2 Sheets—Sheet 1.

G. DUNCAN, W. A. & G. A. WILSON.

ROTARY PAPER-FOLDING MACHINE.

No. 185,898. Patented Jan. 2, 1877.

Fig 1

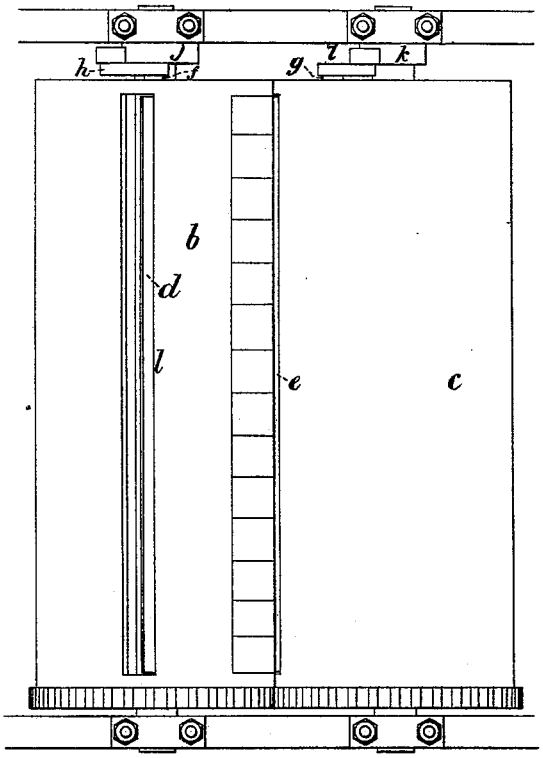
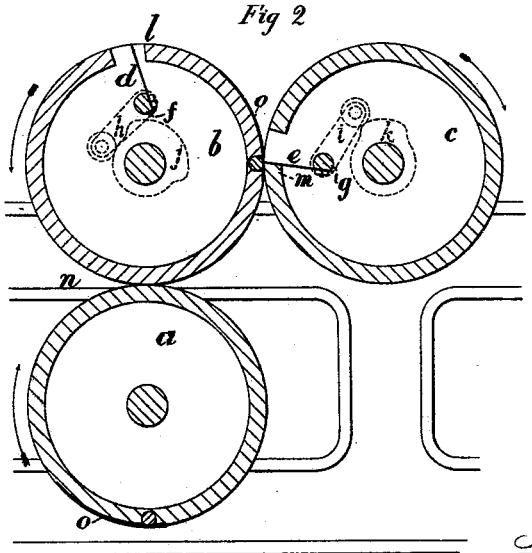


Fig 2



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2 Sheets—Sheet 2.

G. DUNCAN, W. A. & G. A. WILSON.

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Fig 3

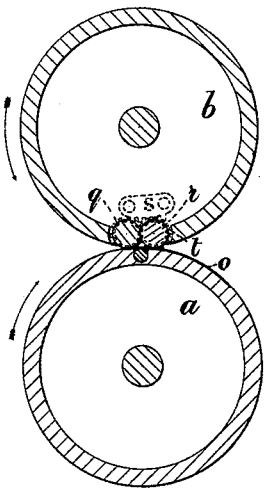


Fig 4

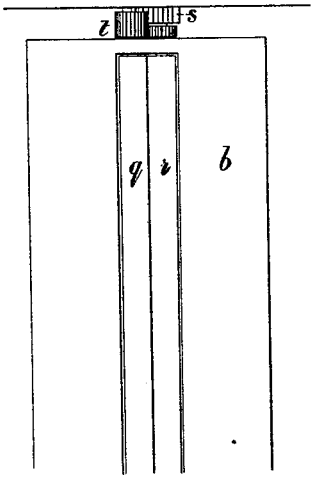


Fig 5

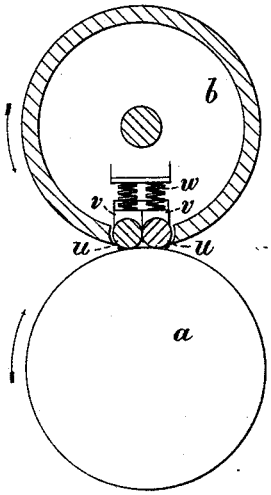
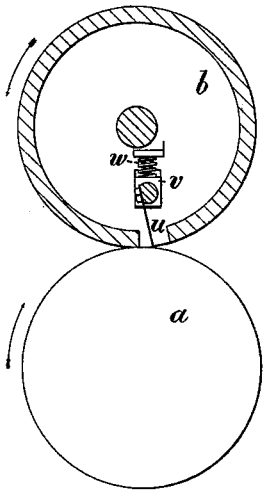


Fig 6



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UNITED STATES PATENT OFFICE.

GEORGE DUNCAN, WILLIAM A. WILSON, AND GEORGE A. WILSON, OF LIVERPOOL, ENGLAND.

IMPROVEMENT IN ROTARY PAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. **185,898**, dated January 2, 1877; application filed August 14, 1876.

To all whom it may concern:

Be it known that we, GEORGE DUNCAN, WILLIAM ASHLEY WILSON, and GEORGE ASHLEY WILSON, all of Liverpool, in the county of Lancaster, England, have invented new and useful Improvements in Rotary Paper-Folding Machines, which improvements are fully set forth in the following specification, reference being had to the accompanying two sheets of drawings.

This invention has for its object to provide simple and efficient means for folding sheets of paper, or paper as it issues from the printing-cylinders of a web-printing machine.

Hitherto paper has been folded either by means of a knife or blade doubling or creasing the said paper when stationary, and forcing it between two rotating rollers, or by means of a knife or blade secured on and projecting from a rotating cylinder, doubling or creasing the said paper when passing over such cylinder, and forcing the doubled or creased portion between gripers, rollers, or tapes contained in a second rotating cylinder.

Now, our invention consists, essentially, in the use of two rotating cylinders, between which the paper passes, and in one of which a wiper, scraper, lifter, or gatherer is employed to wipe, scrape, lift, or gather up, and carry forward from off the surface of the other cylinder, that portion of the paper where it is desired to make a fold. The folded sheet is then released, to receive a second fold or to be delivered, as desired.

Under a first modification, the said wiper, scraper, lifter, or gatherer consists of a knife or blade fitted in a groove, and caused, by means of a cam or its equivalent, to move over the surface of the other cylinder toward the edge or lip of the groove, and so wipe, scrape, lift, or gather up a portion of the paper between itself and the edge or lip of the groove.

Under a second modification, we employ in a rotating cylinder two rollers, which are caused to revolve when in contact with the paper on the surface of another cylinder, and by their revolution wipe or gather up and carry forward that portion of the paper where it is desired to form a fold.

To insure the correct action of the wipers, scrapers, lifters, or gatherers, we either so construct that portion of the surface of the cylinder from which the paper is wiped, scraped, lifted, or gathered that it shall be yielding or elastic—say, by means of curved springs—or we give a little in-and-out play to the said wipers, scrapers, lifters, or gatherers by means of springs, or their equivalents.

Figure 1 is a plan view, and Fig. 2 a sectional elevation, of apparatus illustrative of our invention. Here three cylinders, *a b c*, are employed for giving two folds to the paper. In the arrangement shown the paper is receiving the second fold. *d e* are the wipers, scrapers, gatherers, or lifters, formed of a thin sheet of metal, caused to vibrate, during the revolution of the cylinders, on the shafts *f g* by means of the arms *h i*. Springs may be used to keep the arms in contact with the stationary cams *j k*. The wiper or gatherer *d* is shown away from the lip *l*. The wiper or gatherer *e* is shown close to the lip *m*, so as to hold the portion of the paper lifted or gathered up. The paper enters the cylinders at *n*, and receives the first fold from the wiper or gatherer *d*, which carries round the double end of the paper until it arrives at the position shown on cylinder *b*, when it moves away from the lip and leaves free the double paper, which is wiped or gathered up at its center by the wiper or gatherer *e*, to produce a second fold. The paper is then delivered from the cylinder *c* to further folding mechanism, or as desired. When the paper entering at *n* is from a web, a knife is provided to cut the paper into sheets, and is placed, by preference, on the cylinder *a*. *o* are springs secured to the surface of the cylinders *a* and *b*, to provide an elastic surface for the wipers or gatherers to operate upon. India-rubber springs, as shown, may be inserted under the curved springs *o*, if desired.

Fig. 3 is a sectional elevation, and Fig. 4 a plan view, of a modification, in which rollers are used instead of a blade. *a b* are the cylinders; *q r*, wiping or gathering rollers, oper-

ated from the rack *s* by the gearing *t*. *o* are the curved springs.

Figs. 5 and 6 are modifications, in which the cylinders *a* are left smooth, and the wipers or gatherers *u* are allowed a little motion to and from the center of the cylinders by being fitted in bearings *v*. *w* are springs to cause the said wipers or gatherers to fit well up to the cylinders *a* when operating. The arrows show the direction of motion of the parts.

The above apparatus may be used in conjunction with any web-printing machine, or may be employed separately.

We do not herein claim, broadly, the combination of rotary folding devices with web-printing mechanism, or the combination of three cylinders having folding mechanism, the said devices and combinations being shown in English Patent 3,031 of 1870; but

We claim—

1. In a paper-folding machine, the combination of two folding-cylinders, one of said cylinders having gathering or lifting mechanism, substantially as described, for gathering or lifting the material from the periphery of the other cylinder, substantially as and for the purpose specified.

2. The combination of two folding-cylinders, one of said cylinders having gathering or lifting mechanism, substantially as described, for gathering or lifting the material, and the other cylinder provided with an elastic or yielding surface, substantially as and for the purpose specified.

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