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C. S. BEALL

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PAPER FOLDING MACHINE

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Fig. 1.

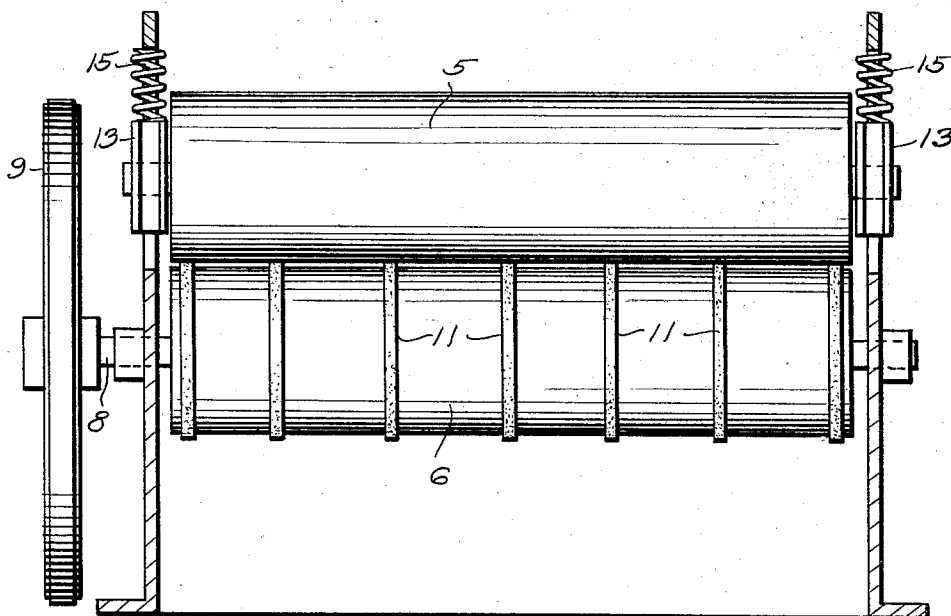
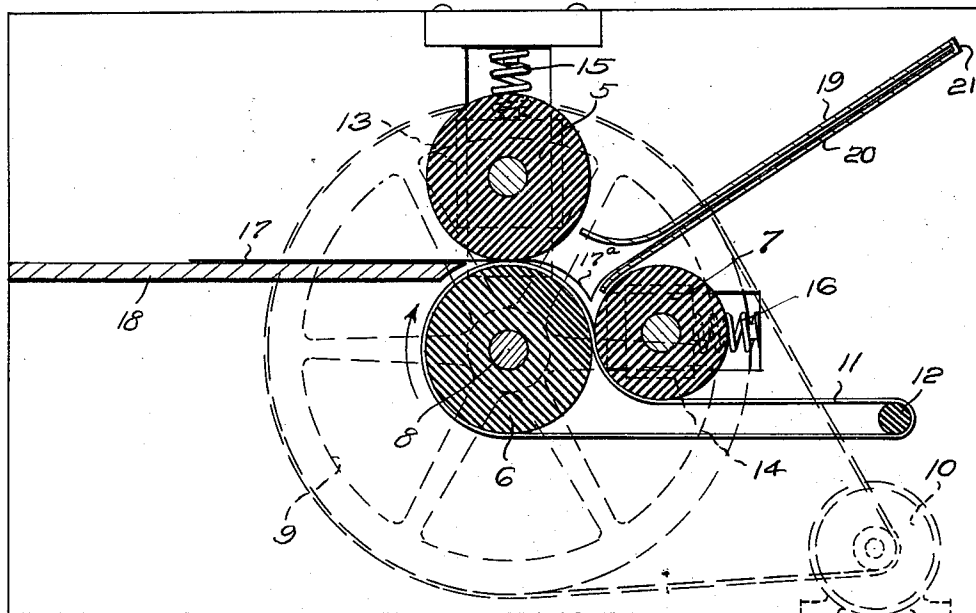


Fig. 2.

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PAPER FOLDING MACHINE

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This invention relates to a paper-folding machine and has for its object the providing of an exceedingly simple, economical and rapid-operating mechanism for making single folds in sheets of paper or other material, as hereinafter described.

The main feature of my invention is the arrangement in combination of a pair of rollers made of soft rubber, one of the pair being power-driven and the other being held in contact with the driven roller by means of springs in such manner that when the driven roller is caused to revolve, the frictional grip of its surface upon the surface of the other roller causes that roller to also revolve in a direction opposite to that of the driven roller, by means of which arrangement or combination of soft rollers, pressure may be exerted upon and motion imparted to a sheet of paper or other substance introduced to said rollers at their line of contact while they are revolving,—the friction of the surfaces of the revolving rollers on the surfaces of the paper or other substance causing said paper or other substance to be immediately caught by and drawn between the said rollers, emerging on the far side thereof, the forward motion of the paper or other substance continuing as long as there is any of it remaining between the rollers and they continue to revolve.

This feature occurs twice in the present invention, one power-driven roller operating by friction alone, two other rollers held in contact therewith.

Other improvements of my invention are:

(a) The placing of the rollers in a horizontal rather than a vertical position, so that the paper is fed to them flat and not standing on edge and passes immediately onto a flat surface, where it is supported by the force of gravity, no springs or other devices being necessary to hold the paper in alignment or to keep it from sagging, springing or turning up at the corners or edges during any part of the progress through the machine, or folding on a line different from the line desired.

(b) The use of friction-operated take-off tapes to deliver the folded paper.

These various improvements permit the

elimination of all expensive or noisy cog-wheels, chains, timing devices or gears of any nature, absolute accuracy of feed being assured by the tenacious grip of the soft rubber rollers on the paper fed between them, and result in a practically noiseless machine, so extremely simple and inexpensive in construction and time-saving in operation as to bring it well within the means of hundreds of small shops which at present are unable to afford the expense of a folding machine; and operating so rapidly that it will do all the folding needed in such shops, it being possible, with the use of my invention, to fold as many as four thousand sheets in an hour, and perhaps even more than that. It will be noted that the machine has no adjustable parts whatever aside from the paper guides on the feed table and the paper stop between the receiving plates or grids. Hence there is nothing apt to be lost, mislaid or broken or requiring time for adjustment, with the delays attendant thereon.

I have found by experiment that the machine will fold with equal facility all classes of paper stock amendable to folding without any need of scoring or slitting the paper along the line of the desired fold; also that the buckle produced by the machine is never so pronounced as to form a double fold in the paper, however rapidly the machine be operated.

The following is a description of the machine aided by the accompanying drawing in which

Fig. 1 is a vertical, sectional view of the apparatus of the invention, and

Fig. 2 is a view partly in transverse section and partly in end elevation, with the feed table removed.

Like numerals designate corresponding parts in both figures of the drawing.

The machine of the present invention is provided with three horizontally positioned rollers, 5, 6, and 7. These rollers are made of, or surfaced with, rubber or any equivalent thereof of such a degree of softness and elasticity as to frictionally grip, hold, feed and fold the paper in the manner presently to be described. The roller, 6, is a driven

roller receiving its movement through the shaft, 8, and pulley, 9, from a motor or other suitable source of power, 10.

(By inserting a handle or crank in the pulley, 9, it could be made to turn by hand power, or it could be operated by means of a foot treadle, though either of such methods of operation would be at a great sacrifice of speed.)

Take-off tapes 11 pass over the roller 6, under roller 7 and over a guide roll 12, but if it should be desired to reverse the direction of the take-off, they could be passed over roller 7, under roller 6 and over the guide roll 12, which in that case would be placed under the feed table in front of the rollers rather than behind them as in the drawing.

The rollers 5 and 7 receive their movement from frictional contact or engagement with roller 6, the rollers 5 and 7 being mounted in movable bearings set in sliding blocks 13 and 14, which are spring-actuated toward roller 6 by springs (preferably coil springs) 15 and 16, which operate to hold the rollers 5 and 7 in contact with roller 6 or with paper or other material introduced between roller 6 and roller 7 or 5 as the case may be.

The operation of the machine is as follows: Power being applied to roller 6, causing it to revolve from front to rear, this in turn causing rollers 5 and 7 to revolve in the opposite direction, a sheet of paper or other material to be folded which is indicated at 17, is fed forward over a feed table 18, which is fitted with adjustable guides for directing the paper or other material in its course toward the rollers, and is by the action of rollers 5 and 6 seized and carried forward and upwardly between guide plates or grids 19 and 20, set in an inclined plane at an angle of 45°, more or less, from horizontal, until the forward or upward edge of the paper strikes the stop 21, which is adjustable and so arranged as to close the channel between the plates or grids 19 and 20 at any desired distance from the roller 6, scales for regulating its position being marked on the upper side of the top guide plate or on the framework of the machine.

Contact of the forward edge of the paper with the stop 21 causes the intermediate or free portion of the paper to at once buckle or fold downwardly as indicated at 17^a, this downward buckling action continuing until the buckled portion of the sheet is caught between rollers 6 and 7 and folded, the whole sheet in folded condition being then drawn downwardly by the continued action of rollers 6 and 7 on the delivery tapes 11, which carry it off over the delivery roll 12.

So far as I am aware, I am the first to discover and provide anything of this nature or of such simple and inexpensive construction to rapidly and economically form single

folds in sheets of paper. However, it is apparent that if a sheet so folded were to be again fed through the mechanism, the operation would be repeated and a second fold produced, and further feeding would produce additional folds. Consequently, it is to be understood that the principles disclosed are applicable to machines wherein the mechanism here shown is duplicated or multiplied for the purpose of making two or more folds in the same sheet of paper or other material.

It is to be understood that the invention is not limited to the precise arrangement shown, but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims; and further, that the principles disclosed are applicable to machines wherein an arrangement in combination of soft-surfaced, spring-contacted rollers such as is herein described and the power of the friction developed by their manner of operation as herein set forth, is used for purposes other than the folding of paper, or for a variety of purposes.

Having described my invention, what I claim as new and desire to secure by Letters Patent is the following:—

1. A machine of the character described, comprising three horizontally-positioned rubber rollers, one of which is positively driven and the other two of which are frictionally engaged by said driven roller, a feed table with guides for conducting a sheet of paper to and between the driven roller and one of the other two, and means for guiding and stopping the paper on the far side of said rollers,—the remaining or third roller being so associated with the driven roller that when the intermediate portion of the paper is caused to buckle by contact of the forward edge of the paper with the stopping means, said third roller and the driven roller will grip the buckled portion of the sheet and draw it between them, producing a fold in said sheet.

2. A machine of the character described, comprising three horizontally positioned rubber rollers, one of which is positively driven and the other two of which are frictionally engaged by said driven roller, a feed table with guides for conducting a sheet of paper to and between said driven roller and one of the other two, and means for guiding and stopping the paper on the far side of the rollers, the remaining or third roller being so positioned in relation to the driven roller that when the intermediate portion of the paper is buckled by contact of the forward edge of the paper with the stopping means, said third roller and the driven roller will grip the buckled portion of the sheet and draw it between them, producing a fold in said sheet, and friction-impelled take-off tapes which travel between the two last mentioned rollers.

3. The arrangement in combination of a

power driven roller made of or surfaced with soft rubber or any equivalent thereof having the property of pronounced elasticity or resiliency with another roller made of or surfaced with a like substance, the said second roller being yieldably pressed against the said driven roller by means of springs in such a manner that when the driven roller is caused to revolve, the frictional contact of its surface and the surface of the second roller will cause said second roller to also revolve in a direction opposite to that of the driven roller, whereby pressure may be exerted upon and motion imparted to paper or other material introduced to said rollers at their line of contact while they are revolving, the pressure being produced by the springs and the motion by the frictional grip and pull of the surfaces of the revolving rollers on the upper and lower surfaces of the paper or other material so introduced between them.

4. A machine of the character described, comprising three horizontally-positioned rubber rollers, means for positively driving one of said rollers, means for yieldably pressing the other two of said rollers against the driven roller, a feed table with guides positioned for the feeding of paper between the driven roller and one of the non-driven rollers, a guiding and stopping means at the far side of the driven roller, and tapes passing between said driven roller and the other of the non-driven rollers, said guiding means being so associated with the last-named non-driven roller and the driven roller that when the intermediate portion of the paper is buckled downwardly it will be caught by and drawn between the driven roller and the last-named non-driven roller.

In testimony whereof he affixes his signature.

CLIFFORD S. BEALL.