

No. 883,687.

PATENTED APR. 7, 1908.

A. BENDIEN.

AUTOMATIC MACHINE FOR FOLDING CLOTH AND THE LIKE.

APPLICATION FILED JUNE 14, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

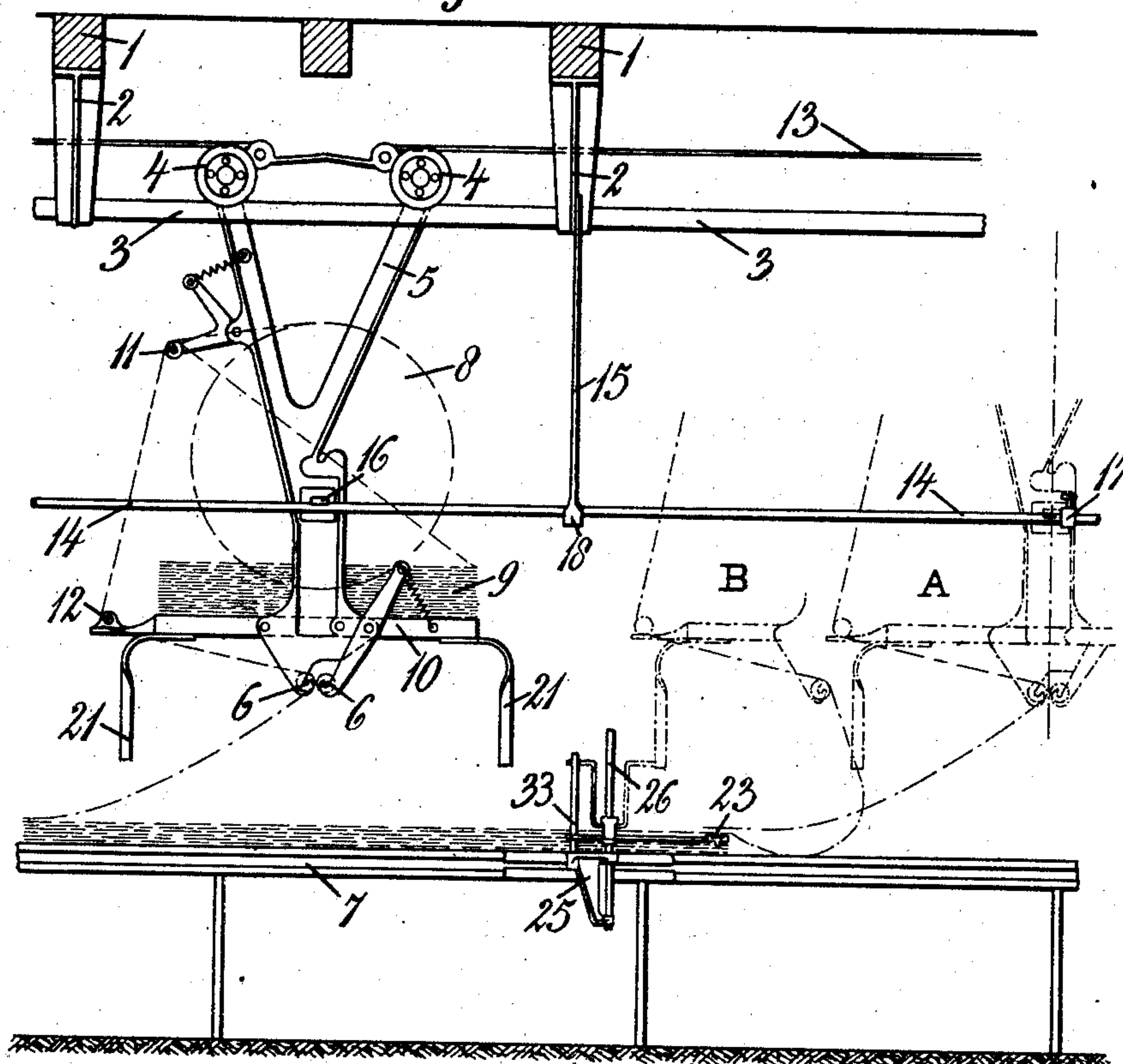
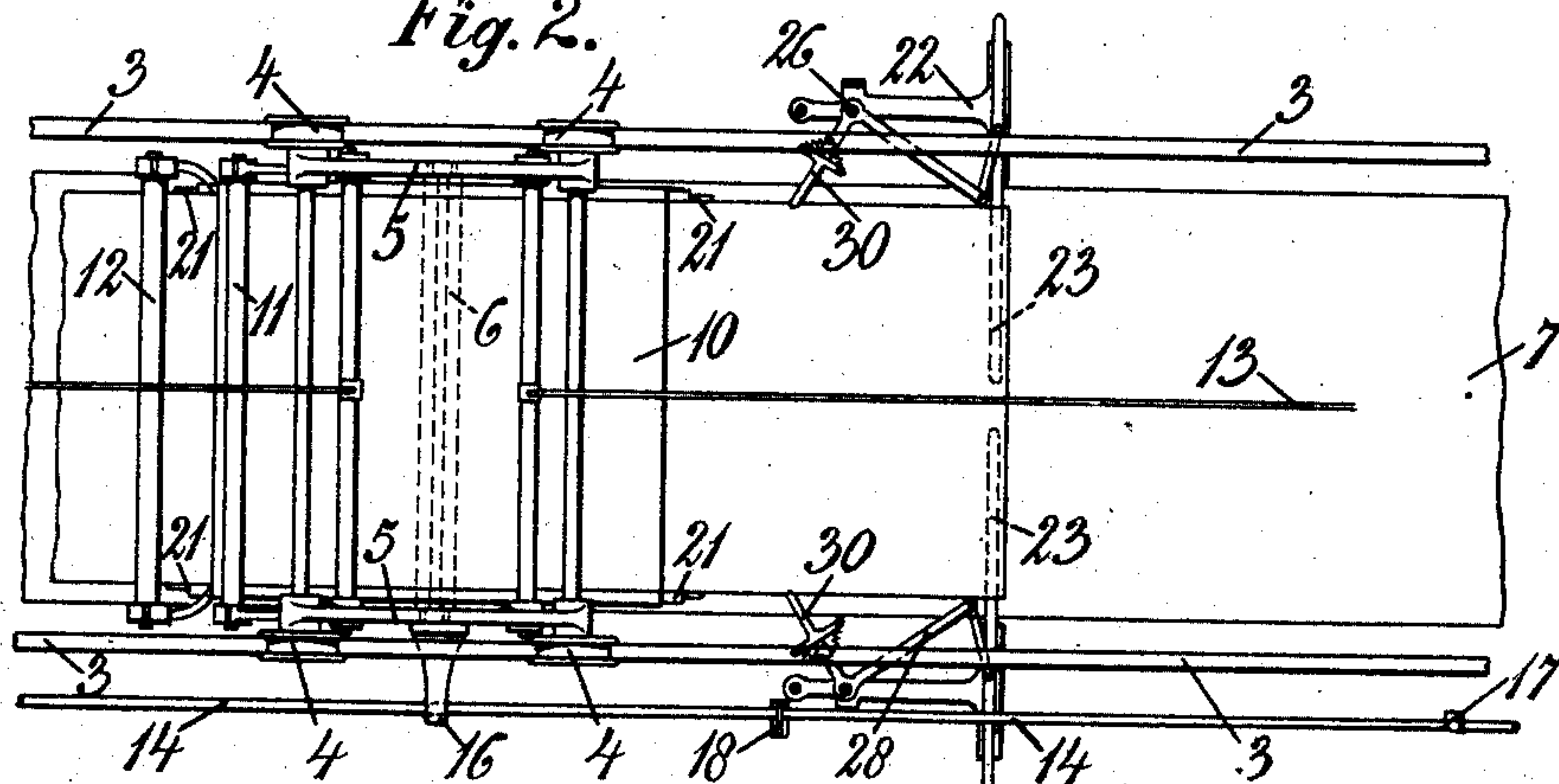


Fig. 2.



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Fig. 3.

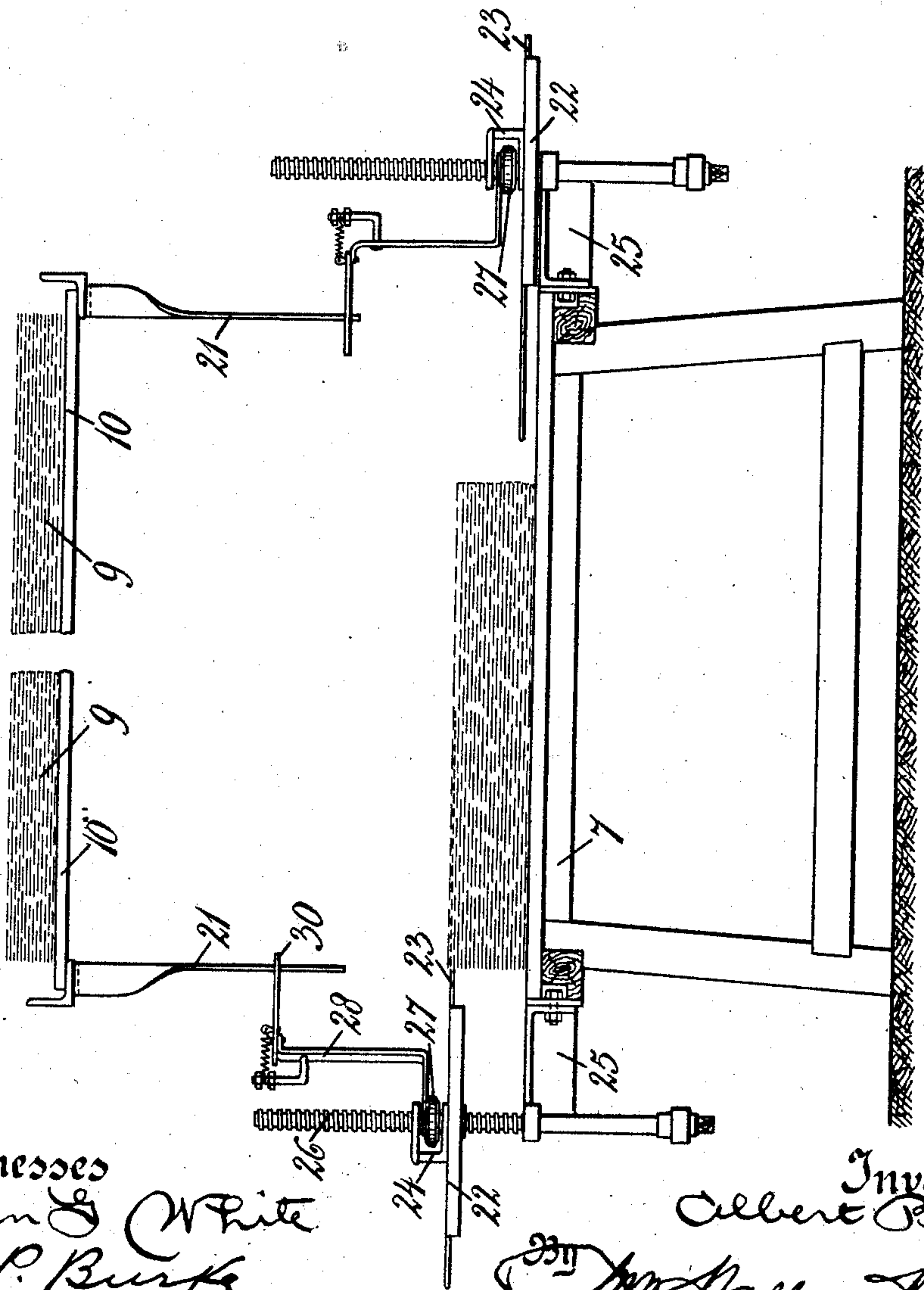
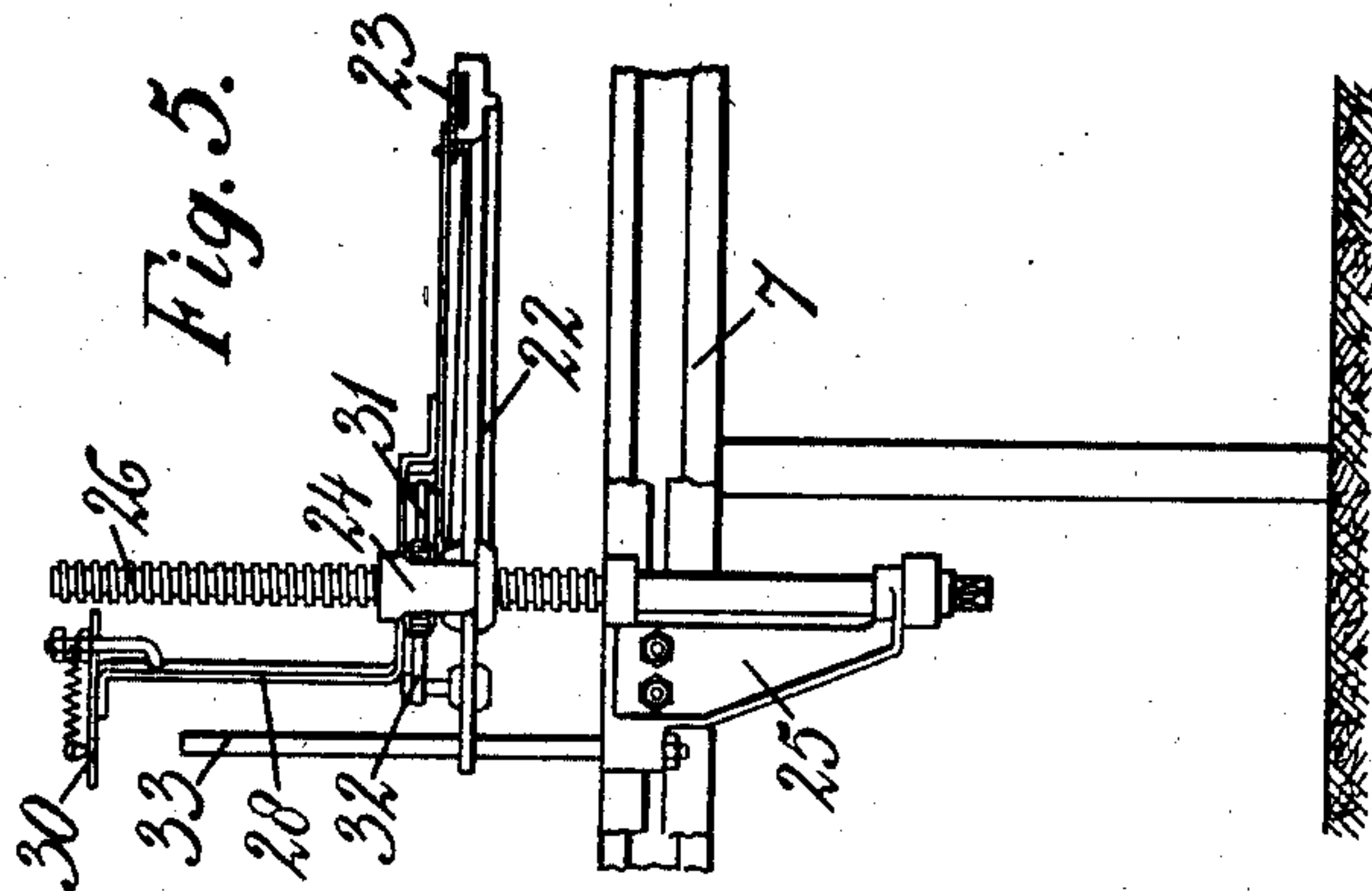


Fig. 5.



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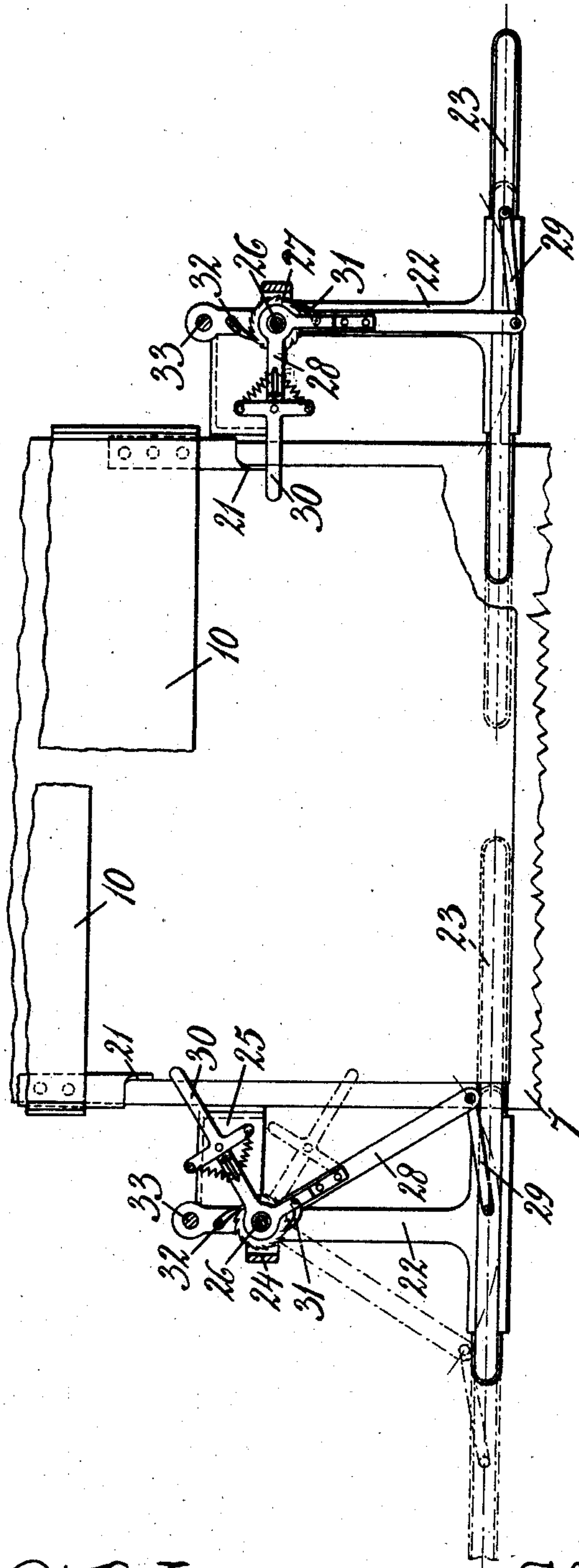
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

ALBERT BENDIEN, OF ALMELO, NETHERLANDS.

AUTOMATIC MACHINE FOR FOLDING CLOTH AND THE LIKE.

No. 883,687.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed June 14, 1907. Serial No. 379,105.

To all whom it may concern:

Be it known that I, ALBERT BENDIEN, a subject of the Queen of the Netherlands, residing at No. 235 Holtjesstraat, Almelo, Kingdom of the Netherlands, have invented certain new and useful Improvements in Automatic Machines for Folding Cloth and the Like, of which the following is a specification.

This invention has for its object an automatic machine for folding cloth and the like, in which the said cloth or the like is deposited on to a work-table from a reciprocating carriage or traveler, and the motion of the said carriage or traveler is automatically reversed each time after the deposition of the layer or fold. The folding itself takes place over a rod laid on the cloth, which rod is either actuated by the hand or by an automatic device. The carriage or traveler, which runs on rails and is moved by means of a rope or band and which contains the cloth or the like to be folded, is arranged at a suitable height above a work-table, on which the cloth or the like is to be folded. A rigid arm is provided on the carriage or traveler and slides along a reversing rod provided with an adjustable cam. During the impact of this arm against the cam, the motion of the carriage or traveler is reversed, whereupon the attendant lays a flat rod in the desired position on the cloth and the fold is formed round this rod during the return of the carriage or traveler. Should this folding device be also required to work automatically, two automatic rod-actuating devices arranged opposite to each other are provided at each end of the work-table, these devices being adjustably mounted on the sides of the table and being operated by arms arranged on the carriage or traveler. The rod-actuating devices are operated by the moving carriage or traveler at the end of its travel, as follows:—The rods of one pair of rod-actuating devices are first drawn out of the previously formed fold, and the whole rod-actuating device is simultaneously raised through a height approximately equal to the thickness of the cloth or the like; during the return of the carriage or traveler, the rods are again pushed in, in order that the cloth coming down can form a fresh fold over the pushed in rods. The unrolling of the cloth is effected by the motion of the carriage or traveler itself, the cloth being guided by means of rollers in any suitable manner.

In the accompanying drawings, there is shown one constructional form of the apparatus.

In these drawings, Figure 1 is a front elevation and Fig. 2 a plan of the complete apparatus; while Fig. 3 is a side elevation and Fig. 4 a plan of the work-table with a pair of the automatic rod-actuating devices drawn to a larger scale and in different positions; and Fig. 5 a front elevation of the rod-actuating device.

On the roof-beams 1 are arranged brackets 2 in any suitable manner, these brackets bearing rails 3, 3. Along these rails a carriage or traveler can move on wheels 4 over a work-table 7. This carriage or traveler is formed by the two axles of the wheels, two forked carriers 5, and a table 10 connecting the lower ends of these two carriers. The cloth or the like can either be suspended in the form of a roll 8 rotatably mounted on the carriers 5 or be deposited in the form of a folded pile 9 on the table 10.

On the carriage is provided an elastically arranged guide-roller 11 and a fixed guide roller 12, over which the cloth is suitably guided by means of two guide-rollers 6 mounted beneath the table and of which one is elastically pressed against the other.

To the carriage or traveler is connected a rope or band 13 which, when it is made endless, is conducted over two rope-pulleys (not shown in the drawing), of which one can be rotated by an open and a crossed belt either in a right-handed or left-handed direction; the said rope or belt may be moreover actuated in any other suitable manner.

On one of the carriers 5 is fixed a laterally extending arm 16 which partly surrounds a reversing rod 14 movably suspended on the carrier-rods 15 and carrier-arms 18. The suspension of the reversing rod is such that the arm 16 can conveniently slide along the rod 14 and can move past the various carrier-arms 18. On the rod 14 is provided in any suitable manner an adjustable ring or cam 17. The reversing rod 14 itself is connected in a known manner by means of levers and the like to the belt-shifter for reversing the motion of the rope- or band-pulley.

The cloth or the like from a roll 8 or a folded pile 9 is conducted as above mentioned over the rollers 11 and 12 and between the guide-rollers 6 and is fixed at one end of the

working table 7 in any suitable manner. The driving gear is now set in operation, so that the carriage or traveler is moved from left to right (Fig. 1). The cloth is unrolled, 5 the arm 16 slides along the reversing rod 14 until, as shown in dotted lines in Fig. 1, it abuts against the cam 17. The reversing rod is thereby moved to the right, whereupon the rope-pulley is rotated in the reverse direc- 10 tion and the carriage or traveler is moved back.

The adjustable ring 17 is adjusted in such a manner that the carriage or traveler moves through a greater distance than the distance 15 between two folds and thus moves at each side some distance beyond the place where the folds take place before the return motion occurs. If the formation of the folds is effected by hand, the table is provided for 20 this purpose at each end and on both longitudinal sides with holes for the insertion of plugs, which can be placed in these holes in positions varying according to the length of the fold. For the sake of clearness, these 25 holes and plugs are not shown in the drawings. The attendant then uses a rod the length of which corresponds to the breadth of the table and, immediately after the reversal of the motion of the carriage or traveler takes 30 place, he lays this rod on the top of the cloth against the said plugs, so that in the return motion the cloth is folded round this rod, in other words, a fold is formed. When the carriage or traveler reaches the left hand end 35 of the work-table, the operation is repeated on this side in the same manner. The rod must remain in position at each end of the table until the carriage or traveler has reached the other end of the table, that is to 40 say, until the cloth or the like is no longer pulled by the moving carriage or traveler. At the end where the carriage is, the rod is not drawn out of the here previously formed fold and again placed on the top of the next 45 layer of cloth until the carriage or traveler has reached its outermost position beyond the fold and has commenced its return motion.

Instead of the repeated insertion and with- 50 drawal of the rod by hand, the folding may also be effected automatically as already mentioned. For this purpose, four automatic rod actuating devices are arranged on the work-table. These devices consist essen- 55 tially of a T-shaped piece 22 which will hereinafter be called a rod-carrier and of which the transverse bar forms a guide-groove for a folding rod 23, which is pushed out from each side over nearly half the width of the table. 60 The foot of the T-shaped rod-carrier is made in the form of a U-shaped head 24. Through this head extends a spindle 26 which is provided with a screw thread of square cross-section and which is fixed in a bracket 25 ar- 65 ranged on the work-table 7 (Fig. 5). In the

head 24 there is arranged a ratchet-wheel 27 and a bell-crank lever 28 so as to be capable of rotation about the spindle 26 (Fig. 4).

The ratchet-wheel 27 is provided with an internal screw thread and forms a nut which 70 can be moved along the spindle 26 and in its motion carries the head 24 up or down with it. The bell-crank lever 28 is connected on one side by a rod or link 29 to the rod 23 and on the other side is turned upwards and pro- 75 vided with a T-shaped elastically mounted end 30 (Figs. 3 and 4). Moreover a pawl 31 is provided on the long arm of the bell-crank lever 28 and a pawl 32 on the rod-carrier 22, both of which pawls engage with the ratchet- 80 wheel 27. On the bracket 25 is arranged a guide-rod 33, along which the rod-carrier 22 can slide up and down (Fig. 5). The spindle 26 is mounted in the bracket 25, so that it can be itself turned at the lower end by means 85 of a loose handle, when the rod-carrier is to be returned to its initial position.

In order to actuate the rod-actuating device, four reversing arms 21 are provided on the moving table 10, which arms reverse the 90 bell-crank levers 28 by means of their short arms and their elastic ends 30 respectively.

The operation of the rod-actuating devices is as follows:—In Fig. 4 (left hand side), the carriage or traveler is assumed to move from 95 above downwards, and as shown in Fig. 3, the cloth is already folded in a number of superposed layers. The still unfolded cloth 9 here lies on the table 10 (Fig. 3). In the said motion of the traveler, its front arms 21, 100 that is to say the arms turned towards the rod-actuating devices, abut against the arms 30 forming part of the short arms of the bell-crank levers 28, which they reverse by reason of the further motion of the carriage or 105 traveler. The rods 23, which have previously been pushed in, are thereby drawn back out of the fold until they reach the position shown in dotted lines in Fig. 4 and are held in this position. In the further motion 110 of the reversing arms 21, that is to say past the rod-actuating devices, the spring ends 30 are pressed away, so that the carriage or traveler can continue its motion and the rear reversing arm at the other side of the 115 table can also freely pass the bell-crank lever 28. It will be understood that the springs which control arms 30 are strong enough to prevent said arm 30 from moving relatively to the short arm of the lever 28 120 when said lever is capable of being moved but as soon as the lever 28 reaches the end of its movement said springs yield and arms 21 move arms 30 relatively to the lever 28. On the right hand side of Fig. 4, the rod and its 125 actuating device are shown in their mid positions, in which the bell-crank levers are continuously in engagement with the reversing arms 21.

By reason of the reversal of the bell-crank 130

lever 28, the pawl 31 will turn the ratchet wheel 27 through one tooth and consequently move upwards the head 24 and therefore also the rod-carrier 22 on the spindle 26 approximately through a distance equal to the thickness of one layer of cloth. In this operation the pawl 32 slides freely on the ratchet-wheel and only serves to prevent turning back of the ratchet wheel during the pushing in of the rod 28. The carriage or traveler 5 now moves on until the arm 16 thereon strikes against the cam 17, the carriage or traveler has thus reached the position A (Fig. 1). By means of the reversing device already described, the carriage or traveler now receives motion in an opposite direction and thus commences its return travel. When the carriage or traveler reaches the position B (Fig. 1), the rear reversing arms 21 abut against the arms 30 of the bell-crank levers 28, whereupon the latter are thrown over and the rods 23 are pushed over the cloth again, the parts being brought into the position indicated in full and dotted lines in Fig. 4. Since, in the motion of the carriage and in the drawing out of the rods, the rod-carriers 22 were moved slightly upwards by the ratchet-wheels 27, the rods 23 when pushed in come somewhat higher and accordingly lie over the previously deposited layer of cloth. In the further motion of the carriage or traveler, the bend or loop in the cloth (Fig. 1) comes up to the rods 23, the fold is formed and the cloth is again further unwound until the carriage or traveler has reached its other extreme position. As soon as the rear reversing arms, shortly before this position is reached, again actuate the left-hand rod-actuating devices, the rods at this end of the table are drawn out, raised and subsequently pushed in again, so that a fold can be formed there, and so on.

As already mentioned, there are two sets of two rod-actuating devices. The first set is generally not adjustable, while the other, by means of the movably arranged bracket 25, can be adjusted to any desired distance, according to the length to which the cloth is to be folded, by slacking the securing bolts. Obviously the arrangement of the brackets may be such that they can be moved by means of worm or rack and pinion gearing along the table.

What I claim is:—

55 1. An automatic machine for folding cloth and the like comprising a movable carriage for said cloth or the like, rails for said carriage, a stationary work-table beneath said rails, gearing for reciprocating said carriage
60 on said rails, guide-rolls for the cloth and the like on said carriage, a pair of cloth-folding-rod-supports arranged opposite to each other at each end of the work-table, cloth-folding rods movably arranged in said supports,

arms fixed on said carriage, gearing actuated, 65 by said arms for reciprocating said cloth-folding rods substantially as the carriage approaches and recedes from each end of its travel, and means for intermittently raising said cloth-folding-rod supports. 70

2. An automatic machine for folding cloth and the like comprising a movable carriage for said cloth or the like, rails for said carriage, a stationary work-table beneath said rails, gearing for reciprocating said carriage 75 on said rails, guide-rolls for the cloth and the like on said carriage, a pair of cloth-folding-rod-supports arranged opposite to each other at each end of the work-table, cloth-folding-rods movably mounted in said supports, 80 bell-crank levers pivotally mounted on said supports, links coupling said bell-crank levers and said cloth-folding rods, elastically mounted arms on said bell-crank levers, arms on said carriage for engaging the elastically- 85 mounted arms of said bell-crank levers, and means for intermittently raising said cloth-folding-rod supports.

3. An automatic machine for folding cloth and the like comprising a movable carriage 90 for said cloth or the like, rails for said carriage, a stationary work-table beneath said rails, gearing for reciprocating said carriage on said rails, guide-rolls for the cloth and the like on said carriage, a pair of cloth-folding- 95 rod-supports arranged opposite to each other at each end of the work-table, cloth-folding-rods movably mounted in said supports, bell-crank levers pivotally mounted on said supports, links coupling said bell-crank le- 100 vers and said cloth-folding rods, elastically mounted arms on said bell-crank levers, arms on said carriage for engaging the elastically-mounted arms of said bell-crank levers, screw-threaded spindles and nuts connect- 105 ing said cloth-folding-rod-supports and said work-table, ratchet-wheels combined with said nuts, pawls pivotally mounted on said bell-crank levers and coacting with said ratchet-wheels, and retaining pawls pivot- 110 ally mounted on said cloth-folding-rod supports and coacting with said ratchet-wheels.

4. An automatic machine for folding cloth and the like comprising a movable carriage 115 for said cloth or the like, rails for said carriage, a stationary work-table beneath said rails, rope-gearing for moving said carriage along said rails, a longitudinally-movable rod controlling the direction of motion of said gearing, cams adjustably mounted on 120 said rod, an arm fixed on said carriage and coacting with said cams, guide-rolls for the cloth or the like, on said carriage, a pair of cloth-folding-rod-supports arranged opposite to each other at each end of the work-table, 125 cloth-folding-rods movably mounted in said supports, bell-crank levers pivotally mounted on said supports, links coupling said bell-

crank levers and said cloth-folding rods,
elastically mounted arms on said bell-crank
levers, arms on said carriage for engaging the
elastically-mounted arms of said bell-crank
5 levers, screw-threaded spindles and nuts con-
necting said cloth-folding-rod-supports and
said work-table, ratchet-wheels combined
with said nuts, pawls pivotally mounted on
said bell-crank levers and coacting with said
10 ratchet-wheels, and retaining pawls pivotally

mounted on said cloth-folding-rod supports
and coacting with said ratchet-wheels.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

ALBERT BENDIEN.

Witnesses:

THOMAS HERMANN VERHAVE,
AUGUST SIEGFRIED DOCEN. 3