No. 744,039. PATENTED NOV. 17, 1903.

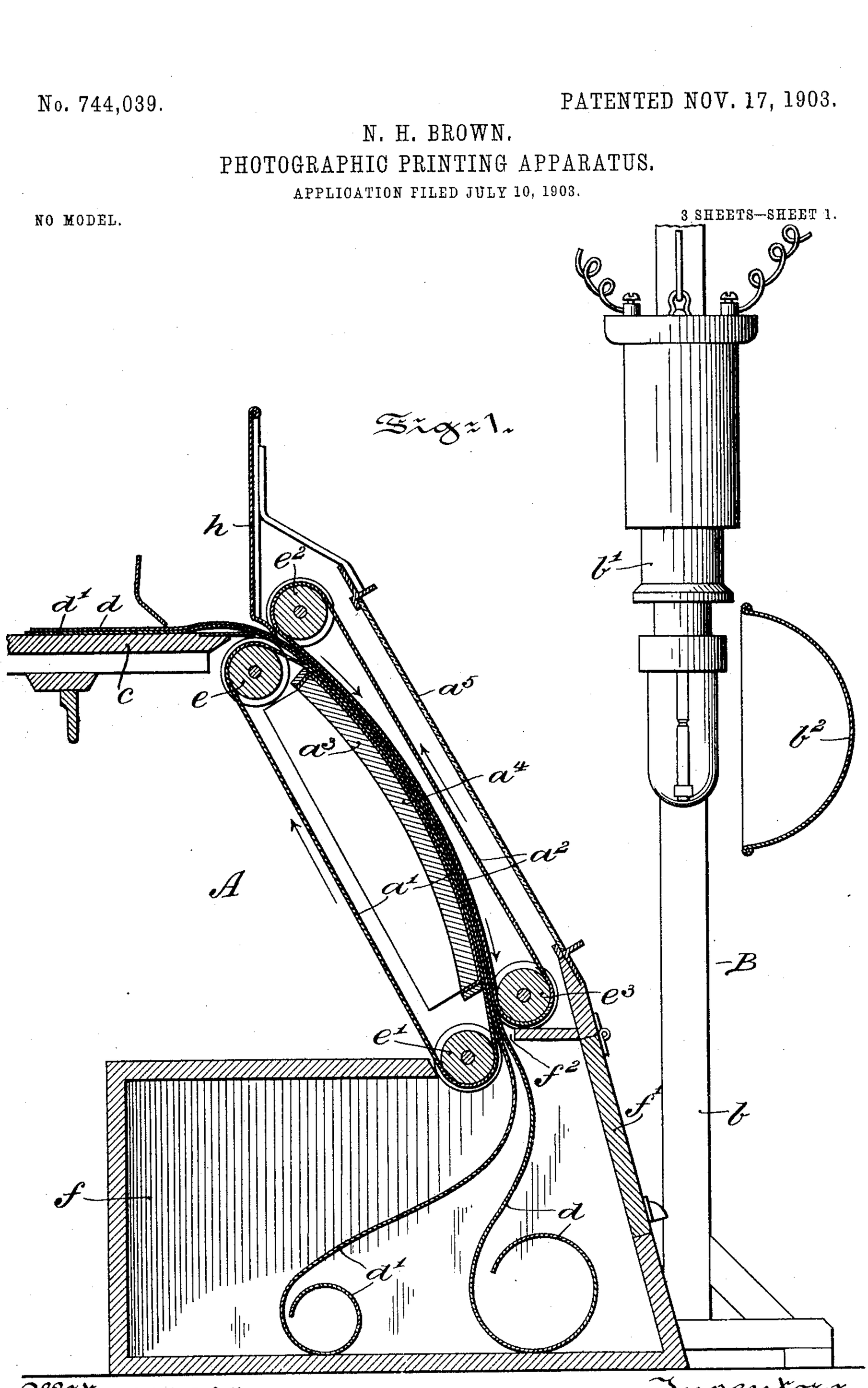
N. H. BROWN.

PHOTOGRAPHIC PRINTING APPARATUS.

APPLICATION FILED JULY 10, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



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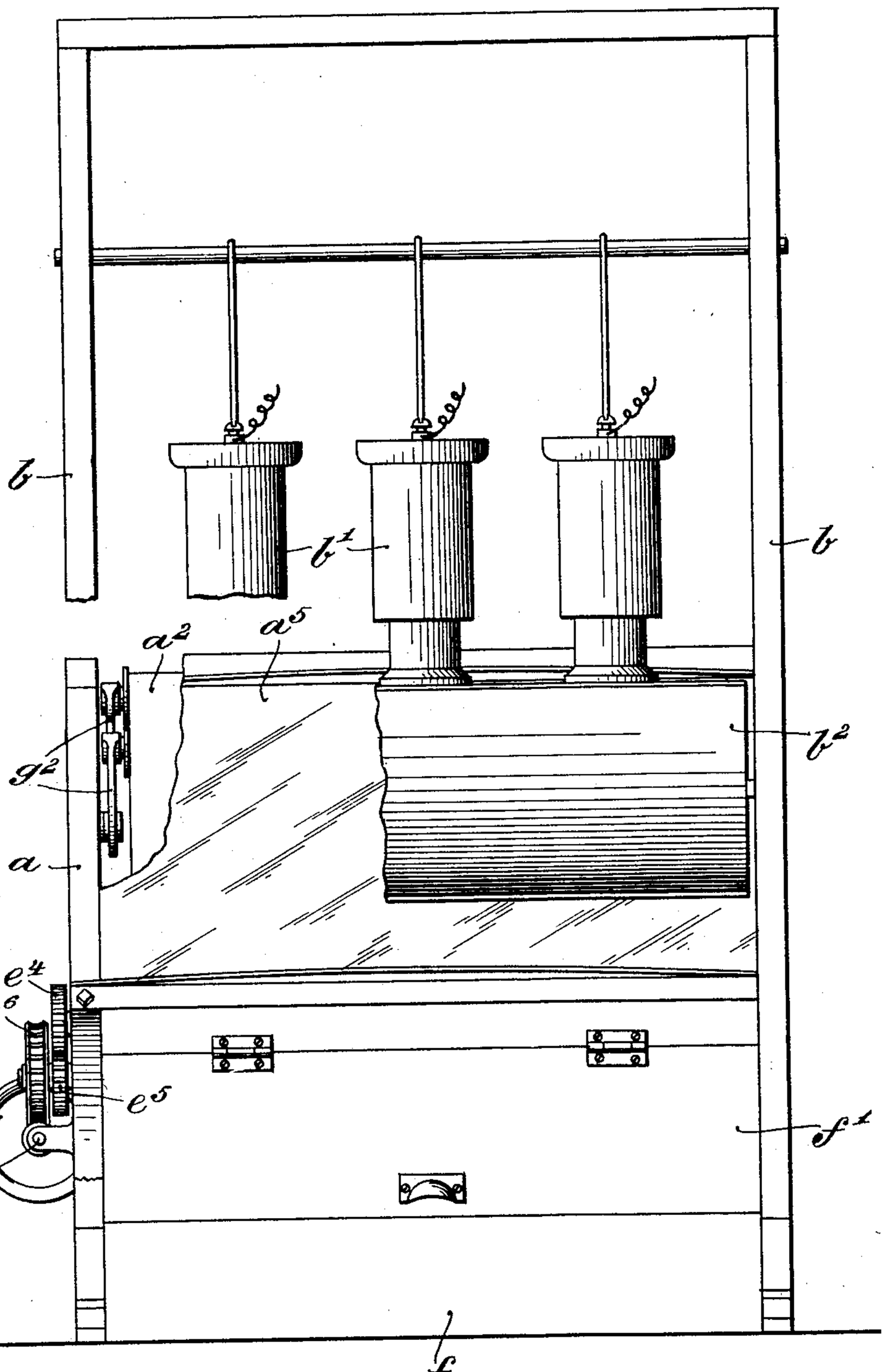
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

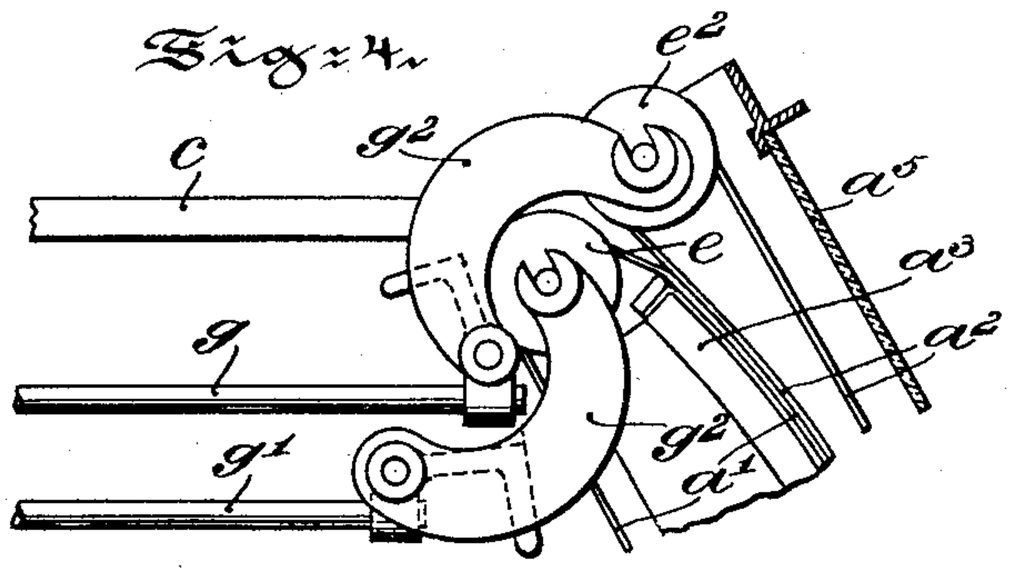


Fig. 5.

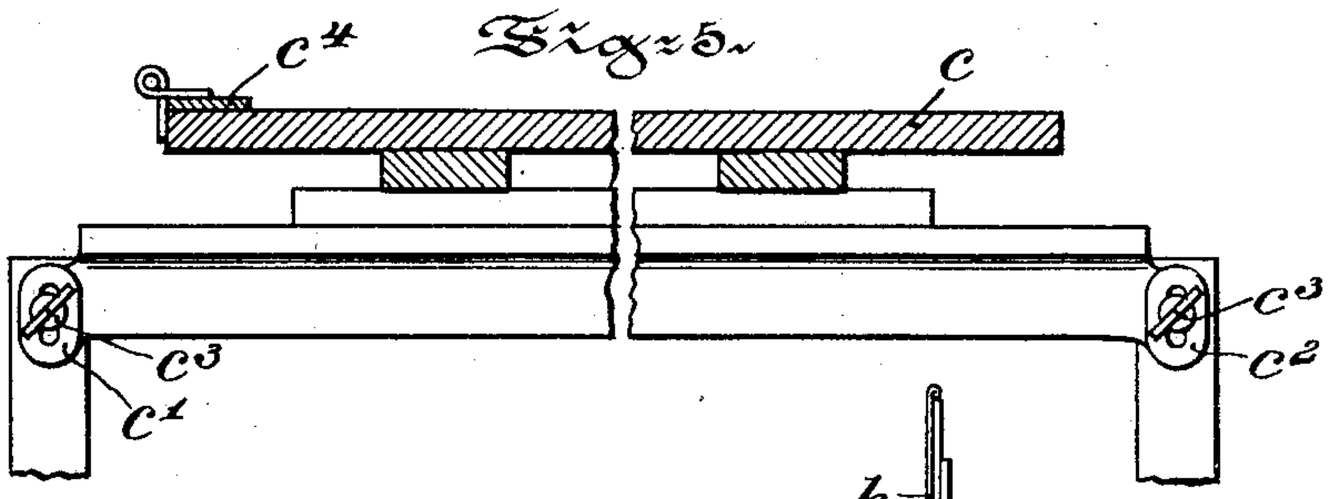
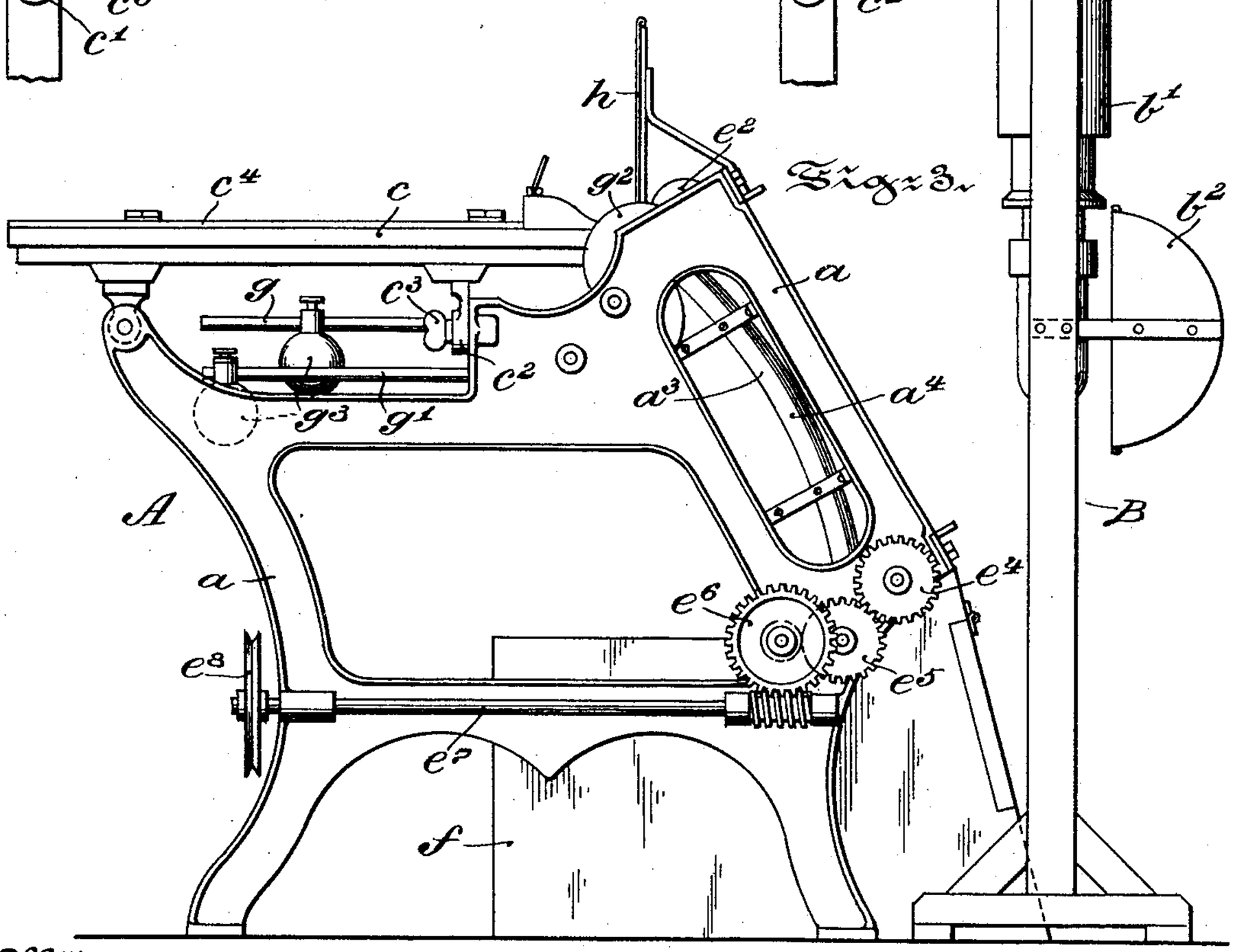


Fig. 3.



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No. 744,039. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

NATHANIEL HOWLAND BROWN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, HENRY S. WILLIAMS, AND MORRIS EARLE, OF PHILADELPHIA, PENNSYLVANIA, TRADING AS WILLIAMS, BROWN & EARLE, A FIRM.

PHOTOGRAPHIC-PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 744,039, dated November 17, 1903.

Application filed July 10, 1903. Serial No. 164,937. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL HOWLAND BROWN, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Photographic-Printing Apparatus, of which the following is a specification.

My invention has relation to an apparatus for printing continuously and quickly from a transparent or semitransparent film upon a sheet or sheets of sensitized material—such, for instance, as blue-print or photographic sensitized paper or cloth.

The present apparatus covers improvements in such general type of apparatus patented to me by United States Letters Patent No. 721,011, dated February 17, 1903; and in such connection my present invention relates in such apparatus to the arrangement of parts of an apparatus for the defined purposes of my said invention.

The principal objects of my invention are, first, to provide an apparatus of the character defined with endless traveler conveyers comprising a sheet or sheets of transparent or semitransparent material, such as celluloid or the like, adapted to continuously feed and print from a film on a sheet of sensitized material without casting a shadow in the face of a light-emitting body to which such sheet is exposed in its travel and in the return of one of the conveyers; second, to provide an apparatus of the character described with an adjustable table having a feeding device and shield for protecting a sensitized sheet, as blue-print or photographic sensitized paper or cloth carrying a film, and directing in a straight course continuously the sheet and film to and between the endless conveyers over the bed of the machine exposed to the influence or intensity of a light-emitting body; third, to provide an apparatus of the character described with a dark chamber or box adapted to receive the sensitized sheet and film after exposure to an intense light-emitting-body, with the transfer made by the exposure in its travel over a bed by means of endless conveyers; fourth, to provide an apparatus of the character described with means for controlling the tension under which endless traveler conveyers expose a sensitized sheet and film to the intensity or influence of a light-emitting body to effect transfer or printing thereof and prior to delivery of both into a dark chamber or box; fifth, to provide an apparatus of the character described operated by a suitable motor in which the time exposure of a film upon a sensitized sheet or sheets under the intensity or influence of a light-emitting body continuously passing between endless traveler conveyers is adapted with certainty to be determined, whereby perfect prints or reproductions from the film or films on the sensitized sheet or sheets are obtained, and, sixth, to provide an apparatus of the character described having certain arrangements of mechanism operating automatically and continuously and controlled actions thereof are provided for the production of photographic or other prints economically and expeditiously and with defined clearness without regard to the length or size of the film to be copied or printed on a sensitized sheet or sheets.

My invention, stated in general terms, consists of a photographic-printing apparatus constructed and arranged substantially as to general features of the apparatus in the manner hereinafter described and claimed.

The nature and scope of my present invention will be more fully understood from the following description, taking in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a view, partly in section and partly in side elevation, of an apparatus for photographic or film printing embodying main features of my said invention. Fig. 2 is a front elevational view, partly in broken section, of the apparatus. Fig. 3 is a side elevational view of the complete apparatus. Fig. 4 is a side view, in broken section, of tension means for the endless conveyers; and Fig. 5 is a view, partly in elevation and partly

in section, of the adjustable feed-table of the apparatus.

Referring to the drawings, a represents the two standards of the machine A.

b represents the uprights of a movable display-framework B, adapted to support a series of preferably inclosed arc-lamps b'.

b^2 is a reflector device located in front of the framework B and adjacent to the globes of the arc-lamps b'. These lamps constitute one form of an intense light emitting means for exposing a film on a sensitized sheet along a bed a^3 in their travel together through the machine by means of the endless conveyers a' and a^2. The bed a^3 may be of any general construction and be covered with metal or pliable material.

The front of the apparatus is provided with an inclined or swell front a^4, fitted with a removable panel of glass a^5.

In the upper front portion of the machine and adapted to bear against an adjustable table c is a vertical shield h, of metal or other suitable material, which is curved at the base, as indicated in Fig. 1, to direct the course of the film d and sensitized sheet d' in a downward direction between the inclined or slanting aprons a' and a^2 of the endless conveyers. These aprons a' and a^2 are preferably made of celluloid or similar material by reason of its toughness and the clearness of such material and the fact that in their travel as the aprons a' and a^2 of said conveyers they do not cast a shadow nor distort the image or configuration of the film upon the sensitized sheet or sheets d' exposed to the light-emitting bodies b' in giving quickly and perfectly a print of the same upon the sheet or sheets d' of the image or configuration of the film d. The aprons a' and a^2 travel continuously around over two series of rolls e e' and e^2 e^3, journaled to the standards a and actuated by means of gear-wheels e^4, e^5, and e^6, one of which, e^6, meshes with a worm-shaft e^7, journaled to one of the standards a of the machine A. The shaft e^7 at its opposite end is provided with a pulley e^8, as clearly illustrated in Fig. 3. This pulley is adapted to be revolved by an electric or other prime motor. (Not shown.) The two aprons a' and a^2, constituting the endless conveyers of the machine, when in operation travel in the direction indicated by the arrows in Fig. 1 of the drawings, one, a', over and under the bed a^3, while the other apron, a^2, travels above the bed parallel with the apron a' in one direction and at the same rate of speed and returns in front of the light-emitting bodies b' and in advance of travel in a forward direction of this apron of the said conveyer, as indicated by the arrow in Fig. 1. Between the two endless conveyers a' and a^2 the sensitized sheet d' and film d together under tension travel, effecting instantly upon reaching the bed under the exposure of the lights b' the imprinting from the film d' of its image or configuration, and both sheet and film after the receiving of the imprint from the film are discharged through a slot f^2 in the roof of a dark chamber or box f into the interior thereof. This chamber or box f is located between the standards a below the bed and conveyers a' and a^2. The slot of said dark chamber or box f registers with the space where the two aprons of the conveyers a' and a^2 part on their return movements in reverse directions to each other, as illustrated in Fig. 1. The front of the dark chamber or box f is provided with a door f' in order that access may be had thereto, so as to readily remove the printed sheet or sheets, as illustrated in Figs. 1 and 3.

The table c is adjustable in up and down directions in connection with the two standards a by means of tightening-nuts c^3, passing through slotted brackets c' and c^2, suitably connected with the said table.

c^4 is an adjustable guide or way mounted on the table for directing in a straight course the sheet d' and film d to and between the endless parallel conveyers a' and a^2 in their travel by means of said conveyers over said bed a^3.

g and g' are counterweighted bars or rods pivoted to the standards a and carrying bearings g^2, adapted to engage journals of each of the conveyer-rolls e and e^2 to control with accuracy the degree of tension of the aprons in their travel, so that the requisite degree of friction of the aprons a' and a^2 upon the sensitized sheet d' and film d in travel between them and by them over the head a^3 will always be insured, and thus a uniform passage and speed in a straight course of the sensitized sheet and film over the bed a^3 and into the dark chamber or box f for subsequent development or washing to complete the same for use. The weighted tension means g and g' are such as that the requisite degree of pressure on the conveyer-rolls e and e^2 can be regulated at all times by the manipulating of the weights g^3 on the bars or rods g and g', as clearly illustrated in Figs. 3 and 4.

The arrangement of the apparatus is such that printing from a film of any length upon a sensitized sheet can be readily and efficiently accomplished by causing the continuous travel of the endless conveyers, because the feed of the sensitized sheet and film together is automatically effected when the conveyers are started up and the light-emitting bodies are brought into use to cause by the exposure the printing to instantly begin and continue during the conveying of the sheet so being printed along the bed a^3 by the due timing as to rapidity of speed of travel of the conveyers for effective work with respect to the intensity of light from the light-emitting bodies b' of the apparatus, giving in the travel of the sheet d', exposed to the film d, the print desired and discharging the same automatically printed ready for developing or washing, as the nature of the printing demands, in the dark chamber or box f. The mode of print-

ing can be carried on in this manner as long as the machine is kept in action and so long as the sheet d' and film d are being fed together to the conveyers a and a' of the machine.

It will be manifestly obvious that as to some of the details of arrangement of the apparatus described modifications may be made without departing from the spirit and scope of my present invention, and hence I do not wish to be understood as limiting myself to the precise arrangement of parts of the apparatus as illustrated; but,

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, a bed arranged adjacent to a source of light, an endless conveyer inclosing said bed so as to travel in one direction over said bed, a second endless conveyer of translucent or transparent material arranged wholly between the bed and the source of light, the inner portion of said second conveyer traveling over said bed adjacent to a corresponding portion of the first conveyer to constitute a feeding means for a film and sensitized sheet over said bed, and the outer portion of said second conveyer traveling in an opposite direction between the inner portion of the conveyer and the source of light.

2. In an apparatus of the character described, two endless conveyers of celluloid or like material, a bed arranged adjacent to a source of light and supported within one of said conveyers and over which bed the said inclosing conveyer travels, the second of said conveyers arranged to travel in one direction adjacent to the corresponding portion of the first conveyer traveling over said bed, and said second conveyer returning in an opposite direction between said bed and the source of light.

3. In an apparatus of the character described, two endless-apron conveyers, means for actuating the same, an adjustable feed-table with a shield, a bed located between one of said conveyers, the other conveyer arranged in front of the first conveyer, means for maintaining under varying tension the two conveyers in contact with each other in their travel in one direction over said bed and a chamber or box located beyond said conveyers having a slot registering with the space formed at the point of parting of the aprons of the conveyers in their respective return travel in opposite directions to each other.

4. In an apparatus of the character described, two endless conveyers, a bed located between one of said conveyers and over which in one direction said conveyer travels, the other of said conveyers traveling parallel to said first conveyer in one direction over said bed and returning in a reverse direction in front thereof, a table with a shield and feeding device arranged adjacent to the entrance to said conveyers and a box or chamber located adjacent to the discharge from said conveyers.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

NATHANIEL HOWLAND BROWN.

Witnesses:
J. WALTER DOUGLASS,
THOMAS M. SMITH.