

Oct. 18, 1927.

W. RITZERFELD

1,645,930

PROCESS FOR MULTIPLYING RECORDS

Filed March 25, 1925

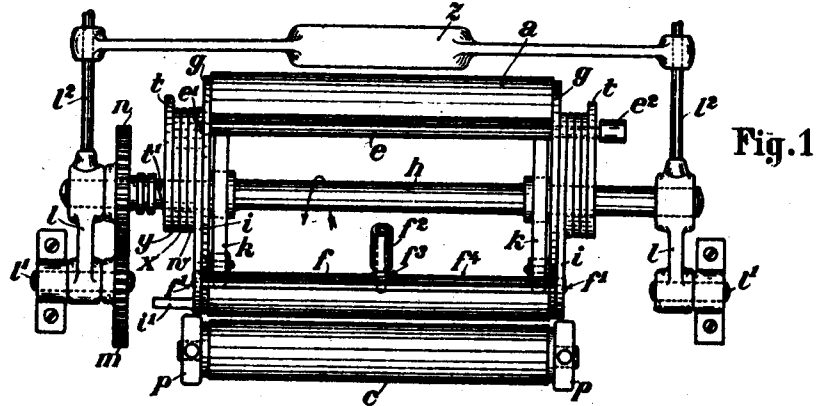


Fig. 1

Fig. 2.

Fig. 3.

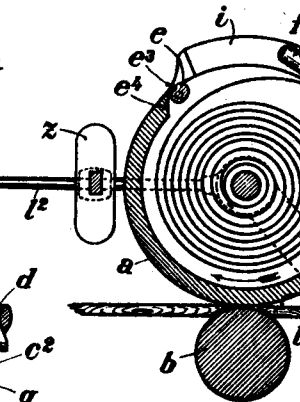
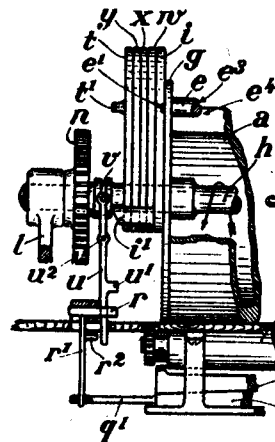


Fig. 4.

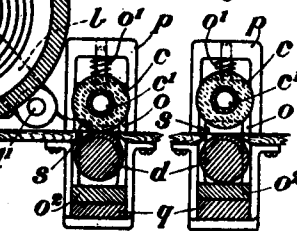
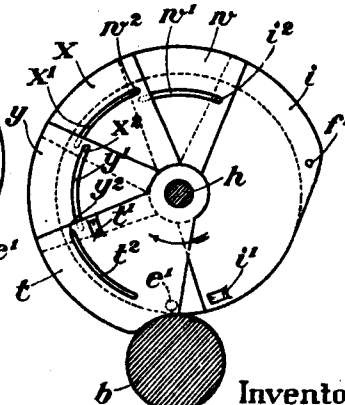
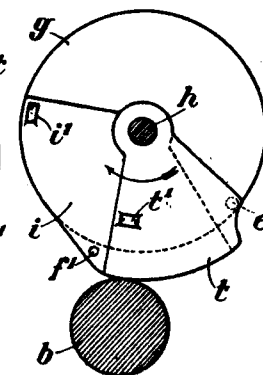
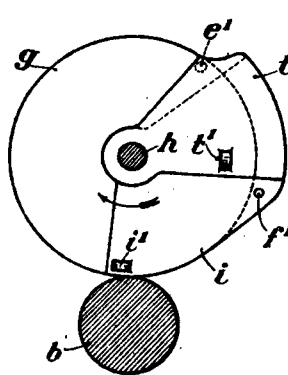


Fig. 5.

Fig. 6.

Fig. 7.



Inventor:

Wilhelm Ritzfeld
By - B. Singer, Atty

UNITED STATES PATENT OFFICE.

WILHELM RITZERFELD, OF BERLIN-CHARLOTTENBURG, GERMANY.

PROCESS FOR MULTIPLYING RECORDS.

Application filed March 25, 1925, Serial No. 18,265, and in Germany April 2, 1924.

My invention relates to improvements in the process for multiplying records, and more particularly in the process in which the record made on a sheet of paper or the like is applied to sheets of paper by damping the ink applied to the original record and thus transmitting the same to the sheet or sheets of paper. In processes of this kind such as are now in use a positive record made on the original is used for taking therefrom the copies. Therefore the copies show the negative of the record, and, in order to display the positive record, thin and absorbing sheets of paper are used for taking the copies from the original. The object of the improvements is to provide a process in which a positive record is made on sheets of paper of any desired thickness from an original made on a sheet of paper, and with this object in view I produce a negative record on the said original sheet of paper by placing the same when making the original by means of writing, printing, or drawing, on a surface coated with a suitable copying ink, and I place the original thus produced on a suitable printing surface with the negative record in position for being pressed on the sheets of paper to be printed upon, said sheets of paper being damped by a suitable damping apparatus with a liquid adapted to dissolve the ink applied to the original. I have found that by my improved process a comparatively large number of copies can be taken from the same record, which number will be sufficient for many purposes of the commerce.

For the purpose of explaining the invention an apparatus suitable for reproducing the original made by my improved process has been shown in the accompanying drawing, in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings,

Fig. 1, is a top plan view of the apparatus,
Fig. 2, is a partial elevation thereof partly in section,

Fig. 3, is a sectional elevation taken on the line 3—3 of Fig. 1,

Fig. 4, is a detail sectional view showing the damping rollers in a different position, and

Figs. 5 to 7, are diagrammatic end views of the printing cylinder and the impression roller co-operating therewith, Fig. 5 showing the parts in the position before printing and with the damping apparatus in the posi-

tion for receiving a new sheet of paper, Fig. 6 showing the printing cylinder lifted away from the impression roller prior to passing a sheet of paper therethrough, and Fig. 7 showing the printing cylinder arranged for receiving short sheets of paper and at the beginning of printing.

In carrying out my improved process I first make an original record for example by means of a typewriting machine, by placing a sheet of paper together with a sheet of paper or the like coated with a suitable copying ink on the platen of the typewriting machine, the sheet containing the copying ink being placed on the rear face of the sheet of paper adapted to receive the record. When now operating the typewriting machine a negative record appears on the rear face of the sheet of paper. The inking paper is coated with an ink permitting several copies, say 40 copies or more, to be taken from the record. The negative record is now placed on a suitable copying apparatus, the rear face of the paper containing the negative record being in position for having the sheet to be printed placed thereon, which sheet is now damped with a suitable liquid adapted to dissolve the ink of the record and placed on the record. By compressing the sheets a positive record is transferred to the damped sheet. The operation is repeated until the ink of the original record is used up or the desired number of copies has been taken.

In the drawing I have shown an apparatus which is particularly useful for carrying out my improved process. As shown the apparatus comprises a printing cylinder *a* adapted to have the original fixed thereto, an impression roller *b* adapted to press the sheets into contact with each other, and a damping apparatus comprising a damping roller *c* of absorbing material and a roller *d* adapted to press the sheet to be printed upon against the roller *c*.

The impression roller *b* is rotatably mounted in a suitable frame (not shown), and the printing cylinder *a* is provided on a shaft *h* mounted on a pair of arms *l* rockingly mounted at *l'* on the said frame.

To the said arms *l* rods *l'* are secured which carry a weighted body *z* providing the pressure for forcing the cylinder *a* and the roller *b* into contact with each other. On the shaft *h* a gear wheel *n* is loosely mounted, which is adapted to be coupled

with the shaft *h* by means of a clutch *n*¹. The gear wheel *n* is in mesh with a gear wheel *m* mounted on one of the pivot bolts *l*¹ and adapted to be rotated in a suitable way for transmitting rotary movement to the printing cylinder *a*.

The printing cylinder *a* is fixed to a pair of end disks *g* fixed to the shaft *h*, and it is formed with a cut-out portion *a*¹. For fixing the original record to the printing cylinder *a* clamping members *e* and *f* are provided. The clamping member *e* is in the form of a rod located within the cut-out portion *a*¹ and rockingly mounted in suitable bores of the disks *g* by means of eccentric trunnions provided at the ends of the rod *e*. To one of the said trunnions a milled disk *e*² is secured, by means of which the clamping member *e* may be turned. The rod *e* is formed with a longitudinal recess providing a shoulder *e*³ adapted to project beyond the circumference of the cylinder *a* and providing a registering guide for the original when placing the same on the printing cylinder. Adjacent to the rod *e* the cut-out portion *a*¹ is formed with a wall *e*⁴ cooperating with the said rod for clamping the paper in position. When placing the sheet with one margin into contact with the shoulder *e*³ and turning the rod *e* in anti-clockwise direction, the margin is bent inwardly against the wall *e*⁴ and thereafter clamped between the rod *e* and the said wall. At the other side of the cut-out portion *a*¹ a clamping member *f* in the form of a rod is provided, which rod is rockingly mounted in a pair of segmental plates *i* rockingly mounted on the shaft *h* at the outer sides of the disks *g*. The said rod is formed with a longitudinal tongue *f*⁵ adapted for clamping engagement with one of the edges of a rail *f*⁴ secured to the plate *i*. To the rod *f* a bolt *f*⁶ is secured on which a sleeve *f*² provided with a cam *f*³ is mounted. The said cam bears on the rail *f*⁴, and when turning the sleeve *f*² on the pin *f*⁶ the cam *f*³ is turned so as to rock the arm *f*⁶ outwardly and to press the tongue *f*⁵ towards the rail *f*⁴, the original sheet being placed between the said rail and the tongue *f*⁵. To accommodate record sheets of different lengths the plates *i* and the clamping members *f*, *f*⁴ carried thereby are adapted to be rocked for shifting the said clamping members on the cylinder *a* in circumferential direction. A pair of spiral springs *k* attached respectively to the shaft *h* and the rail *f*⁴ tend to turn the plates *i* to the left in Fig. 3 and to put the original clamped between the clamping members *e*, *e*⁴ and *f*, *f*⁴ under tension.

The coupling member *n*¹ is adapted to be operated for coupling or uncoupling the shaft *h* and the gear wheel *n* by means of a lever *u* having a fulcrum at *u*² and engag-

ing in a circumferential groove *v* of the coupling member. The said lever *u* is adapted to be operated by means of a lug *t*¹ provided on a plate *t* rigidly mounted on the shaft *h*, said lug being formed with a bevelled face adapted for engagement with a lug *u*¹ provided on the lever *u*. When turning the shaft *h* the lug *t*¹ is brought into engagement with the lug *u*¹ in a certain position of the cylinder shown in Fig. 6 for disconnecting the shaft *h* from the gear wheel *n*. The said parts are automatically coupled by means of a finger *r*² carried by a rod *r*¹ and adapted to rock the lever *u* with its bottom end to the right in Fig. 2, as will be described hereinafter.

The damping roller *c* is made from a suitable absorbing medium such as felt, and it is provided on a tubular shaft *c*¹ having a foraminated wall, which shaft is connected with a supply of a suitable liquid adapted to dissolve the copying ink applied to the record sheet. The said roller is mounted for being retracted away from the roller *d*, its bearing blocks *o* being slidable in a frame *p* and acted upon by a spring *o*¹ tending to force the same downwardly. At their bottom ends the said bearing blocks are connected by a rail *o*² disposed parallel to and below the roller *d* and guided within a frame *p*¹. The said rail *o*² is formed with bevelled bottom faces bearing on wedges *q* connected by a rod *q*¹ with the rod *r*¹ secured to a slide *r*. The roller *d* is provided with suitable driving means represented in Fig. 2 by a gear wheel *d*¹ adapted to rotate the roller *d* for feeding the sheet of paper placed between the rollers *c* and *d*. The slide *r* is adapted to be shifted to the right or left for raising or lowering the roller *c*. To show what may be done a lug *i*¹ is provided on the left hand plate *i*, which lug is adapted to engage the slide *r* at its right hand end face and to shift the same to the left for retracting the roller *c* away from the roller *d*. When thus elevating the damping roller *c* a rail *s* carried by the bearing blocks *o* is elevated into position above the paper table *y* and into position for providing a registering guide, as is shown in Fig. 4. After placing a sheet of paper between the rollers *c* and *d* the slide *r* is shifted to the right in Fig. 2 by means of a suitable handle secured thereto. Thereby the registering guide *s* is moved downwardly, and the roller *c* is forced by the springs *o*¹ against the sheet of paper and the roller *d*.

The operation of the apparatus is as follows: The original is fixed in position on the printing cylinder *a* by means of the clamping members *e* and *f*, and it may be assumed that the printing cylinder is in the position shown in Fig. 6, in which it has been lifted by the segmental cam members *t* away from the impression roller *b*, the lug

t^1 has engaged the lug u^1 and rocked the lever u into position for uncoupling the shaft h from the gear wheel n , and the damping roller c has been lifted away from the roller d . Now the attendant places a sheet of paper between the rollers c and d and into contact with its forward margin with the registering guide s . Thereafter he shifts the slide r to the right, thus allowing the roller c to be forced by the spring o^1 on the sheet of paper and to retract the guide s out of the path of the said sheet. Further the pin r^2 engages the bottom end of the lever u and couples the gear wheel n with the shaft h . Now the feed roller d and the printing cylinder a begin their rotary movement, the sheet of paper being fed towards the left and into position between the printing cylinder a and the impression roller b . The movements of the feed roller d and the cylinder a are timed so that the front margin of the sheet of paper gets into position between the cylinder a and the roller b , after the cam t has passed the roller b . Now the cylinder a is lowered into the position shown in Fig. 7 in which it clamps the sheet of paper between the same and the roller b , the sheet of paper and the original being now in register so that the upper part of the original is a suitable distance below the upper margin of the sheet of paper. Now the cylinder a continues its rotary movement while being pressed by the weighted body z on the original and the sheet of paper and the roller b . Therefore the damped sheet of paper dissolves a part of the ink of the original, whereby the record is transferred to the said sheet of paper. In the course of the rotary movement of the cylinder a the lug i^1 gets into position for engagement with the slide r (Fig. 5) so as to shift the wedges q to the left and to elevate the damping roller c and the registering guide s . Therefore the attendant can place another sheet of paper between the rollers c and d , while the printing cylinder a continues its rotary movement, until the cams t engage the roller b and elevate the printing cylinder away from said roller. Simultaneously the lug t^1 gets into engagement with the lug u^1 , thus uncoupling the shaft h from the gear wheel n . Now the attendant removes the printed sheet of paper and starts the movement of the roller d and the cylinder a by shifting the slide r to the right, whereupon the operation is repeated.

The radial dimension of the cam i is such that the clamping members e and f do not get into engagement with the roller b .

If it is desired to take copies from comparatively short originals, the clamping member f is shifted circumferentially of the cylinder a by rocking the cams i , and in order to continue the cam faces i and t seg-

mental cam disks w , x , y are provided intermediate the cam members i and t , which cam members are spread apart in the manner of a fan, as is shown in Fig. 7. For fixing the segmental cam members in position relatively to one another, the cam member w is provided with a concentric slot w^1 engaged by a clamping pin i^2 fixed to the cam member i , the cam member x is formed with a slot x^1 engaged by a clamping pin w^2 secured to the cam member w , the cam member y is formed with a concentric slot y^1 engaged by a clamping pin x^2 secured to the cam member x , and the cam member t has a concentric slot t^2 engaged by a clamping pin y^2 secured to the cam member y . In Fig. 7 the cam members are spread apart so as to adapt the apparatus to sheets of paper of the smallest size, while in Figs. 1 to 6 the cam members are placed one above the other for accommodating full size sheets.

While in describing the invention reference has been made to a particular example embodying the same I wish it to be understood that my invention is not limited to the construction shown in the drawing, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

I claim:

1. The herein described process of multiplying copies consisting in placing an original paper sheet on a transfer sheet provided with a printing ink medium, making the original of the desired copies on the obverse of the original paper sheet to thereby cause a reverse duplicate to be formed by said transfer sheet on the reverse side of said original sheet; placing an unprinted sheet on said reverse side of said original sheet and subjecting such sheets to pressure to cause the copy on the reverse side of the original sheet to be transferred to the duplicate sheet.

2. The herein described process of multiplying copies consisting in placing an original paper sheet on a transfer sheet provided with a printing ink medium, making the original of the desired copies on the obverse of the original paper sheet to thereby cause a reverse duplicate to be formed by said transfer sheet on the reverse side of said original sheet; applying a rapidly drying liquid solvent to one surface of a duplicate sheet, placing such treated surface of the duplicate sheet against the reverse side of said original sheet and subjecting such duplicate sheet and original sheet to pressure to cause the matter on the reverse side of the original sheet to be transferred to the obverse of the duplicate sheet.

In testimony whereof I hereunto affix my signature.

WILHELM RITZERFELD.