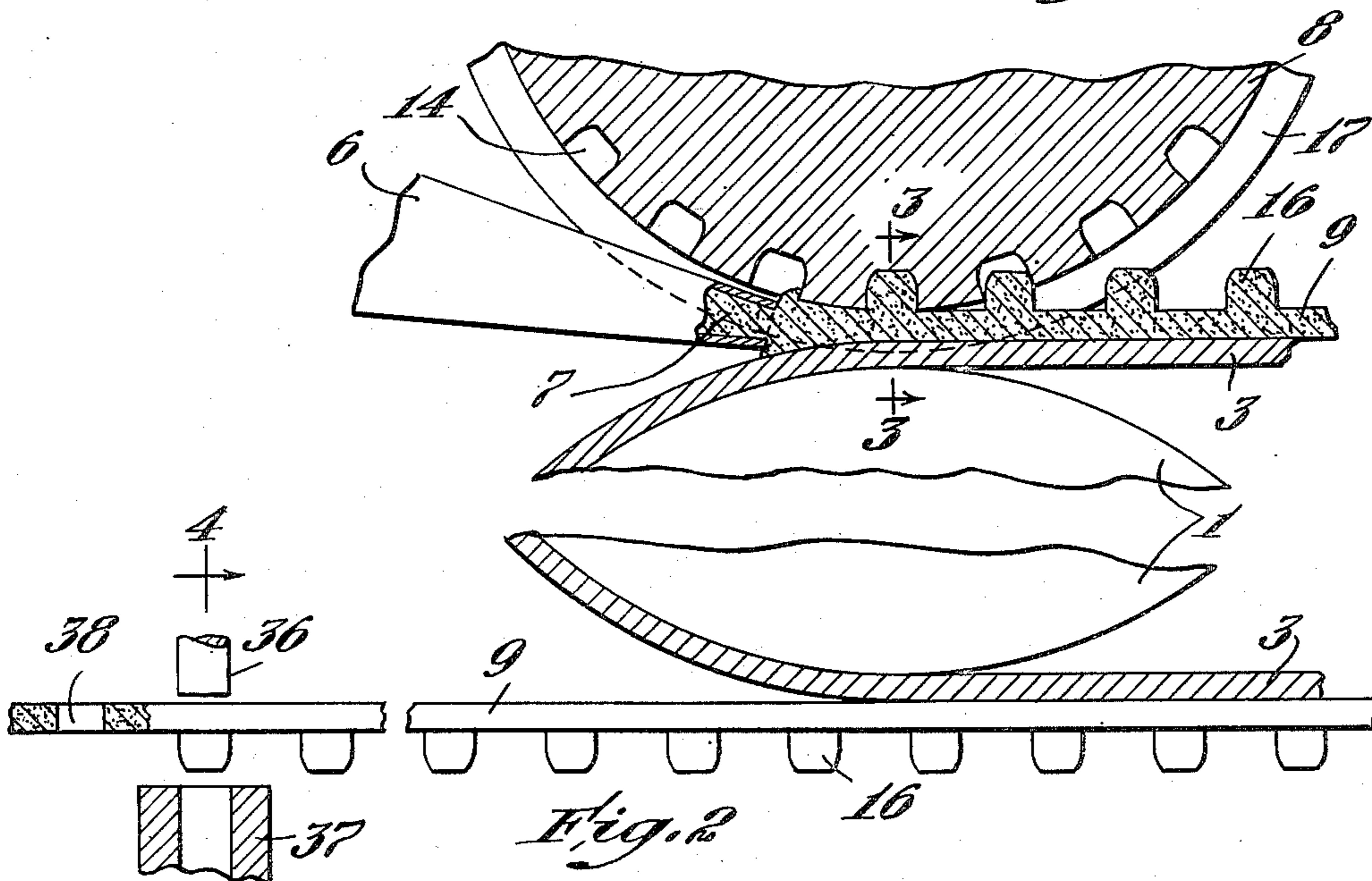
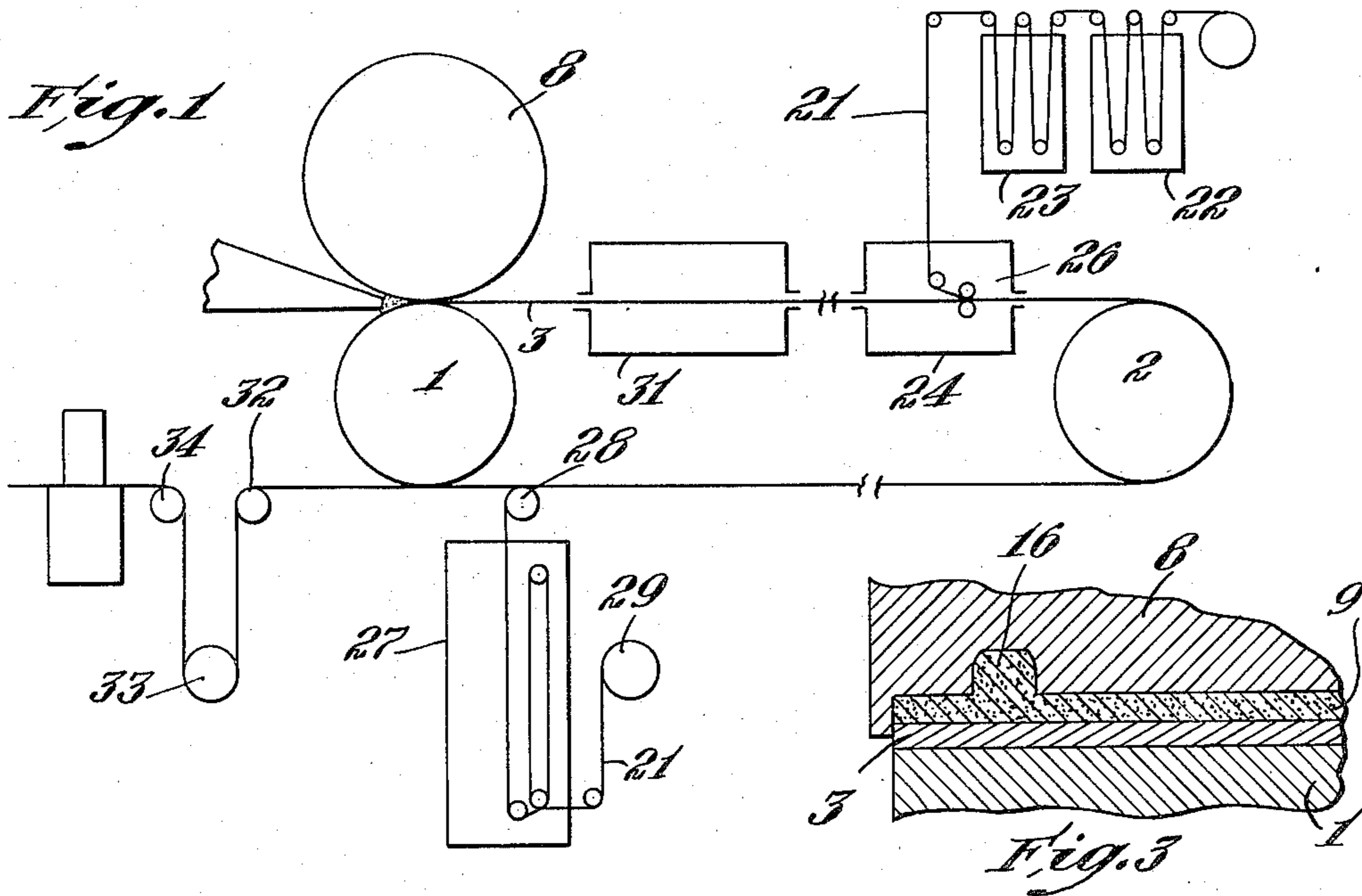
March 6, 1951

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2,544,257

CINEMATOGRAPHY

Filed March 3, 1945



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UNITED STATES PATENT OFFICE

2,544,257

CINEMATOGRAPHY

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Application March 3, 1945, Serial No. 580,832

5 Claims. (Cl. 101—149.1)

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In printing cinematographic pictures by imbibition it is customary to use ordinary film coated with gelatin which imbibes the dye from a printing matrix when the two are pressed together face to face. Such film must be manufactured in advance by first forming a base of cellulose acetate or the like and then coating the face with gelatin or the like. This not only involves considerable expense of manufacture but also the expense of shipping the film from film manufacturer to the printing establishment. Moreover the film must be carefully stored in humidified compartments and even when so stored its imbibition characteristics change with time.

Objects of the present invention are to provide an improved film and method of making same which eliminates the necessity of forming the film in advance of printing, which eliminates the necessity of coating the film base, which reduces the time and cost of printing and which affords a superior film.

In one aspect the present invention involves a cinematographic film comprising a transparent ribbon adapted to have the images printed thereon, characterized in that it has register teeth along one or both of its margins to hold it in register with a film having sprocket holes fitting over the teeth during a printing operation. Preferably the film is composed of plastic material and the teeth are molded integrally with the ribbon. In the preferred embodiment the ribbon is dye-absorptive so that the pictures can be printed thereon by imbibition.

In another aspect the invention involves a method which comprises forming a film with register teeth adapted to fit into the sprocket holes of cinematographic film, feeding the toothed film and a printing film together with the teeth fitting in the sprocket holes of the printing film, printing on the toothed film from the printing film, and subsequently punching out the aforesaid teeth to leave sprocket holes where the teeth were originally, so that the printed film may thereafter be fed over register teeth in the usual way. Preferably the film is molded on a carrier which travels continuously along a predetermined path, a printing film is fed to the toothed film along said path with the teeth fitting into the sprocket holes of the printing film, the pictures are printed while the two films are held in register by the aforesaid teeth, the two films are peeled from the carrier and from each other farther along the aforesaid path and thereafter the teeth are punched out of the tooth film

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to leave sprocket holes. When the film is printed by imbibition the printing film is dyed before it contacts with the dye-absorptive toothed film.

While any suitable molding material may be employed, for most purposes the finished film should be transparent. Typical examples comprise polyvinyl alcohol, polyvinyl acetal and regenerated cellulose. However, because of greater strength better results are obtained with cellulose esters such as cellulose acetate, cellulose acetopropionate and cellulose acetobutyrate. To improve its dye absorptivity the cellulose ester film may be treated with alkali such as sodium hydroxide or an organic amine such as ethanolamine or isopropylamine. For example, the film may be bathed for two minutes at 120° F. in a solution comprising three parts of 5% sodium hydroxide and two parts of isopropylamine, and then rinsed.

For the purpose of illustration a typical embodiment of the invention is shown in the accompanying drawings in which

Fig. 1 is a diagrammatic view;

Fig. 2 is a side elevation of the molding means;

Fig. 3 is a section on line 3—3 of Fig. 2; and

Fig. 4 is a section on line 4—4 of Fig. 2.

The particular embodiment of the invention chosen for the purpose of illustration comprises two drums 1 and 2, and an endless belt 3 trained over the two drums. One or both of the drums 1 and 2 are driven continuously by suitable means. The material for molding the film may be fed to the register belt from a hopper 6, the material being indicated at 7 in Fig. 2.

The means for molding the material on the belt in the form of a thin film comprises a roller 8, the space between the roller and the belt 3 being equal to the desired thickness of the film 9 to be molded. The roller 8 has radial openings 13 and 14 to mold teeth 16 integrally with the ribbon 9. By confining the space between the belt 3 and the roller 8 at the sides, as indicated at 17 in Fig. 3, and by using material which has relatively high viscosity, sufficient pressure is produced between the belt 3 and roller 8 to fill the recesses 13 and 14 with the material.

The apparatus for printing pictures on the film 9 comprises a matrix film 21 having dye-absorptive images thereon, a tank 22 in which the dye-absorptive images are saturated with dye, a tank 23 in which the superficial dye is washed off, a liquid tank 24 in which the matrix 21 is pressed against the molded film 9 by pressure rollers 26 and a drying compartment 27 in which the matrix film is dried after it is fed away from

the film 9 at the roller 28 and before it has been reeled on the take-up reel 29. By bringing the two films together while submerged in the liquid in tank 24, air bubbles are excluded from between the films and a better transfer results. If the molded film 9 is pretreated, as above described for example, another liquid tank 31 may be provided. The endless belt 3 and the films carried thereon enter and leave the tanks 24 and 31 through narrow slots which are provided with liquid traps to minimize the loss of liquid. While the films are traveling in face to face contact from the rollers 26 to the roller 28 the dye is imbibed from the matrix 21 into the film 9 to print pictures on the film 9 corresponding to the images on the matrix 21.

After the matrix 21 is fed away from the film 9 at the roller 28, the film 9 continues to the roller 32 where it feeds downwardly under a floating roll 33, thence upwardly to a roll 34 and thence to punching means comprising a punch 36 and a die 37. By providing the floating roll 33 the film 9 may be fed continuously until it leaves the belt 3 and then intermittently past the punch and die. As indicated in Fig. 2 both the punch and die are retracted as each pair of teeth 16 move into position to be punched out. Then the die 37 rises until it contacts the film 9 around the teeth 16, after which the punch descends to punch out a pair of teeth. The teeth 16 are preferably of standard size and shape, and the punch and die are correspondingly shaped. Thus when the teeth are punched out the film 9 has sprocket holes 38 at the locations formerly occupied by the teeth.

From the foregoing it will be evident that the film may be printed as manufactured and that in printing the film the teeth 16 serve to hold the two films in registry so that no other registering means are required.

As the matrices are successively fed to the film the same teeth of the film engage corresponding sprocket holes of the matrices, so that any slight non-uniformity in the teeth throughout the length of the film has corresponding effect in the different printing operations. Thus in one aspect the invention is related to that disclosed in Patent 2,369,176, granted February 13, 1945.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. In the art of cinematography the method which comprises forming a film with register teeth adapted to fit into the sprocket holes of cinematographic film, feeding the toothed film and a printing film together with said teeth fitting in the sprocket holes of the printing film, printing on the toothed film from the printing film, and subsequently punching out said teeth to leave sprocket holes instead of the teeth, so that the printed film may thereafter be fed over register teeth in the usual way.

2. In the art of cinematography the method which comprises molding a film with integral

register teeth adapted to fit into the sprocket holes of cinematographic film, feeding the toothed film and a printing film together with said teeth fitting in the sprocket holes of the printing film, printing on the toothed film from the printing film, and subsequently punching out said teeth to leave sprocket holes instead of the teeth, so that the printed film may thereafter be fed over register teeth in the usual way.

3. In the art of cinematography the method which comprises forming a dye-absorptive film having register teeth adapted to fit into the sprocket holes of a cinematographic matrix feeding the dye-absorptive film and a dyed matrix together with said teeth fitting in the sprocket holes of the dyed matrix, printing on the dye-absorptive film from the dyed matrix by imbibition, and subsequently punching out said teeth to leave sprocket holes instead of the teeth, so that the printed film may thereafter be fed over register teeth in the usual way.

4. In the art of cinematography the method which comprises continuously feeding a carrier along a predetermined path, at one location along the path molding on the carrier a film having integral register teeth along its margin, at another location farther along the path feeding said film and a printing film together with said teeth fitting into the sprocket holes of the printing film, printing pictures on the toothed film from the printing film while the two are held in register by said teeth, farther along said path peeling the films from the carrier and from each other, and subsequently punching out said teeth to leave sprocket holes.

5. In the art of cinematography the method which comprises continuously feeding a carrier along a predetermined path, at one location along the path molding on the carrier a dye-absorptive transparent film having integral register teeth along its margin, at another location farther along the path feeding said film and a dyed matrix together with said teeth fitting into the sprocket holes of the dyed matrix, printing pictures on the dye-absorptive film from the dyed matrix while the two are held in register by said teeth, farther along said path peeling the film and matrix from the carrier and from each other, and subsequently punching out said teeth to leave sprocket holes.

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