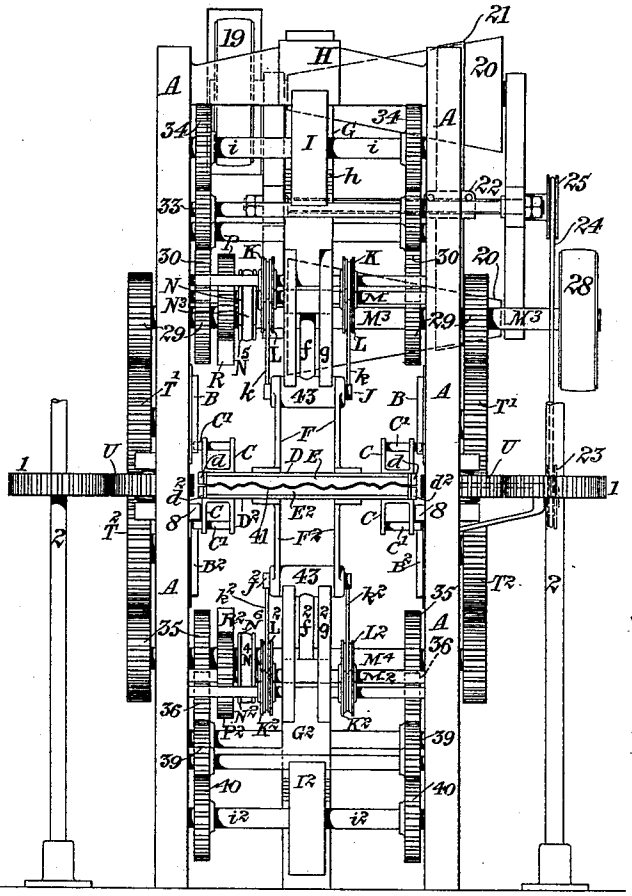
(No Model.) 4 Sheets—Sheet 1.

T. J. PALMER.

APPARATUS FOR EMBOSSING AND THE LIKE.

No. 425,826. Patented Apr. 15, 1890.

Fig. 1.



Witnesses:
E. J. Griswold.
Geo. A. Crane.

Inventor:
T. J. Palmer.
By his Attorneys,
Howson and Howson

(No Model.) 4 Sheets—Sheet 2.

T. J. PALMER.

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Fig. 2.

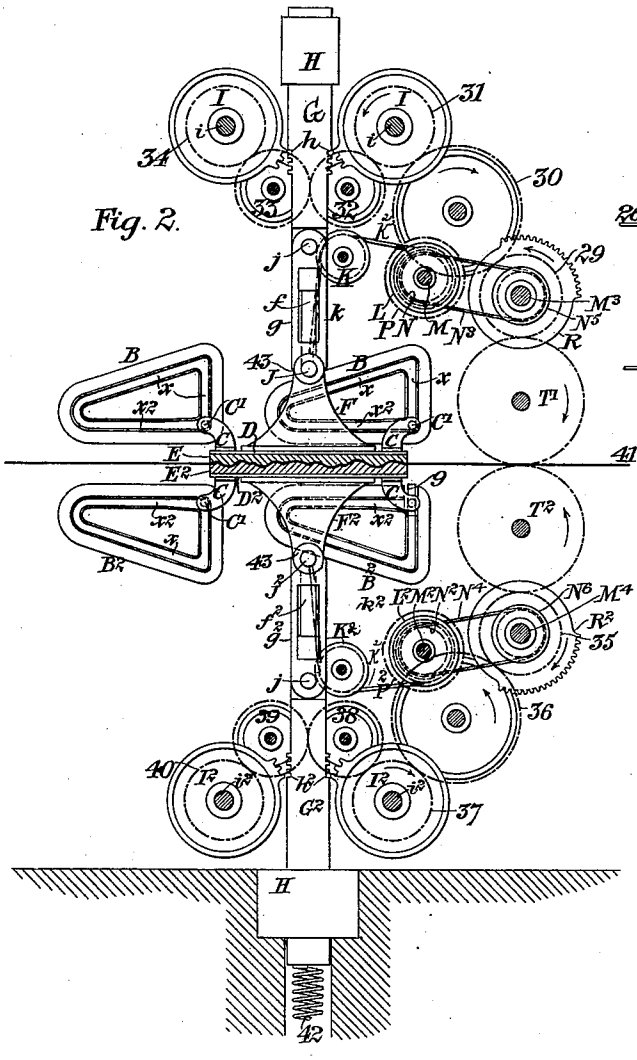
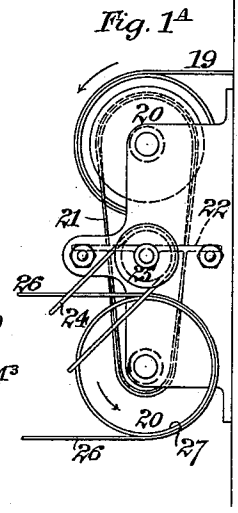


Fig. 1A.



Witnesses:
E. J. Griswold.
Geo. A. Crane.

Inventor:
T. J. Palmer
By his Attorneys Howson & Howson

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T. J. PALMER.

APPARATUS FOR EMBOSSING AND THE LIKE.

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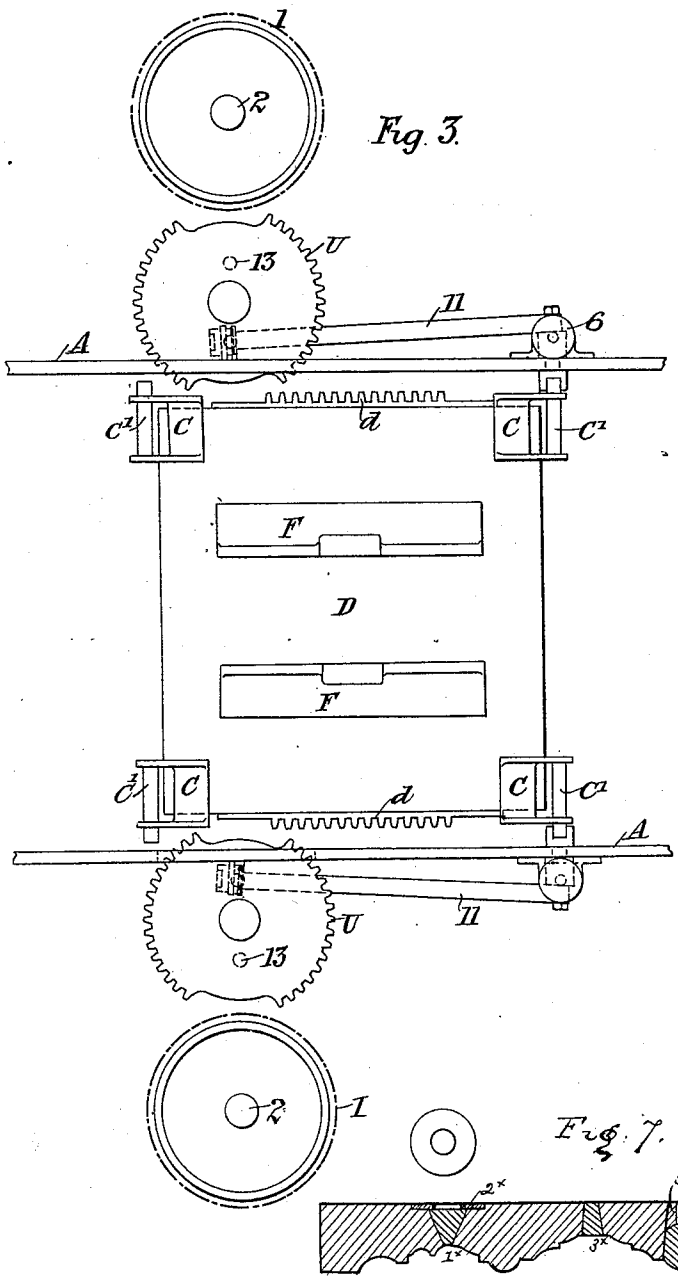

Fig. 3.

Fig. 7.

Witnesses:
E. J. Griswold
Geo. A. Crane.

Inventor:
T. J. Palmer
By his Attorneys
Howson and Howson

(No Model.) 4 Sheets—Sheet 4.

T. J. PALMER.

APPARATUS FOR EMBOSSING AND THE LIKE.

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Fig. 5

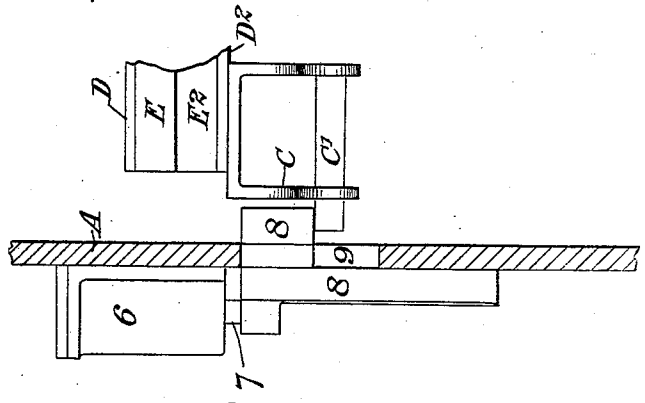


Fig. 4.

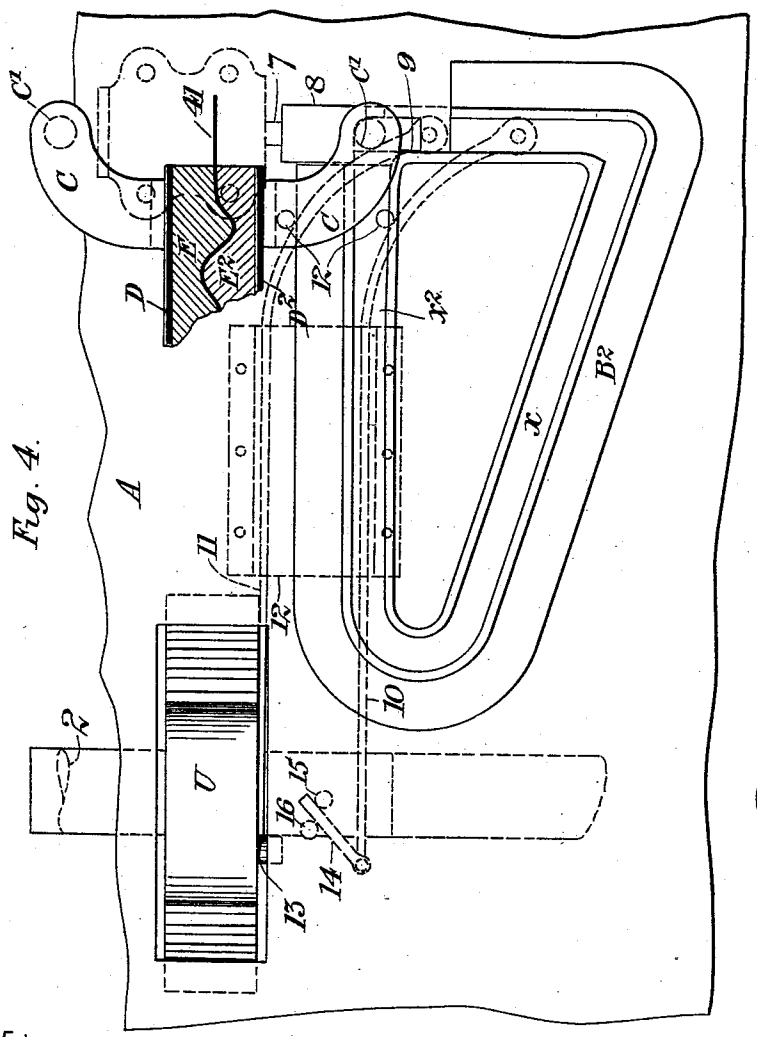
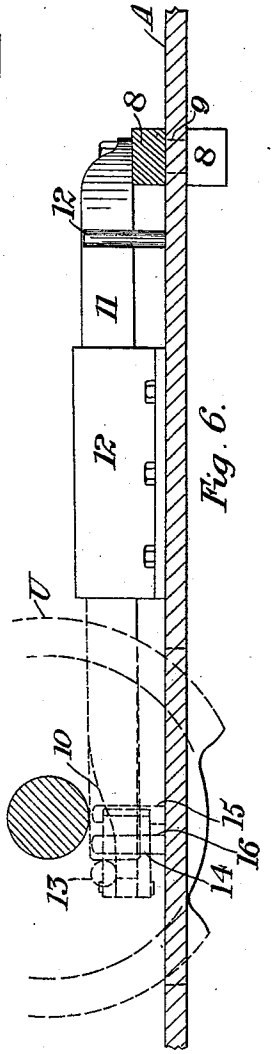


Fig. 6.



Witnesses:
E. J. Griswold.
Geo. A. Crane

Inventor:
T. J. Palmer.
by his Attorneys Howson and Howson

UNITED STATES PATENT OFFICE.

THOMAS JOHN PALMER, OF LANCASTER, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR EMBOSSING AND THE LIKE.

SPECIFICATION forming part of Letters Patent No. 425,826, dated April 15, 1890.

Application filed July 18, 1888. Serial No. 280,324. (No model.) Patented in England June 18, 1888, No. 8,906.

To all whom it may concern:

Be it known that I, THOMAS JOHN PALMER, decorative material manufacturer, a subject of the Queen of Great Britain, and residing at Queens Mill, Lancaster, in the county of Lancaster, England, have invented certain Improvements in Apparatus for Embossing and the Like, (for which I have obtained a patent in Great Britain, No. 8,906, dated June 18, 1888,) of which the following is a specification.

My invention relates principally to apparatus for the manufacture by blocks of embossed decorative material, panels, architectural ornaments, and such like articles from partially-manufactured paper or other materials; but the said invention is also applicable to analogous operations—such as stamping materials while in motion—the said apparatus being arranged so that it can be adapted for use for producing various lengths of "repeat" of the pattern embossed or stamped.

I will describe my invention with reference to the accompanying drawings as applied to the production of embossed decorative material from paper-making material as it issues from a paper-making machine, from which description the application of the said invention to analogous operations—such as to printing or stamping materials in motion—will also be readily understood.

Figure 1 is an end elevation; Fig. 1^A, a view at right angles thereto of part of the same, and Fig. 2 a diagrammatic transverse section of an apparatus constructed according to my invention. Fig. 3 is a part plan, and Figs. 4, 5, and 6 are detail views of portions thereof, as hereinafter explained. Fig. 7 is a sectional view, drawn to a larger scale, of a detail.

In carrying out my invention, according to the example which I have chosen for the purpose of illustration, I make a layer or web of paper-pulp on the "wet end" of a paper-making machine, either in the way described in the specification to my patent No. 4,227 of 1883, or in any other suitable way, and after it has passed the coucher-rolls I convey it onto an endless felt, and for some patterns I convey it by means of this felt between rollers to press and consolidate it, while for other patterns I carry it forward without pressing to be embossed in the state in which it leaves the coucher-rolls. To effect this embossing, I arrange at a convenient point, preferably in a direct line with the paper-making machine, a strong and suitably-formed frame A. On the inner sides of this frame I fix plates B B B^2 B^2, having channels or grooves x therein, as shown in Fig. 2, to receive pins C′ on brackets C, fixed to the plates D D^2, to which the embossing-blocks E E^2 are affixed by screws or in other convenient way. The plates D D^2 are connected by brackets F F^2, sliding rods f f^2, and links g g^2 to rack-bars G G^2, through which the embossing-blocks E E^2 are operated by the segment-wheels I I I^2 I^2, operated by gearing, as hereinafter described. The upper rack-bar G passes up through a guide H, and the lower rack-bar G^2 is similarly guided by a guide H^2, which may be in a concrete base or bed. On two opposite sides of the rack-bars G and G^2 are teeth h h^2, to engage with corresponding teeth on the segment-wheels I I^2.

J J^2 are bolts or pins which secure the brackets F F^2 to the rack-bars G G^2, and to these bolts or pins are attached chains (or ropes or bands) k k^2, which are guided by free-running grooved pulleys K K K^2 K^2, and are connected at their opposite ends to pulleys L L L^2 L^2, fast on shafts M M^2, on which are fixed the friction-pulleys N N^2, round which pass friction-straps N^3 N^4, leading from corresponding pulleys N^5 N^6, fast on shafts M^3 M^4. Fast on the shafts M M^2 are toothed wheels P P^2, which at the requisite periods gear with the teeth of segment-wheels R R^2, fast on the shafts M^3 M^4, in order to withdraw the blocks E E^2 from the material being acted upon, as hereinafter described. When the wheels P P^2 are not in gear with the segments R R^2, the shafts M M^2 will run free, except for the friction of the belts N^3 N^4 on the pulleys N N^5 and N^2 N^6, respectively.

When the blocks E and E^2 are in contact with the material, as shown in the drawings, they are caused to move forward at the same speed as that at which the material is being fed to the machine, the pins C′ sliding along the parallel portions x^2 of the grooves x, and to admit of this longitudinal movement of the said blocks the rack-bars G G^2 are made to act telescopically by the heads of the rods f f^2 sliding in slots in the links g g^2, which connect the rack-bars G G^2 to the brackets F, the

said links turning on the pins J^2 at one end and the pins j at the other end. The longitudinal movement of the blocks is effected by the teeth of the segment-wheels V gearing with racks d d d^2 d^2, respectively, on opposite sides of the plates D D^2, Fig. 3. Immediately after the plates D D^2 and blocks E E^2 have completed their forward travel and the pins C′ arrive at the end of the parallel portions x^2 of the slots x the segment-wheels U will have become disengaged from the racks d, leaving the plates D D^2 and blocks E E^2 free to be withdrawn from the material.

The segment-wheels U receive a little less than half a revolution at a time and are driven by means of the wheels 1 on shafts 2, which rotate continuously.

To prevent the segment-wheel U upon disengagement being carried round by their momentum, so as to come into gear at the wrong time with the racks d and wheels 1, respectively, I provide the construction shown at Figs. 4, 5, and 6, which stops their motion and retains them out of gear, also causing them to be brought into gear again at the proper time. This construction is provided at each side of the apparatus and consists of a vertical cylinder 6, fixed to the frame A and containing a spring which constantly maintains a downward pressure, through the rod 7, upon the slider 8, tending to keep it at the lower limit of its travel in the guide-slot 9 in the framing. This slider 8 projects by a sidewise extension into the vertical groove of one of the plates B^2, so that as the embossing-blocks come into the position illustrated in Fig. 2, in readiness to receive their forward traverse, the pin C′ may strike the said extension and raise the slider 8 against the resistance of the spring in the cylinder 6. The raising of this slider lifts the tail ends of plate-springs 10 11, which are secured thereto, and the other ends of these springs are constrained to move forward horizontally by the guide and guide-pins 12. Studs 13 are fixed to the under side of each segment-wheel U in such a position that one end of the spring 11, being forced forward, comes into contact with a stud, and thereby pushes the wheel U into gear with the rack d and with the wheel 1, with the result that the dies are traversed horizontally. As soon as the pin C′ in its horizontal travel leaves the under side of the projection of the slider 8 the said slider is forced to its lowest position by the spring in the cylinder 6, and the springs 10 and 11 resume their original positions in readiness for another operation.

The stop-piece 14 is carried by and hinged upon the spring 10, and lies between two guide-pins 15 16, these pins being so arranged that on the end of spring 10 commencing to travel forward horizontally, as described, the hinged stop-piece 14 is brought into contact with the guide-pin 16, and its upper end thereby prevented from traveling forward; but its lower end is being carried forward horizontally by the spring 10, and thus the hinged piece is caused to rotate on its hinge, sliding downward and forward between the two guide-pins 15 16. Its upper end is lowered out of the way of the stud 13 into the position illustrated in Fig. 4 at the same moment that the spring 11 pushes at the opposite side of the stud 13 to bring the segment-wheel U into gear with the racks d; but as soon as the horizontal travel of the bed-plate D^2 and its pin C′ permits the slider 8 to fall the consequent horizontal withdrawal of the end of the spring 10 causes the hinged stop-piece 14 to rotate on its hinge and to slide upward between guide-pins 15 and 16 into a vertical position, so that the upper edge of the stop-piece may intercept and stop the stud 13, and thereby prevent the segment-wheels U from making more than half a revolution. I may use any other suitable device to bring the wheels U and 1 into gear.

I will now describe the means by which the apparatus is driven, together with the devices for varying the speed of withdrawal and return of the dies E E^2 in accordance with the repeat in the pattern being embossed, to enable different lengths of repeat to be produced in the machine and prevent the length of pattern last embossed from either overlapping or falling short of the length of pattern just previously embossed, it being understood that the pulp or paper material from the coucher-roller passes through the apparatus at a constant speed. The shafts 2 are geared with the coucher-roll driving-gear, so that the speed of horizontal travel of the blocks E E^2 may always be the same as that of the pulp or paper material.

The mechanism, hereinbefore described, for controlling the rise and fall of the embossing-blocks may be driven by the well-known double-cone devices for variable speed, 19 being the driving-belt leading from the steam-engine or other prime mover and passing over a pulley on the shaft, on which is fixed the upper of the two cones 20 20. The belt-transmitting motion from one cone to the other is marked 21, 22 being the belt-shifter, capable of being operated by the attendant by means of the rope 24, which passes around the pulleys 23 and 25, the pulley 25 being fixed upon a screw which causes the belt-shifter to traverse the belt when variations of the length of period between successive embossings are required. The belt 26 (see Fig. 1ᴬ) transmits motion from the pulley 27 on the lower cone-shaft to a pulley 28, fixed to the shaft M^3. A spur-wheel 29, fixed on which shaft, transmits motion from that shaft to one of the segments I (the hinder one not seen in Fig. 1) by means of the gear-wheels 30 and 31, (see Fig. 2,) and in order that the movements of both the segments I may be synchronous their shafts i i are geared by the wheels 31, 32, 33, and 34, so that the rack-bars G are operated as described. To synchronize the movements of the rack-bar G^2 with those of the rack-bar G, the wheel 29

on the shaft M^3 is geared by the wheels T′ and T^2 with a wheel 35, by which the segments I^2 are driven synchronously by the gear-wheels 36, 37, 38, 39, and 40. (See Fig. 2.)

I will now describe the action of the machine, starting with the assumption that the pulp or paper 41 is receiving an impression, the embossing-blocks E E^2 being in the position shown in Fig. 2. The segment-wheels U, running at the same speed as the pulp or other fabric to be treated, are in gear with the racks *d* of the plates D D^2, and these plates, with the blocks E E^2, are carried forward. The edges of the grooves x^2, for about one-third of their length, are slightly inclined toward the blocks E E^2, so that as they are carried forward the pressure upon them is gradually increased until they have passed through about one-third of their travel, when the maximum pressure is reached and is maintained until the ends of the grooves x^2 are reached and the said blocks are withdrawn, respectively, up and down the inclined grooves *x*. During the horizontal traverse of the blocks the telescopic portions *f* f^2 of the rack-bars G G^2 are extended, and as the pins C′ reach the ends of the portions x^2 of the grooves the racks *d* on the edges of the plates D D^2 will have cleared the segment-wheel U, and the stud 13 on that wheel comes into contact with the stop-piece 14, Figs. 4 and 6, and the wheel U prevented from being carried farther round by its momentum. When the plates D D^2 cease to receive motion from the wheel U, the segment-wheels R R^2 engage with the toothed wheels P P^2 on the shafts M M^2, and the rollers L L^2 on those shafts wind in the chains *k* k^2, attached to the bolts J J^2, which chains draw the plates D D^2 and blocks E E^2 along the inclined grooves *x*. In doing so the telescopic portions *f* f^2 of the rack-bars G G^2 are first pulled home, (these telescopic portions being fitted in order that the compressing-links *g* g^2 may be caused always to take a proper bearing on the collars 43 of the brackets F.) Then the rack-bars G G^2, still operated by the chains *k* k^2, are respectively elevated and depressed until the pins C′ of each plate D D^2 have arrived at the end of the inclined grooves *x*, in readiness to traverse the vertical portions of the said grooves. The lower rack-bar G^2 is provided with a spring 42, of sufficient strength to prevent its descent under the influence of gravity while its telescopic portions are being returned, as described. By the time these operations are concluded the segment-wheels I I^2 will have reached the point of gearing into the racks *h* h^2 on the bars G G^2, which latter will immediately carry the plates D D^2 and blocks E E^2 along the vertical portions of the grooves *x* into contact with the material 41, the segment-wheels I I^2 being by this time out of gear again with the racks *h* h^2. The upper plate D is prevented from running away from its rack-bar G and link *g* by the retarding influence of the friction of the belt N^3 upon the pulley N^5. By the friction of the belt N^4 a tension is maintained sufficient to prevent the chain k^2 running freely off the pulley L^2 and hanging loosely about the machine. As the lower block E^2 and its plate D^2 arrive at the upper end of the vertical part of the grooves *x* and the upper block E simultaneously arrives at the bottom, the vertical portions of its grooves *x*, one of the pins C′ of the lower plate D^2 strikes and raises the slider 8, Figs. 4, 5, and 6, which actuates the spring 11, which in turn, acting upon the pin 13 of the segment-wheel U, forces it into gear with the wheel 1 and the racks *d* of the bed-plates D D^2, which are traversed horizontally, as described.

If in embossing it is found that the blocks are either overlapping or not quite reaching the work just previously done by reason of the slight slipping of any of the belts, or because of any inequalities in the repeat of the pattern, the attendant in charge can immediately rectify this by operating the belt-shifter 22, increasing or decreasing the speed of that portion of the machine which operates to cause the withdrawal and return of the blocks E E^2. This means for increasing or decreasing the speed of that part of the machine which withdraws the blocks will allow of considerable variation in the length of repeat in the patterns applied by the machine. It will be readily seen that the power of varying the speed of this part of the machine is capable of allowing any length of fabric (varying, say, for example, from twenty-one inches to six feet) passing each time before the blocks return to the material; but if working short repeats it will be necessary to decrease the length of the grooves *x*, so that they have a less length in proportion to the length of the blocks than they have in Fig. 1.

When embossing pulp direct from the couch-rolls, I use one or more thick wet felts to absorb the water pressed out, or I may use the arrangement described in the specification of my patent No. 4,227 of 1883.

I prefer to bore holes through the counter-block E^2 at those points where liquid is found to be driven in the operation of embossing to allow of the escape of moisture from the material operated upon, and when desirable I also bore the upper block E in the same manner; but when I do this I plug the said holes with porous material.

I have illustrated in Fig. 7 several forms of plugs and modes of fixing them in the blocks or dies; but I do not restrict myself thereto, as many other shapes may be used. As shown at $1^{\times}$, the plug is conical and fitted in the die with its smallest end to the face of the die, and to prevent the plug being forced out at the back of the die; a metal ring $2^{\times}$ is countersunk and fixed into the back of said die, as shown. As illustrated at $3^{\times}$, the plug is also conical in form and cemented into the die with its largest end to the face thereof. As shown at $4^{\times}$, a hollow metal plug $5^{\times}$ is fitted and secured in a conical hole in the die,

and in front of this metal plug the porous plug $4^{\times}$ is cemented in the hole in the die. $6^{\times}$ represents another form of plug, it being partly conical and partly cylindrical, the smallest end of the cone being toward the face of the die, and a metal ring being countersunk in the back of the die, as in the arrangement shown at $1^{\times}$; and $7^{\times}$ illustrates another form of plug, which may be of metal or other suitable substance, pierced with fine holes through its entire length, or, if desired, only through part of its length, the remainder of its length being pierced by one larger hole, as shown, with which the finer perforations communicate. These plugs may be provided with a screw-thread and be screwed into the holes in the block. For these plugs I prefer to use clay and to mix it with naphthaline or other spirit, then bake it to drive off the spirit, taking care not to raise the temperature too high. When the spirit has been driven off, I form the clay into plugs of suitable shape and secure them in the orifices in the block by cement or otherwise.

I claim as my invention—

1. Apparatus for embossing, stamping, or the like at intervals on paper or other material, and comprising the combination of feed mechanism for the material, and an impression-block and opposite pressure-surface, with intermittent feed mechanism for the impression-block and pressure-surface, to cause them to travel with the paper or other material while in contact with it, and devices, substantially as set forth, to withdraw the block from contact with the material backward and again move it into contact at another point, all substantially as described.

2. Apparatus for embossing, stamping, or the like, at intervals, on paper or other material, and comprising the combination of feed mechanism for the material, and a pair of impression-blocks on opposite sides of the material, with intermittent feed mechanism for the blocks to cause them to travel with the paper or other material while in contact with it, and devices, substantially as set forth, to withdraw the blocks from contact with the material backward and again into contact at another point, all substantially as described.

3. Apparatus for embossing, stamping, or the like, at intervals, on paper or other material, and comprising the combination of feed mechanism for the material, a pair of impression-blocks and grooved guides therefor, with intermittent feed mechanism to move the blocks forward while in contact with the material, and devices, substantially as set forth, to withdraw the blocks under control of the guides back out of contact with the material, and to move the blocks forward again into contact with the material at another point, all substantially as described.

4. Apparatus for embossing, stamping, or the like, at intervals, on paper or other material, and comprising the combination of feed mechanism for the material, a pair of impression-blocks and grooved guides therefor, with intermittent feed mechanism to move the blocks forward with the material while in contact therewith, rack-bars having a hinged extensible connection with the blocks, segment-gears for moving the blocks toward and from the material, and devices, substantially as described, for returning the blocks under the control of the guides after each forward feed movement, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS JOHN PALMER.

Witnesses:

WILLIAM O. ROPER,
Solr. and Notary Public, Bank Buildings, Lancaster.

NORMAN LEIGH,
Solr's Clerk, Bank Buildings, Lancaster.