

PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.



Improvements in or relating to Apparatus for Making Mosaic-screens for Colour Photography.

(A communication from COMPAGNIE D'EXPLOITATION DES PROCÉDÉS DE PHOTOGRAPHIE EN COULEURS LOUIS DUFAY, known as "VERSICOLOR DUFAY", of 10, rue Champ Lagarde, Versailles (Seine & Oise), France, a French company).

I, HAROLD WADE, a British Subject, of 111/112, Hatton Garden, London, E.C. 1, do hereby declare the nature of this invention to be as follows:—

This invention provides a machine for treating long strips of dyed sheet material (for example cellulose acetate film) having a resist pattern imprinted thereon, for the production of "reseaux" or mosaic colour-screens for direct colour photography and cinematography. The invention is particularly adapted for the carrying out of the method of making three-colour reseaux described in the Specification of co-pending Application No. 22,607/28 (Serial No. 322,432) but it is equally well adapted for the production of linear two-colour reseaux.

The machine according to the present invention comprises in combination a trough for a decolorising agent, a device for applying a dye, a washing device, a drying device, a trough (or more than one) for a solvent of the resist material, a wiping device within said trough, a second drying device, and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

It is preferred to mount the trough for the decolorizing agent in such manner that it can be lowered away from the strip or raised to bring the liquid therein into contact with the under side of the strip, as desired.

The device for applying dye to the surface of the strip after the exposed areas thereof have been decolorised preferably consists of a roller dipping into a trough containing a solution of the dye and revolving in close proximity to the surface of the strip. Preferably the peripheral speed of this roller is greater than the speed of the strip (or it may alternatively revolve in a direction opposite to that in which the strip is moving)

[Price 1/-]

whereby any traces of the decolorising agent which may still cling to the surface of the strip may be swept away.

The washing device may comprise a plurality of water-jets directed upon the moving strip, preferably while it is passing around a roller of relatively large diameter. These jets of water wash away the excess dye adhering to the strip.

The drying devices aforesaid may each comprise a series of rollers composed of or covered with absorbent material (for example cotton fabric) over which the strip is led so that alternate rollers contact with opposite sides of the strip.

Preferably several troughs for the solvent of resist material are provided through which the strip is led in succession. One or more of these troughs is provided with a rotating wiping device which preferably consists of a roller covered with felt or flannel which rotates in contact with the strip, in the same direction as the movement of the strip but at a greater linear speed. Alternatively the wiping roller may rotate in the direction opposite to the movement of the strip.

After leaving the last solvent-trough the strip may pass through an alkaline de-greasing bath, preferably provided with wiping rollers one for each side of the strip, and then through a rinsing bath of water, after which it traverses the second of the two drying devices referred to above. It then passes around two large internally-heated drums, one of which contacts with one side of the strip and the other with the other side.

Finally the strip is wound upon a storage spool which is driven through a slipping clutch or its equivalent the adhesion of which is controlled by a spring- or weight-loaded jockey-pulley bearing against the strip, the connection between the jockey-pulley and the slipping clutch being such that when the tension in the strip increases beyond a certain amount the clutch is caused to slip.

It will be readily be understood that the strip, after treatment in the apparatus described, will be dyed in two colours, namely the original colour in those areas

protected by the resist material, and the applied colour in the unprotected areas. If the colours are suitably chosen, the strip may be used after this treatment as a screen for two-colour photography or cinematography. If, however, it is desired to produce a three-colour screen or reseau according to the Specification of copending Application No. 22,607/28 (Serial No. 322,432) a second pattern in resist material must be impressed upon the film, followed by a second decolorising, dyeing and washing treatment similar to that described above.

A second apparatus similar to that described above, may be employed for this second treatment, or the same apparatus may be employed. In the latter alternative, it is found that (when the method described in the aforesaid specification is used) a longer time of treatment in the decolorising bath is necessary. According to a further feature of the invention, therefore, means are provided for enabling the length of that part of the strip which is under treatment in the decolorising trough to be readily varied. For this purpose, one of the two rollers around which the strip passes in its transit along the surface of the decolorising bath is made adjustable towards and away from the other. Instead of a single adjustable roller, two alternative rollers may be provided, either of which may be employed according as a longer or shorter time of treatment is desired.

A practical embodiment of the invention will now be described by way of example.

The decolorising trough, which is in the form of a shallow dish, is mounted at one end of the machine upon two pairs of brackets carried by two eccentric shafts geared together one of which carries a hand-wheel. By turning the hand-wheel the trough may be raised or lowered at will. Just above the trough two guide-rollers are mounted, one of them being adjustable as aforesaid. These rollers are so arranged that the strip passing under them is exactly horizontal, and when the apparatus is in use the trough is adjusted so that the liquid decolorising agent therein just touches the underside of the strip.

After leaving the decolorising trough, the strip passes under a roller upon which it receives dye from an ebonite dye-applying roller which dips into a dye-trough (mounted in a similar manner to the decolorising trough) and which rotates in close proximity to but not in contact with the strip in a direction opposite to the motion of the strip.

The strip then passes around a drum

about 20 cm. in diameter, upon which it is washed by means of jets of water directed upon its exposed side, further jets of water being directed upon the other side just before it comes into contact with the drum for the purpose of removing any dye which may have encroached upon that side. Beneath the drum is a trough provided with a waste-pipe for collecting and removing the washing-water.

After washing, the strip passes between rubber squeegee rollers and then enters between a series of twelve drying or "blotting" rollers covered with absorbent cotton sleeves. These rollers are carried by a frame in two rows of six each, in staggered relationship, and the strip passes in a zig-zag manner over the rollers so that its opposite sides are dried (by absorption or blotting) by alternate rollers.

From the drying or blotting rollers the strip passes to the resist-solvent troughs, of which there are three, then to the degreasing trough and finally to the rinsing trough. These five troughs are mounted on a frame capable of vertical movement and suspended by wire cables led over pulleys to a winch by which it can be raised or lowered.

The strip passes over six upper rollers and five lower rollers, the axes of which are fixed, these lower rollers being so situated that each is inside and near the bottom of one of the troughs when the frame carrying them is in its upper position, the upper rollers being above the troughs and serving to conduct the strip from one trough to the other. The upper rollers, which are positively driven, are of larger diameter than the lower ones and each (with the exception of the first) is provided with a squeegee roller in contact with the strip passing around it.

The resist material is usually of a greasy nature and the solvent in the first three troughs is accordingly benzene, petrol or like solvent of grease. The first and second squeegee rollers must therefore be of a material not attacked by this solvent, and it is preferred to cover them with soft gelatine. The remaining two squeegee rollers, which are in contact only with aqueous alkaline solution and plain water respectively, are coated with rubber.

After leaving the rinsing trough, the strip passes between a second set of drying or blotting rollers similar to those just described, and then over two internally heated drums. These have been previously described herein, as well as the drive for the storage reel, and no further description of these parts is necessary.

The imprinted pattern of greasy resist

material must not be touched by any solid body until after the dye has been applied to the decolorised interspaces. Accordingly, every roller which has to engage

5 the side bearing the resist material, up to the first washing stage, is of the kind comprising two conical roller-elements spaced apart on a spindle, which engage the edge only of the strip.

10 The six rollers which surmount the solvent, degreasing and rinsing troughs are positively driven, as previously mentioned. The drum upon which the strip is supported during the first washing after

15 drying is also positively driven, as are the internally heated drums.

In each solvent tank is a positively-driven flannel-covered wiping roller bear-

ing lightly against the side of the strip on which is the greasy resist material, and these rollers rotate in the same direction as the strip but with a rather greater peripheral speed, two such rollers are provided in the degreasing trough, one on either side of the strip, but there are no wiping rollers in the final rinsing trough.

All the rollers over which the strip passes, particularly those which are not positively driven, are preferably mounted in self-aligning ball-bearings.

Dated this 4th day of August, 1928.

BOULT, WADE & TENNANT,
111 & 112, Hatton Garden, London,
E.C. 1,

Chartered Patent Agents.

COMPLETE SPECIFICATION.

Improvements in or relating to Apparatus for Making Mosaic-screens for Colour Photography.

I, HAROLD WADE, a British Subject, of 111/112, Hatton Garden, London, E.C. 1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention provides a machine for treating long strips of dyed sheet material (for example cellulose acetate film) having a resist pattern imprinted thereon, for the production of "reseaux" or mosaic colour-screens for direct colour photography and cinematography. The invention is particularly adapted for the carrying out of the method of making three-colour reseaux described in Patent No. 217,557, or in the specification of co-pending Application No. 22,607/28 (Serial No. 322,432), but it is equally well adapted for the production of linear two-colour reseaux.

The machine according to the present invention comprises in combination a trough for a decolourizing agent, a device for applying a dye, a washing device, a drying device, a trough (or more than one) for a solvent of the resist material, a wiping device within said trough, a second drying device, and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

It is preferred to mount the trough for the decolourizing agent in such manner that it can be lowered away from the strip or raised to bring the liquid therein into contact with the under side of the strip, as desired.

The device for applying dye to the surface of the strip after the exposed areas thereof have been decolourized preferably consists of a roller dipping into a trough containing a solution of the dye and revolving in close proximity to the surface of the strip. Preferably the peripheral speed of this roller is greater than the speed of the strip (or it may alternatively revolve in a direction opposite to that in which the strip is moving) whereby any traces of the decolourizing agent which may still cling to the surface of the strip may be swept away.

The washing device may comprise a plurality of water-jets directed upon the moving strip, preferably while it is passing around a roller of relatively large diameter. These jets of water wash away the excess dye adhering to the strip.

The drying devices aforesaid may each comprise a series of rollers composed of or covered with absorbent material (for example cotton fabric) over which the strip is led so that alternate rollers contact with opposite sides of the strip.

Preferably several troughs for the solvent of resist material are provided through which the strip is led in succession. One or more of these troughs is provided with a rotating wiping device which preferably consists of a roller covered with felt or flannel which rotates in contact with the strip, in the same direction as the movement of the strip but at a greater linear speed. Alternatively the wiping roller may rotate in the direction opposite to the movement of the strip.

After leaving the last solvent-trough the strip may pass through an alkaline de-greasing bath, preferably provided with wiping rollers one for each side of the strip, and then through a rinsing bath of water, after which it traverses the second of the two drying devices referred to above. It then passes around two large internally-heated drums, one of which contacts with one side of the strip and the other with the other side.

Finally the strip is wound upon a storage spool which is driven through a slipping clutch or its equivalent the adhesion of which is controlled by a spring- or weight-loaded jockey-pulley bearing against the strip, the connection between the jockey-pulley and the slipping clutch being such that when the tension in the strip increases beyond a certain amount the clutch is caused to slip.

It will readily be understood that the strip, after treatment in the apparatus described, will be dyed in two colours, namely the original colour in those areas protected by the resist material, and the applied colour in the unprotected areas. If the colours are suitably chosen, the strip may be used after this treatment as a screen for two-colour photography or cinematography. If, however, it is desired to produce a three-colour screen or reseau according to Patent No. 217,557, or according to the Specification of co-pending Application No. 22,607/28 (Serial No. 322,432), a second pattern in resist material must be impressed upon the film, followed by a second decolourizing, dyeing and washing treatment similar to that described above.

A second apparatus, similar to that described above, may be employed for this second treatment, or the same apparatus may be employed. In the latter alternative, it is found that (when the method described in the aforesaid specification is used) a longer time of treatment in the decolourizing bath is necessary. According to a further feature of the invention, therefore, means are provided for enabling the length of that part of the strip which is under treatment in the decolourizing trough to be readily varied. For this purpose, one of the two rollers around which the strip passes in its transit along the surface of the decolourizing bath is made adjustable towards and away from the other. Instead of a single adjustable roller, two alternative rollers may be provided, either of which may be employed according as a longer or shorter time of treatment is desired.

In the accompanying drawings which illustrate by way of example one practical embodiment of the invention:

Figure 1 is a side elevation partly in section of part of the machine;

Figure 2 is a side elevation partly in section of the remainder and is a continuation of Figure 1 towards the left;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1;

Figure 6 is a section on the line 6—6 of Figure 1;

Like reference characters indicate like parts throughout the drawings.

The machine as a whole comprises a main frame 12 having a succession of rollers 13 to lead the film 14 along the top of the machine to the inlet end.

The decolourizing trough 15, which is in the form of a shallow dish, is mounted at one end of the machine upon two pairs of brackets 16 carried by two eccentric shafts 17 geared together, one of which carries a hand-wheel 18. By turning the hand-wheel 18 the trough 15 may be raised or lowered at will. Just above the trough two guide-rollers 19, 20 are mounted, one of them 20 being adjustable as aforesaid. These rollers are so arranged that the strip 14 passing under them is exactly horizontal, and when the apparatus is in use the trough 15 is adjusted so that the liquid decolourizing agent therein just touches the underside of the strip.

After leaving the decolourizing trough, the strip passes under a roller 21 upon which it receives dye from an ebonite dye-applying roller 22 which dips into a dye-trough 23, (mounted in a similar manner to the decolourizing trough) and which rotates in close proximity to but not in contact with the strip in a direction opposite to the motion of the strip.

The strip then passes around a drum 24 about 20 cm. in diameter, upon which it is washed by means of jets of water directed from pipes 26 upon its exposed side, further jets of water being directed upon the other side just before it comes into contact with the drum for the purpose of removing any dye which may have encroached upon that side. Beneath the drum 24 is a trough 25 provided with a waste-pipe 27 for collecting and removing the washing-water.

After washing, the strip passes between rubber squeegee rollers 28 and then enters between a series of twelve drying or "blotting" rollers 29 covered with absorbent cotton sleeves. These rollers 29 are carried by a frame 30 in two rows of six each, in staggered relationship, and the strip passes in a zig-zag manner over

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the rollers so that its opposite sides are dried (by absorption or blotting) by alternate rollers.

From the drying or blotting rollers the strip passes to the resist-solvent troughs 31, of which there are three, then to the de-greasing trough 32 and finally to the rinsing trough 33. These five troughs are mounted on a frame 34 capable of vertical movement and suspended by wire cables 35 led over pulleys 36 to a winch 37 by which it can be raised or lowered.

The strip passes over six upper rollers 38 and five lower rollers 39, the axes of which are fixed, these lower rollers being so situated that each is inside and near the bottom of one of the troughs 31, 32, 33 when the frame 34 carrying them is in its upper position, the upper rollers 38 being above the troughs and serving to conduct the strip from one trough to the other. The upper rollers 38, which are positively driven, are of larger diameter than the lower ones 39 and each (with the exception of the first) is provided with a squeegee roller 40 in contact with the strip passing around it.

The resist material is usually of a greasy nature and the solvent in the first three troughs 31 is accordingly benzene, petrol or like solvent of grease. The first and second squeegee rollers 40 must therefore be of a material not attacked by this solvent, and it is preferred to cover them with soft gelatine. The remaining two squeegee rollers, which are in contact only with aqueous alkaline solution and plain water respectively, are coated with rubber.

After leaving the rinsing trough, the strip passes between a second set of drying or blotting rollers 41 similar to those just described, and then over two internally heated drums 42. These have been previously described herein, as well as the drive for the storage reel 43, and no further description of these parts is necessary.

The imprinted pattern of greasy resist material should not be touched by any solid body until after the dye has been applied to the decolorized interspaces. Accordingly, every roller which has to engage the side bearing the resist material, up to the first washing stage, may be of the kind comprising two conical roller elements spaced apart on a spindle, which engage the edge only of the strip.

The six rollers which surmount the solvent, de-greasing and rinsing troughs are positively driven, as previously mentioned. The drum 24 upon which the strip is supported during the first washing after dyeing is also positively driven,

as are the internally heated drums.

In each solvent tank is a positively-driven flannel-covered wiping roller 44 bearing lightly against the side of the strip on which is the greasy resist material, and these rollers rotate in the same direction as the strip but with a rather greater peripheral speed, two such rollers are provided in the de-greasing trough 32, one on either side of the strip, but there are no wiping rollers in the final rinsing trough.

All the rollers over which the strip passes, particularly those which are not positively driven, are preferably mounted in self-aligned ball-bearings.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, as communicated to me by my foreign correspondents, I declare that what I claim is:—

1. A machine for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for colour photography comprising in combination a trough for a decolorizing agent, a device for applying a dye, a washing device, a drying device, a trough (or more than one) for a solvent of the resist material, a wiping device within said trough, a second drying device and means for guiding and moving the strip to be treated continuously through the troughs and devices in the order named.

2. A machine as claimed in claim 1 for treating long strips of dyed sheet material having a resist pattern imprinted thereon for the production of mosaic screens for colour photography in which only that side of the strip which is dyed and printed is brought into contact with the decolorizing and dyeing agents.

3. A machine as claimed in Claim 1 in which the trough for the decolorizing agent is mounted in such manner that it can be lowered away from the strip or raised to bring the liquid therein into contact with the under side of the strip.

4. A machine as claimed in Claim 1 in which the device for applying dye to the surface of the strip after the exposed areas thereof have been decolorized consists of a roller dipping into a trough containing a solution of the dye and revolving in close proximity to the surface of the strip.

5. A machine as claimed in Claim 4 in which the peripheral speed of the dyeing roller is greater than the speed of the strip (or in which the dyeing roller surface moves in a direction opposite to that in which the strip is moving) whereby any traces of the decolorizing agent which may

still cling to the surface of the strip may be swept away.

6. A machine as claimed in Claim 1 in which the washing device comprises a plurality of jets directed upon the moving strip preferably while it is passing around a roller of relatively large diameter.

7. A machine as claimed in Claim 1 in which the drying device comprises a series of rollers composed of or covered with absorbent material (for example cotton fabric) over which the strip is led so that alternate rollers contact with opposite sides of the strip.

8. A machine as claimed in Claim 1 in which one or more troughs containing solvent for the resist material is provided with a rotating wiping device which consists of a roller covered with felt or flannel which rotates in contact with the strip in the same direction as the movement of the strip but at a greater linear speed (or rotates in the opposite direction).

9. A machine as claimed in Claim 1 in which after leaving the solvent trough or

troughs the strip passes through an alkaline de-greasing bath preferably provided with wiping rollers, one for each side of the strip, and then through a rinsing bath of water.

10. In a machine as claimed in Claim 1 the provision of means for enabling that part of the strip which is under treatment in the decolorizing trough to be readily varied in which one of the two rollers around which the strip passes in its transit along the surface of the decolorizing bath is made adjustable towards and away from the other.

11. A machine for treating long strips of dyed sheet material (for example cellulose acetate film) having a resist pattern imprinted thereon for the production of mosaic - screens for colour photography substantially as described with reference to the accompanying drawings.

Dated this 23rd day of October, 1928.

BOULT, WADE & TENNANT,
111 & 112, Hatton Garden, London,
E.C. 1,
Chartered Patent Agents.

[This Drawing is a reproduction of the Original on a reduced scale.]

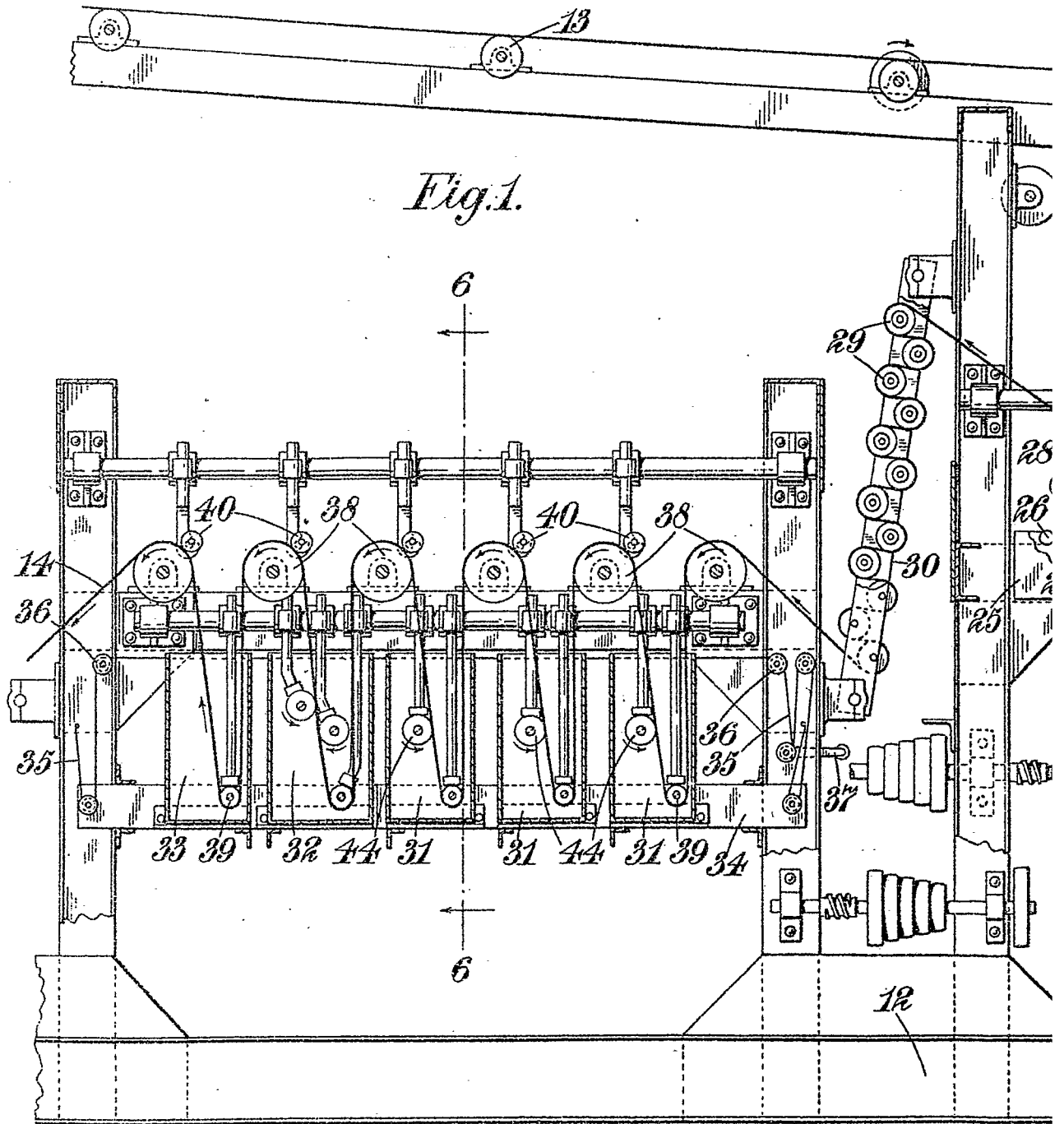
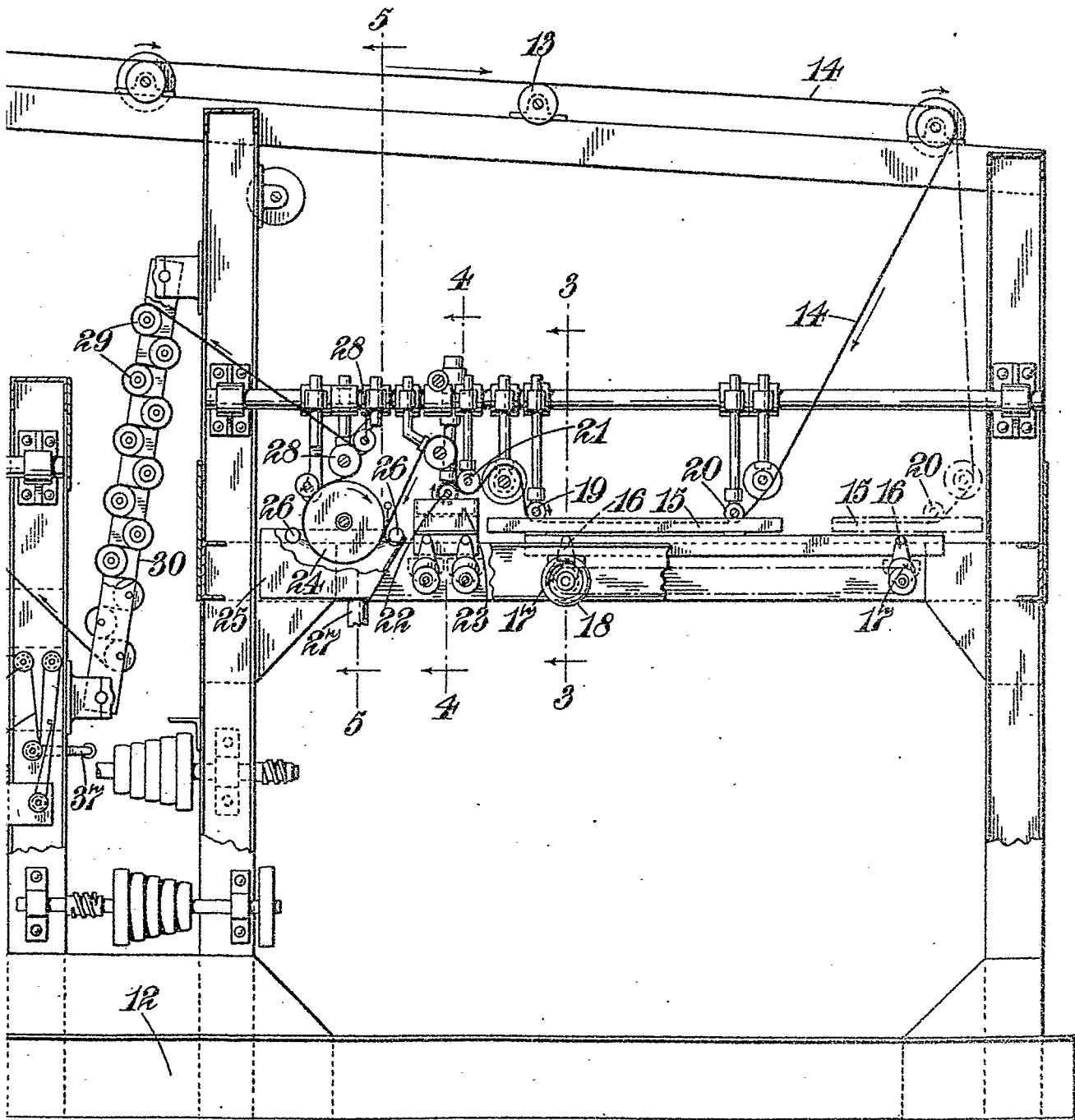


Fig. 1.



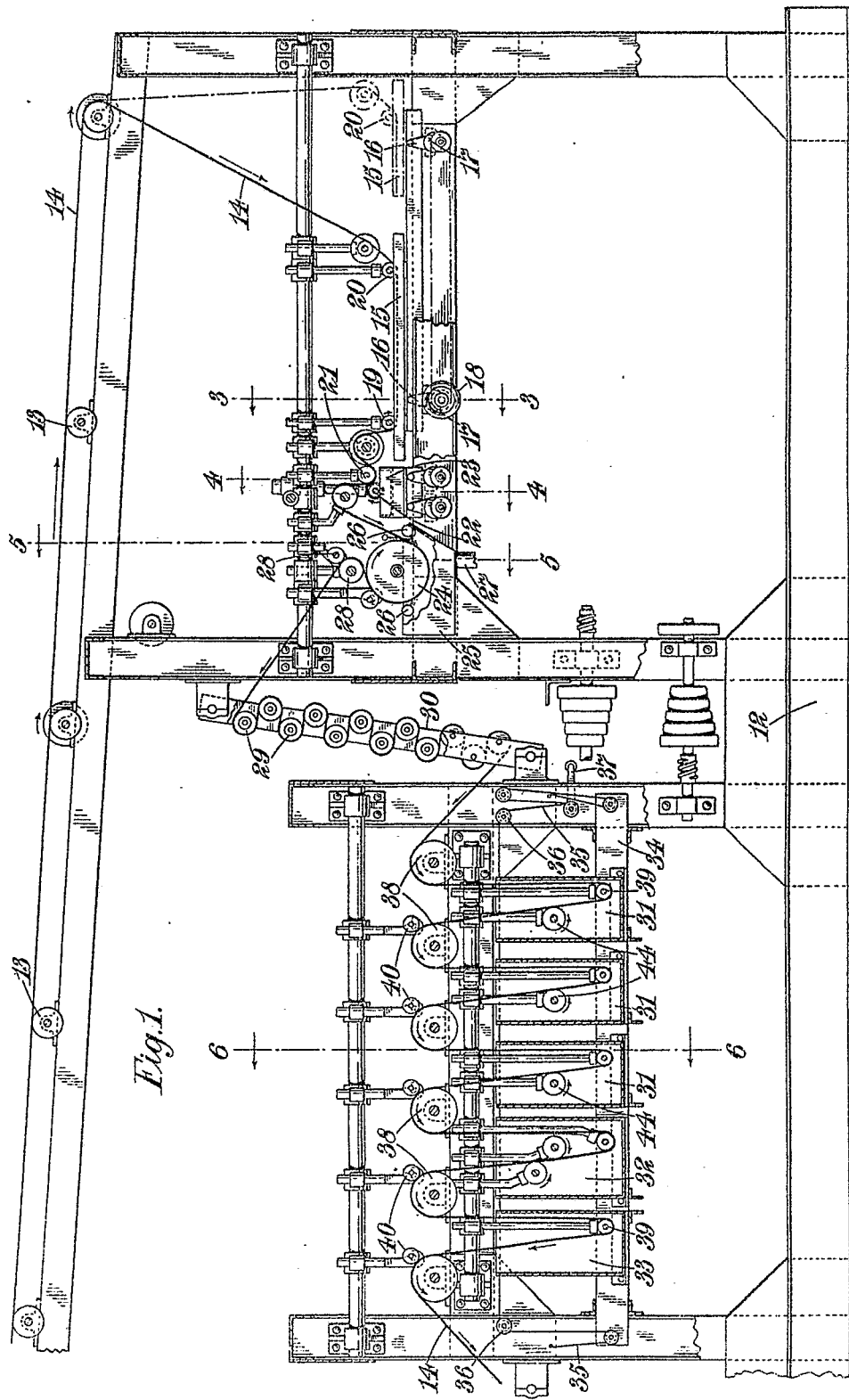
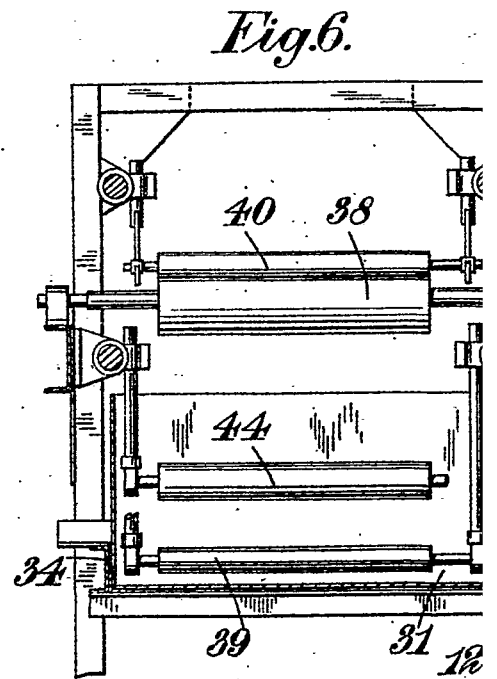
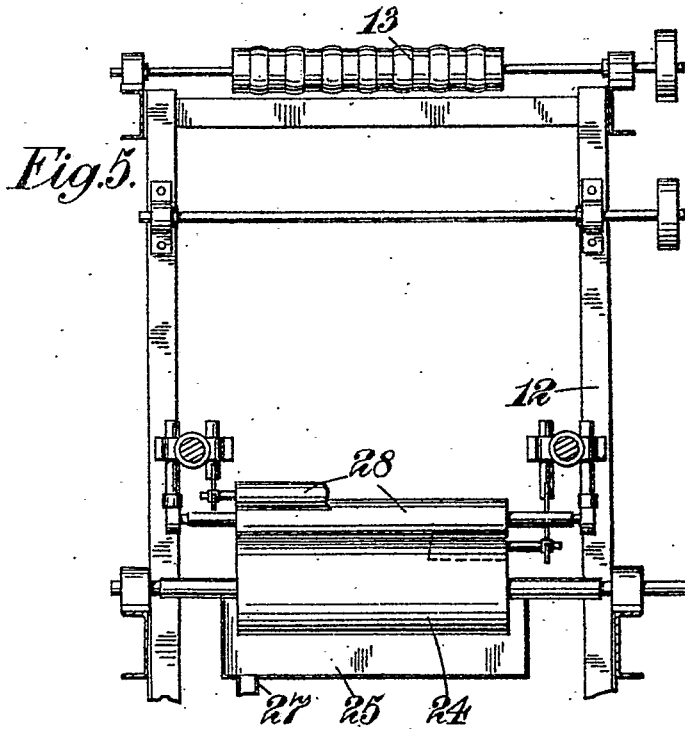
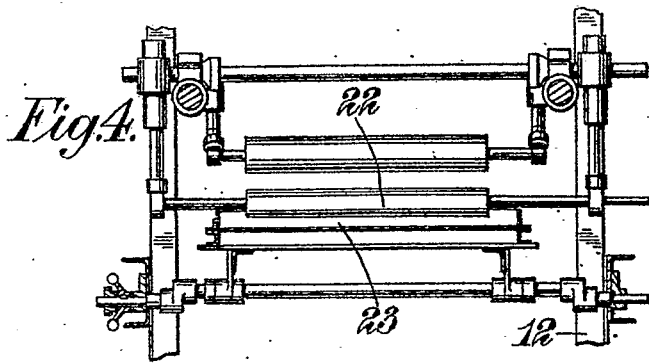
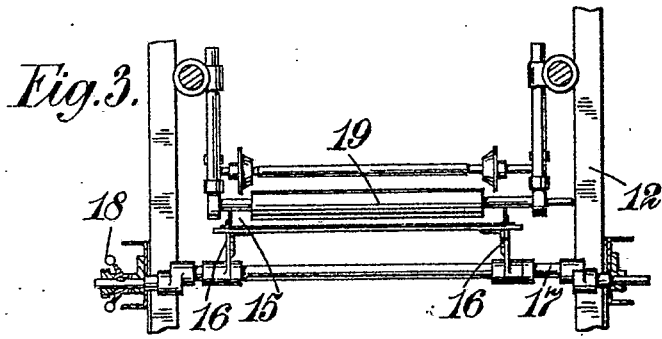


Fig. 1.

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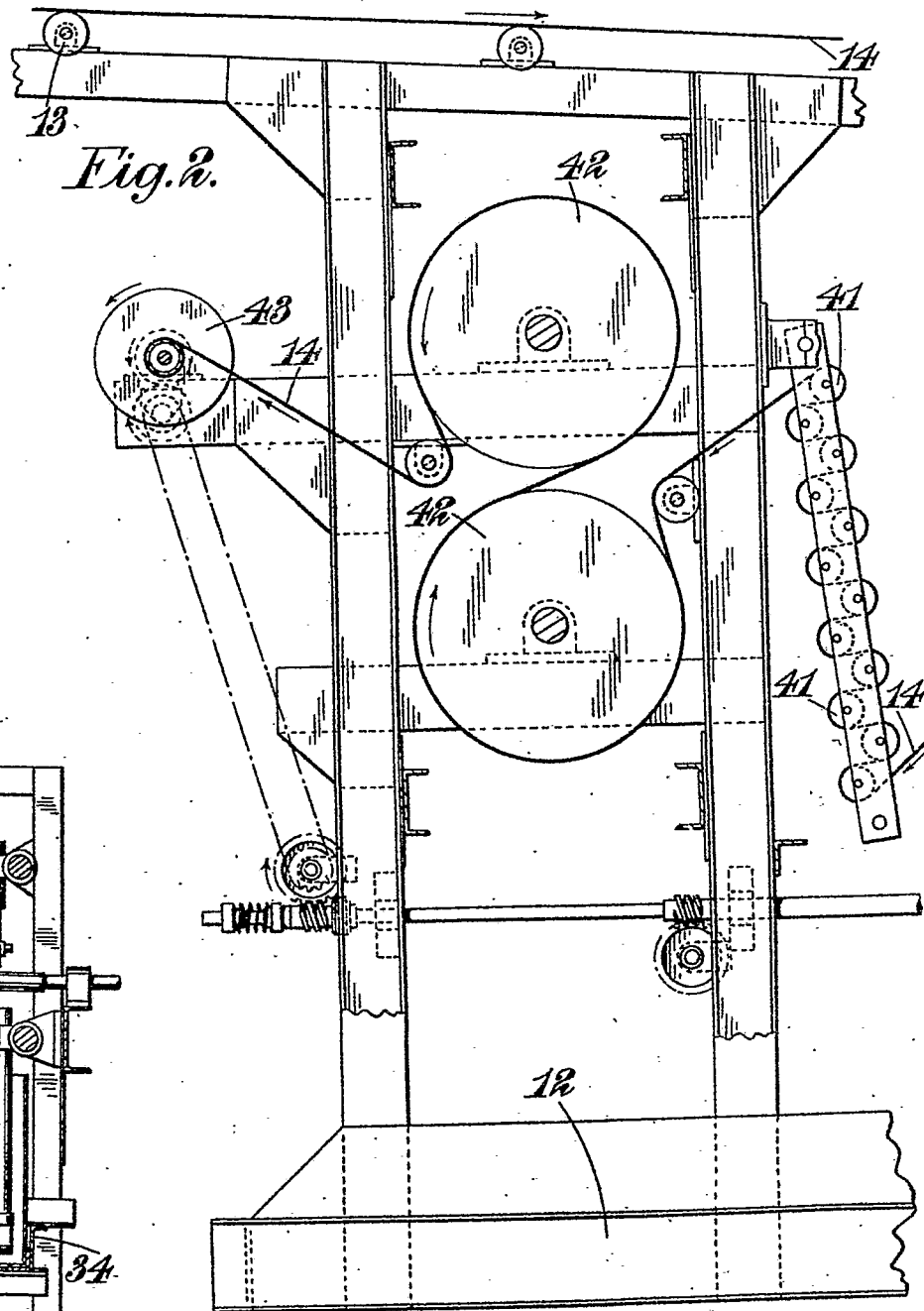


Fig. 2.

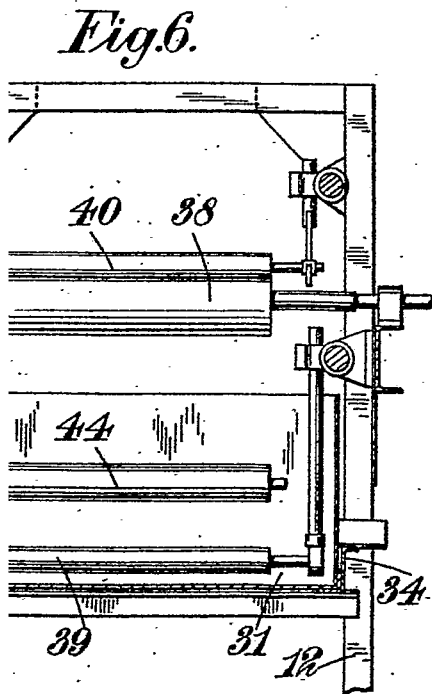
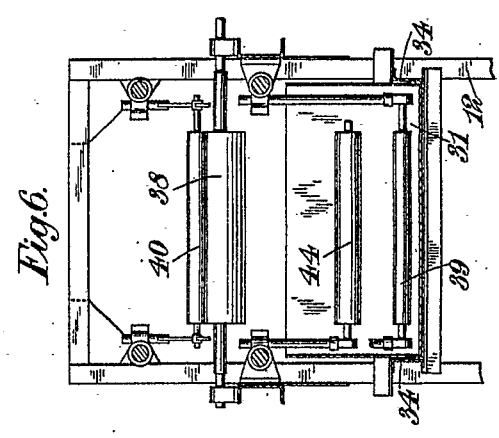
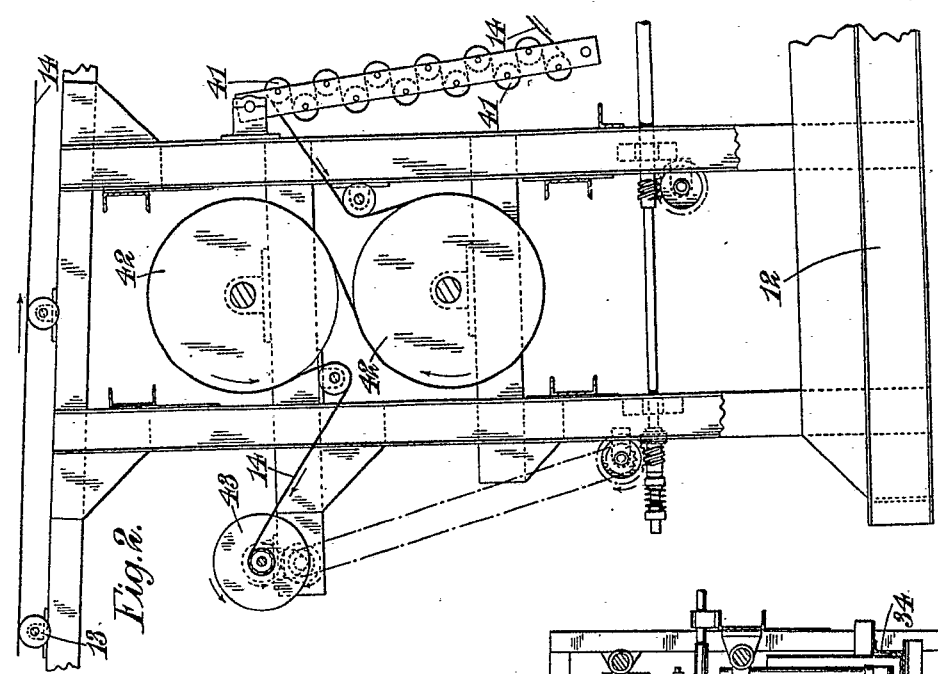
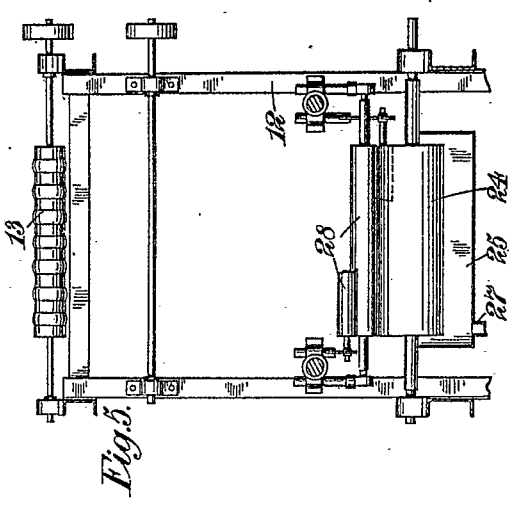
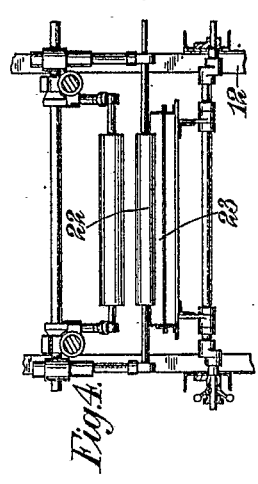
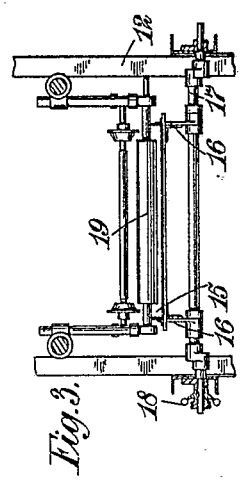


Fig. 6.



[This Drawing is a reproduction of the Original on a reduced scale.]