L. KOCH.

MACHINE FOR MAKING PAPER BOXES.

No. 12,511. Patented Mar. 13, 1855.

Fig. 4.

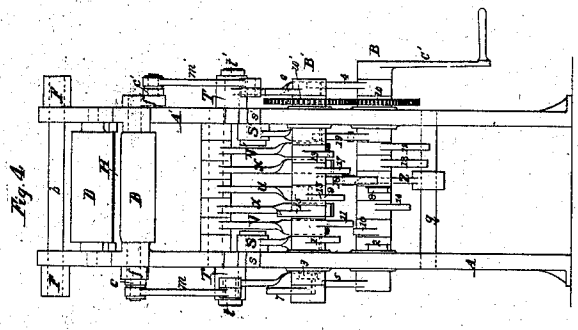


Fig. 1.

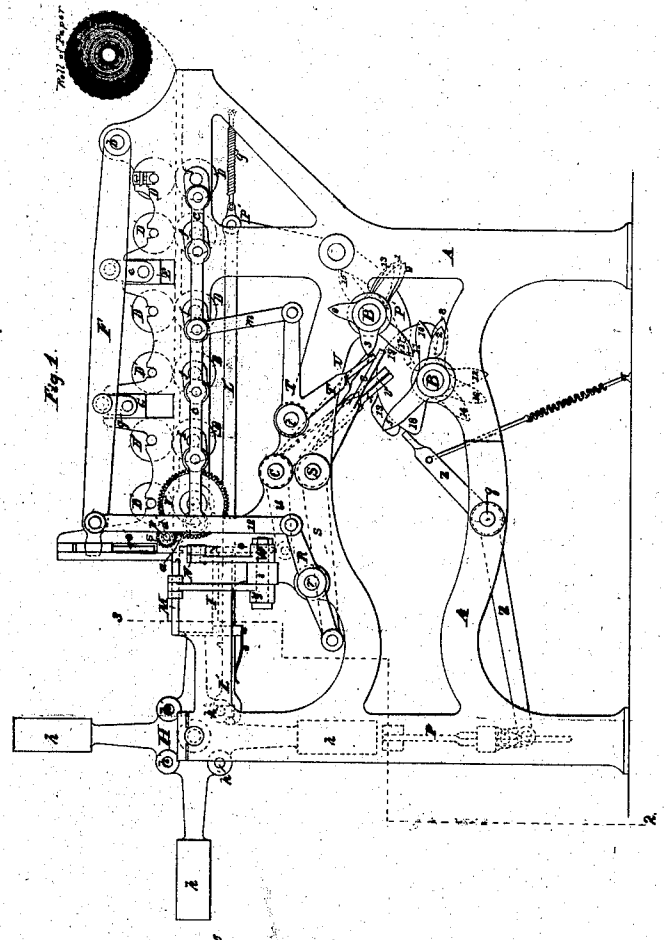


Fig. 2.

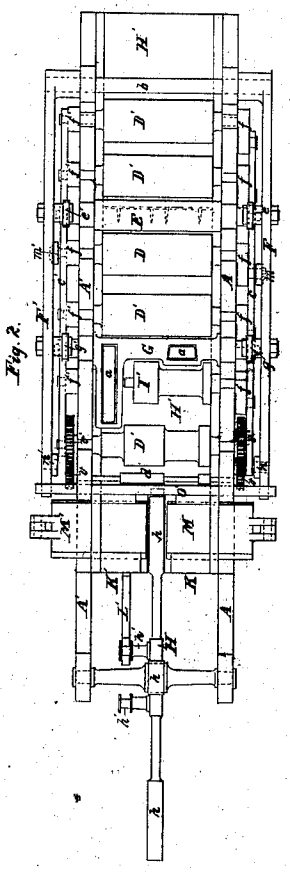
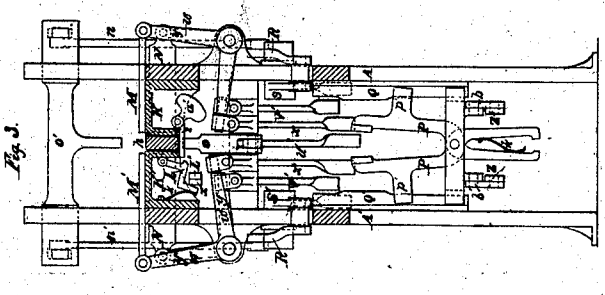


Fig. 3.



Inventor:
Louis Koch

UNITED STATES PATENT OFFICE.

LOUIS KOCH, OF NEW YORK, N. Y.

MACHINE FOR MAKING PAPER BOXES.

Specification forming part of Letters Patent No. **12,511**, dated March 13, 1855.

To all whom it may concern:

Be it known that I, LOUIS KOCH, of New York, in the county and State of New York, have invented a new and useful Machine for Making Paper Boxes, used for lucifer matches, nails, tacks, spice, &c.; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a longitudinal side elevation, Fig. 2 is a top view, Fig. 3 a front view and part section at the line III and II, and Fig. 4 a back end view, of the machine.

The nature of my invention consists in an arrangement of rollers to bring the paper from an endless roll along the machine to the place where the box is to be made; secondly, in a stamp or knife frame by which the paper is cut into the required shape necessary for folding; thirdly, in a pasting-frame provided with suitable paste-boxes so arranged as to paste those parts of the paper necessary to be pasted; fourthly, in a wheel provided with arms to which molds are attached, around which the boxes are to be made; fifthly, in an arrangement of slides by which the paper is folded around the mold, and, sixthly, in a pair of pinchers to draw off the box from the mold after completion. These different parts are made to move successively partly together and partly one after the other, said motions being produced by an arrangement of levers actuated by cams or toes fast upon shafts and working in such a manner that by one revolution of said shafts always one box will be completed.

A A′ are the main frames of the machine.

B B′ are the driving-shafts, geared together by the wheels *w w′*, and upon one of said shafts either pulleys are to be placed to drive the machine by power or (as here represented in Fig. 4) a crank C′ is attached to move the same by hand.

D D′ are rollers running in bearings in the frames A A′. These rollers are of such a size that the outside circumference of the same is equal to the length of the paper required for one box. The lower rollers D have cranks *f f′* attached to the ends of their shafts, which are connected together by rods *c c′*, thereby connecting all the lower rollers together, so that the same move always simultaneously together. The upper rollers D′ run loose in the bearings in the frames A A′ and obtain their motion from their corresponding lower rollers by friction.

Near the front of the machine and as close as possible to the place where the box is made are situated two smaller rollers *d d′*, moved by gearing *v v′* from the nearest roller D. By this arrangement the paper is always held fast until the operation of folding begins.

E is a stamp or knife frame situated between two rollers near the after end, guided in the frames A A′, and connected by links *e e′* to the beams F F′, from which the same receives an up-and-down motion. To the lower side of this frame E stamps or knives are attached, (shown in Fig. 2 in dotted lines,) fitting, when pressed down, in suitable disks, by which said stamps or knives the paper is cut or punched out the required shape in the downward motion. Forward of the frame E, and likewise between two rollers, the pasting-frame G is situated, guided in the frames A A′, and connected by links *g g′* to the beams F F′, from which the same receives an up-and-down motion. This pasting-frame has suitable openings *a a* to contain boxes filled with paste. The lower sides of those boxes are covered with wire, flannel, sponge, or its equivalent, so as to allow the paste to go through in small quantities only, which by pressing down upon the paper is communicated to the latter.

H is a wheel with four arms having at their extremities the molds *h* attached, round which the boxes are to be made. This wheel is fast to a shaft running in bearings in the frames A A′.

h′ h′ h′ h′ are pins attached to the wheel H, by which the same is turned, as will be hereinafter described. The ends of the arms *h*, forming the inner molds for the bases, fit between projections K K′, attached to the inside of the frames A A′, and which said projections form the sides of the outer mold.

I is a hinge-valve attached to the projection K, which, if closed, forms the bottom of the outer mold. This valve has a weight *a′* attached to it to keep it closed, and is likewise secured by the catch L, fastened to the

projection K′. A spring *k*, acting against the back of the catch L, keeps the same in this position.

Instead of the weight *a′*, attached to the valve I, a spring may be used for the same purpose.

M M′ are the top slides. N N′ are the side slides. O is the lower slide, and O′ the upper slide, by which said slides the ends of the paper are folded around the mold *h*. These slides are guided in suitable guides.

P are pinchers situated under the center of motion of the wheel H and sliding up and down over surfaces Q Q′, attached to the frames A A′. Between the lower extremities of the pinchers a spring *k′* is fixed to force the same apart at the required time. On the upper end of the pinchers are projections *p p′*, which slide over the surfaces Q Q′. Those surfaces Q Q′ have elevations part of the way, and so situated that said pinchers P will be thereby pressed together in their downward motion, while at both extremities the same will be forced apart by the action of their spring *k′*. The reason of this arrangement is to give clearance at the upper position for the mold *h*, with the finished paper box attached, to pass between the same, to keep the paper box tight when the same is to be pulled off by the pinchers P from the mold *h* in the downward motion of the pinchers, and to allow the box to fall freely away from and out of the pinchers P after having been pulled off from the mold *h*.

F F′ are beams fast to a shaft *b*, turning in bearings in the frames A A′. To the forward end of those beams the upper slide O′ is attached, as well as the stamp or knife frame E and the pasting-frame G, as has been before described. These beams F F′ are connected, through the rods *n n′*, with levers R R′, turning upon centers *r r′*, fast to the frames A A′, and said levers R R′ are again connected with levers S S′, turning upon centers *s s′*, and which latter levers are acted upon by cams or toes 1 and 2, fast on the driving-shafts B B′. Through this connection motion communicated by the toes 1 and 2 to the levers S S′ is communicated to the beams F F′, and consequently to the stamp or knife frame E, the pasting-frame G, and the upper slide O′, giving thereby an up-and-down motion to those parts.

T T′ are levers turning on centers *t t′*, fast on the frames A A′, and connected, through the rods *m m′*, with the cranks on one of the rollers D, by which connection a rectilinear motion, communicated to the levers T T′, is converted into a circular motion of the rollers. These levers T T′ are actuated by the cams or toes 3, 4, 5, 6, and 7, fast on the shafts B B′, which said cams or toes are so arranged that the motion communicated by the same to the one end of the levers T T′ shall exactly produce one whole revolution of the rollers.

U is a lever turning upon the shaft C, fast to the frames A A′, the one end of which lever is attached to the lower slide O and the other end is actuated by the cams or toes 8 and 9, fast to the shafts B B′, producing by their action an up-and-down motion of the slide O.

V V′ are levers turning upon the shaft C, fast to the frames A A′. The one end of these levers is actuated by the cams or toes 10 11 and 12 13, fast to the shafts B B′, and the other ends of said levers are attached to bell-cranks W W′, turning on centers *i i′*, fast to the frames A A′, and connected with the side slides N N′, respectively. By this connection the action of the cams 10 11 and 12 13 upon the ends of the levers V V′ produces a lateral motion to the slides N N′.

X X′ are levers turning upon the shaft C, fast to the frames A A′. The one end of these levers is actuated by the cams or toes 14 15 and 16 17, fast to the shafts B B′, and the other ends of said levers are attached to bell-cranks Y Y′, turning on centers *i i′*, fast to the frames A A′, and connected with the top slides M M′, respectively. By this connection the action of the cams or toes 14 15 and 16 17 upon the ends of the levers X X′ produces a lateral motion to the top slides M M′.

Z is a lever turning upon the shaft *q*, fast to the frames A A′. The one end of this lever is attached, through the links 6 6′, with the pinchers P, and the other end is acted on by a cam 18, fast on the shaft B. This cam 18 is so constructed that by its action upon the lever Z the pinchers P will be pulled down and retained for a certain time in that position, after which time and as soon as the cam 18 sets the lever Z at liberty the pinchers P will be forced up again by a spring *z*, attached to the lever Z.

L′ is a rod running nearly the whole length of the machine under the rollers. The forward end of the same is cut out for the pins *h′* of the wheel H to fit in and is pressed against said pins by the spring *o*, acting against the under side of said rod L′. The same has suitable guides at the forward end and is attached by means of a spiral spring *q′* at the after end to the frame A. On one side of this rod L′ and near the forward end is a small projection *x*, Fig. 3, so situated as to operate when in motion, upon the catch L in such a manner as to liberate the hinge-valve I from its action.

P′ is a lever turning upon a fixed center *g″*, fast to the frame A. The one end of this lever is attached near the after end of the rod L′ to the same and the other end of the lever P′ is actuated by the cam 19, fast on the shaft B. By this connection of the lever P′ with the rod L′ the motion communicated to the lever P′ by the cam 19 produces a forward motion of the rod L′, and turns thereby the wheel H as soon as said rod L′ comes in contact with one of the pins *h′*, fast to the wheel H. The cam 19 has two projections, which are so constructed that the first projection moves the lever P′ a certain distance and retains it in

that position some length of time, when the second projection begins to act, moving the lever P′ some distance farther, and likewise retains the same in that position a certain length of time and then leaves the lever P′. This motion communicated to this lever is consequently likewise communicated to the rod L′ and the wheel H. As soon as the cam 19 relieves the lever P′ the spring q', which has been expanded by the former action, pulls the rod L′, as well as the lever P′, back again to its former and original position.

Instead of cutting or punching out the paper by the above-described flat stamps the same may likewise be done by attaching the knives to one of the rollers D or D′, and the pasting-frame may likewise be changed by substituting a hollow roller with suitable openings, and into which the paste is forced.

The space between the frames A and A′ and the lower rollers D is filled in with plates H′, whose upper surfaces come very nearly even with the upper part of the circumference of the rollers D, forming thereby a table over which the paper slides.

The operation of this machine is as follows: In the accompanying drawings the machine is represented in a position supposed that a box has just been completed. The cam 19 has already moved a little the lever P′, and consequently the rod L′, and as this motion has been just sufficient for the projection x on the latter to have acted on the catch L, so as to bring the same clear of the valve I, said valve I is now only kept closed by its weight a', and can be pressed open by the mold h to allow the same by the motion of the wheel H to move out of the outer mold. By turning now at the handle C, setting thereby the machine in motion, the cam 19 will still act upon the lever P′, and consequently on the rod L′, which comes now in contact with one of the pins h' of the wheel H and turns the same partly around, thereby bringing the inner mold h (where we suppose a finished box attached) clear of the outer mold, formed by the projections K and K′ and the valve I. In this operation the valve I has been pressed down to allow the mold h to pass, and is then closed again by its weight a', and the catch L, which has likewise been released from the projection x of the rod L′, is pressed by its spring k, so as to lock the valve I firmly to its place. The cam 19 moves the lever P′, and consequently the rod L′, so far that by the action of the latter against the pin h' of the wheel H this wheel H has turned so far around that its arms stand at an angle of about forty-five degrees. During this time the cam 18 has acted continually on the lever Z, keeping the same, and consequently the pinchers P, steady and the latter in the lower position. As soon as the arms of the wheel H arrive at the above-described position—namely, at an angle of about forty-five degrees—the cam 18 relieves the lever Z from its action, and the same is now acted upon by the spring z, thereby forcing the pinchers P suddenly upward. The pinchers are at this top position pressed apart by the action of their spring k', as above described, so as to allow the arms or molds h of the wheel H to pass within them. At the same time the above-mentioned operation has been going on the toes 3, 4, 5, 6, and 7 have acted alternately upon the levers T and T′, respectively, moving the same backward and forward, and which motion has been communicated, through the rods m m', to the cranks f f' of one of the lower rollers D, producing thereby just one whole revolution of the same, and as all the lower rollers are connected together, and the circumference of each roller is just equal to the length of paper required to make one box, such a length of paper has by this operation been brought forward. As will appear by the following, there is on the table of the machine, formed by the plates H′ and in the position the machine is now in, one required length of paper, lying close to the forward end of the machine, ready cut and pasted for folding; close to and behind the same one piece of paper already cut or stamped out, only requiring to be pasted, and behind and close to this last again the paper drawn into the machine by the rollers D D′ from an endless roll of paper situated behind the machine. By the operation of the rollers the first piece of paper, ready cut and pasted, is brought now forward and pushed over the opening of the outer mold, resting upon the top slides M and M′, ready to be folded, while the second piece of paper is brought forward and into the place which was occupied before by the first piece, to be pasted by the next operation, and a further piece from the endless roll of paper is pulled into the machine and into the place occupied before by the second piece, to be cut off by the stamp the required length and shape. The first projection of the cam 19 has brought the arms of the wheel H in the position above mentioned and kept the same stationary in that position until the motion of the rollers, and consequently of the paper, is completed. The second projection of the cam 19 acts now upon the lever P′, and consequently on the rod L′, producing a further motion of the wheel H sufficient to bring the arm or inner mold h into the outer mold, thereby folding the paper which was moved over the opening of said outer mold around itself and taking it with it into the same, leaving only those parts of the paper projecting which are to form the top and end of the box. This cam 19 keeps, then, the lever P′, and consequently the rod L′ and wheel H, for some little time stationary in that position until one of the top slides has been moved over the mold h, by which the same is secured, when the cam 19 leaves the lever P′, and the spring q' at the end of the rod L′ pulls said rod and lever back again to its original position ready for the next action. After the mold h has been moved

into the outer mold formed by the projections K K′ and the valve I the toe 14 acts then upon the lever X, which lever by its connection, through the bell-crank Y, with the top slide M moves the latter over the mold *h*, folding thereby the projecting paper over the top of the same. The toe 15 acts now upon the opposite side of the lever X, and brings, therefore, the top slide M away again; but at the same time the toe 16 acts upon the lever X′, which by its connection, through the bell-crank Y′, with the top slide M′ moves the same over the mold *h*, folding thereby the projecting paper over the top of the same and over that piece of paper which was folded over by the slide M, and as this last-folded piece of paper was pasted beforehand by this operation of folding the second over the first the same will likewise be pasted together. The toe 12 acts now upon the lever V′, which by its connection, through the bell-crank W′, with the side slide N′ moves the latter over the end of the mold *h*, folding thereby the projecting piece of paper over the same. The toe 13 acts then upon the opposite side of the lever V′, and brings thereby the side slide N′ away again. When the side slide N′ is about half-way brought back again, the toe 9 acts upon the lever U, which by its connection with the lower slide O brings the same upward and over the end of the mold *h*, and at the same time the toes 1 act upon the levers S and S′, which by their connections, through the levers R and R′ and the rods *n* and *n*′, respectively, with the beams F and F′, and the connection of the latter with the upper slide O′, move this upper slide downward and over the end of the mold *h*. By those two last operations the top and bottom projecting pieces of paper have been folded over the end of the mold *h* and over the piece of paper which was folded before by the side slide N′. The toes 2 act then upon the opposite sides of the levers S and S′ and the toe 8 upon the opposite side of the lever U, bringing thereby the upper and lower slides O′ and O back again. During the return motion of those slides the toe 10 acts upon the lever V, which by its connection, through the bell-crank W, with the side slide N moves said side slide over the end of the mold *h*, thereby folding the paper projecting on that side over the end of the mold and likewise over the three other pieces which have been folded before over the end of the mold *h*, and as this last-folded piece of paper was pasted beforehand the same has by the last-mentioned operation of folding been pasted to the other pieces of paper which were folded first. The toe 11 acts then upon the opposite side of the lever V, bringing thereby the slide N back again, and the toe 17 acts upon the lever X′, whereby the top slide M′ is brought back, and leaving the box finished, folded, and pasted together on the mold *h*. During the time that this operation of folding the paper around the mold *h* has been going on the cam 18 has acted on the lever Z, and, through the connection of the latter with the pinchers P, the same have been pulled downward by the action of this cam 18 on said lever Z. In this downward motion of the pinchers P the projections *p p*′ on the pinchers P have passed over the elevations on the slides Q Q′, and have pressed thereby the pinchers P together, so that the same take hold of the finished paper box, which we have supposed to be on the lower mold *h*, and pull thereby said box off this mold *h*. As soon as the pinchers have been sufficiently far moved downward, so as to have pulled off the paper box clear of the mold, the projections *p p*′ leave the elevations on the slides Q Q′, and the pinchers are then forced apart by the action of their spring *k*′, thereby allowing the box to fall out from between said pinchers. During the downward motion of the beams F F′ the knife or stamp frame E and the pasting-frame G have been pressed down and upon the paper situated upon the table H′ and between the rollers D and D′ and held stationary at that moment by said rollers. By this action the stamps or knives attached to the under side of the frame E cut off a piece of paper the required shape necessary for one box, while the boxes with paste, situated within the pasting-frame G, have (by being pressed upon the paper) pasted that piece of paper in the required places which lies underneath the same and which was cut out by the former action of the stamp-frame E and has been pushed in that place by the former action of the rollers D D′. The cam 19 begins now again to act upon the lever P′, and the above-described actions will be repeated.

From the above description it will appear that during one revolution of the shafts B B′ a box has been completely folded and pasted together, the before-finished box has been pulled off from the mold, a piece of paper sufficient for a box has been cut off, and a formerly-cut-off piece of paper has been pasted in the required places preparatory for folding the next time.

The paper from which the boxes are to be made is fed into the machine from an endless roll situated near the after end of the same, and which is prepared beforehand, so as to have exactly the width required for a box, and the knives or stamps have therefore only to cut the ends the proper shape.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The application of a series of rollers connected together and worked by an arrangement of levers and toes or cams for the purpose of bringing paper from an endless roll and of a required length into the machine and pieces of paper previously shaped and pasted by the machine to the place required, substantially as described.

2. The application of a stamp-frame with suitable knives or stamps attached, situated

between the rollers, for the purpose of cutting off the paper the required size and shape from the endless roll necessary for one box.

3. The application and construction of the pasting-frame with paste-boxes situated between the rollers and arranged in such a manner as to paste the already shaped paper in the required places, as set forth.

4. The construction and application of a wheel with arms having at their extremity the molds attached around which the boxes are to be made, said wheel with molds being moved by an arrangement of a rod and lever actuated by a cam, in the manner as described.

5. The application and use of a series of slides for the purpose of folding the ends of the paper round the mold, said slides being worked by a combination of levers, &c., actuated by toes, in the manner as set forth.

6. The application and use of a pair of pinchers for the purpose of pulling the finished paper box off the mold, constructed and worked in the manner as set forth.

7. The construction of the outer mold formed by two projections attached to the frames, and a hinge-valve, and the operation and manner of working said valve, the various parts of the whole machine being combined and arranged for the purpose described.

LOUIS KOCH.

Witnesses:

HENRY E. ROEDER,

LAWRENCE MACK.