

(No Model.)

4 Sheets—Sheet 1.

F. L. & S. G. GOSS.
PAPER FOLDING MACHINE.

No. 399,987.

Patented Mar. 19, 1889.

Fig. 1

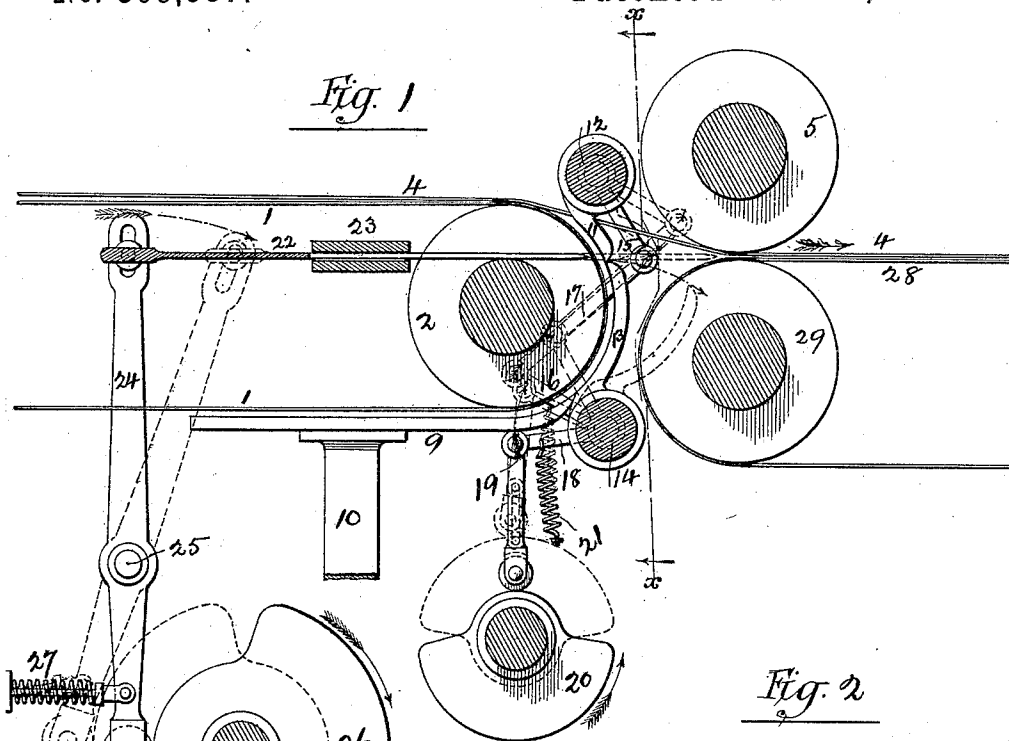
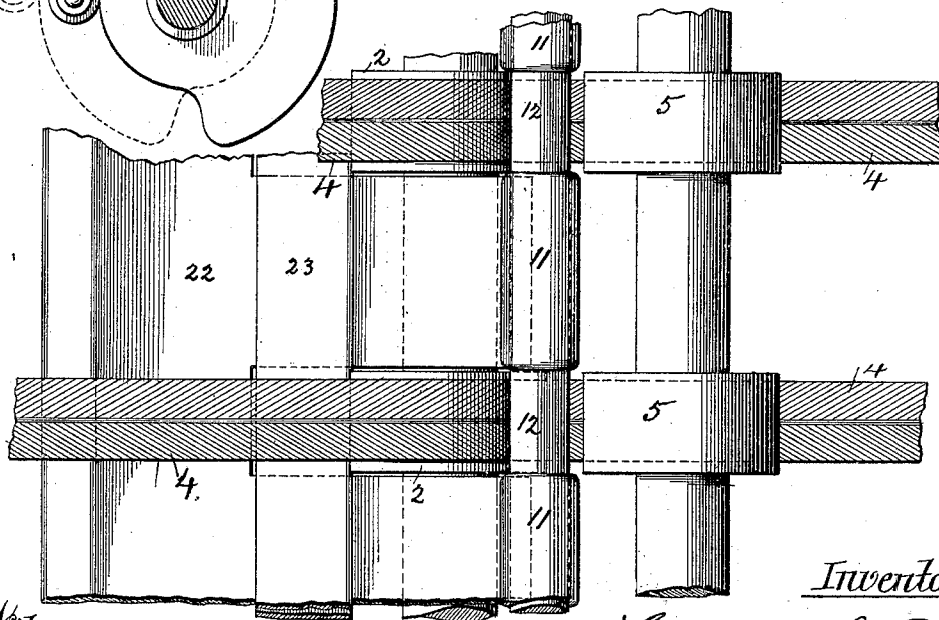


Fig. 2



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4 Sheets—Sheet 2.

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Fig. 3

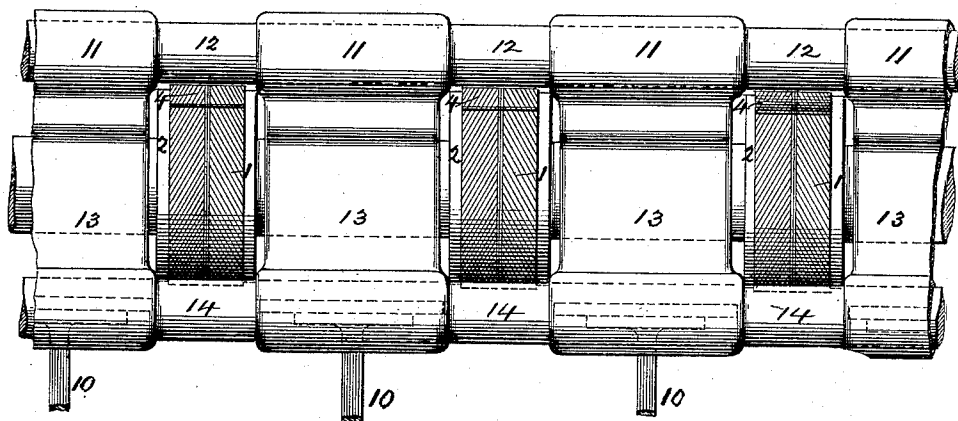


Fig. 4

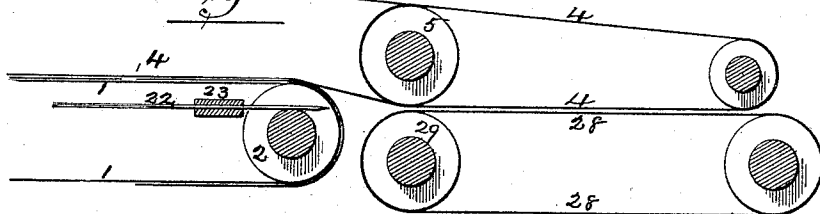
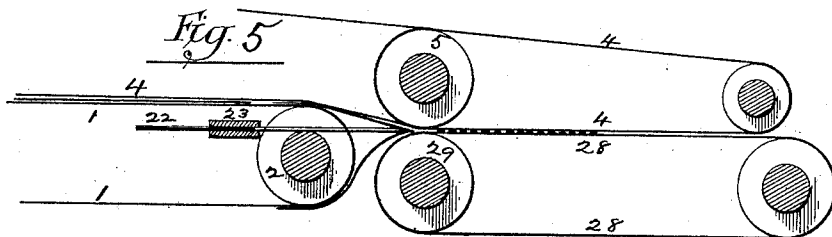


Fig. 5



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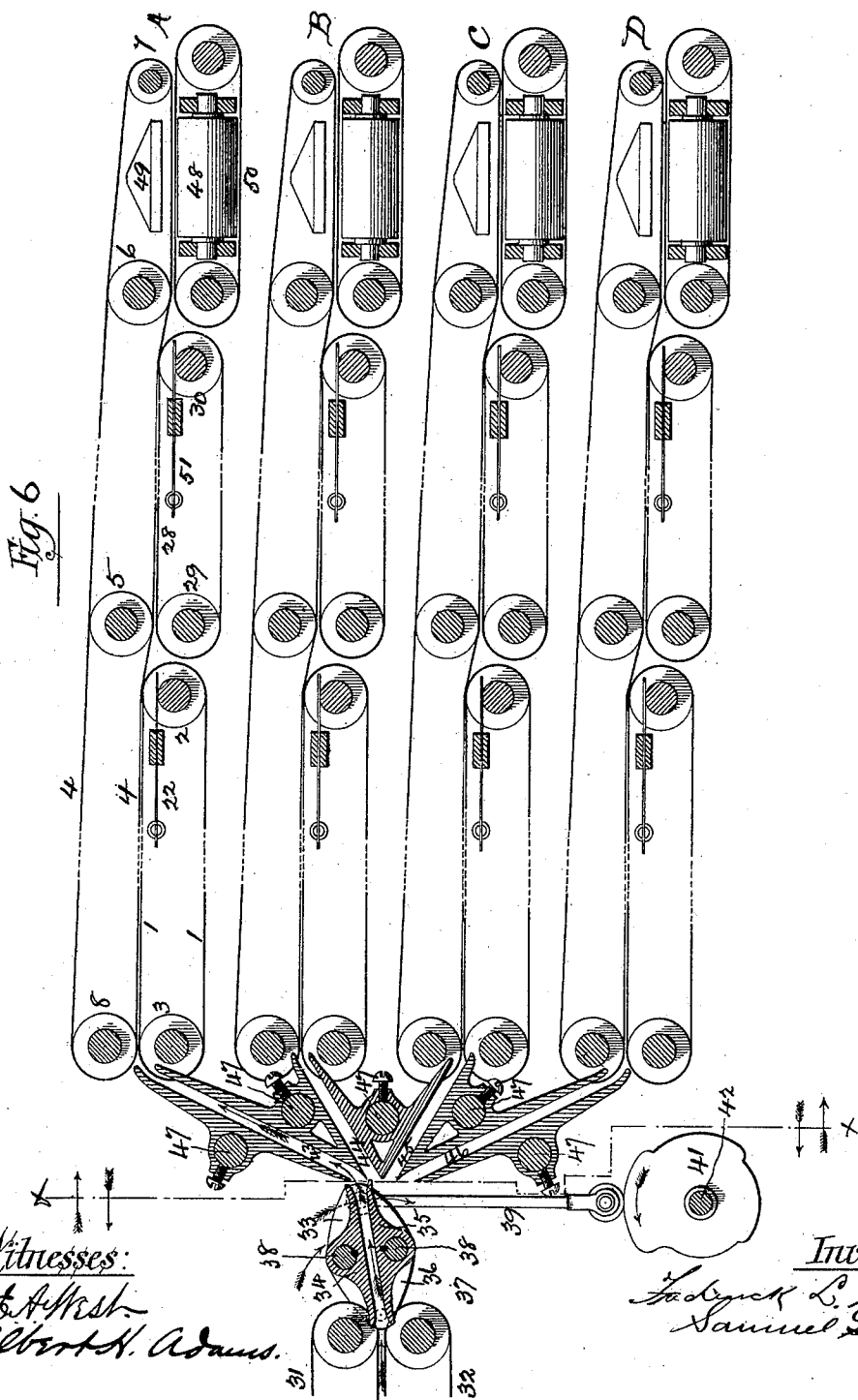
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(No Model.)

4 Sheets—Sheet 4.

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Fig. 7.

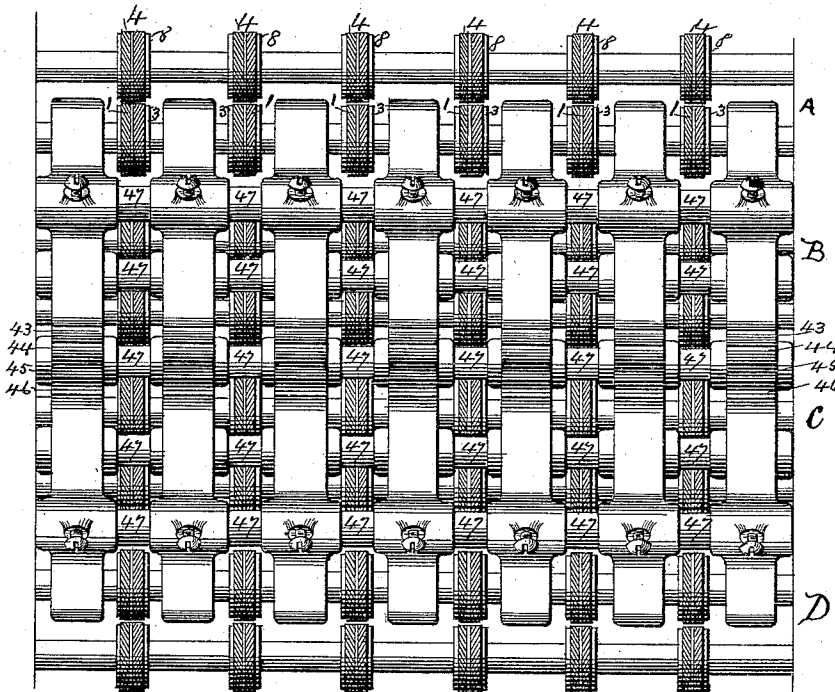
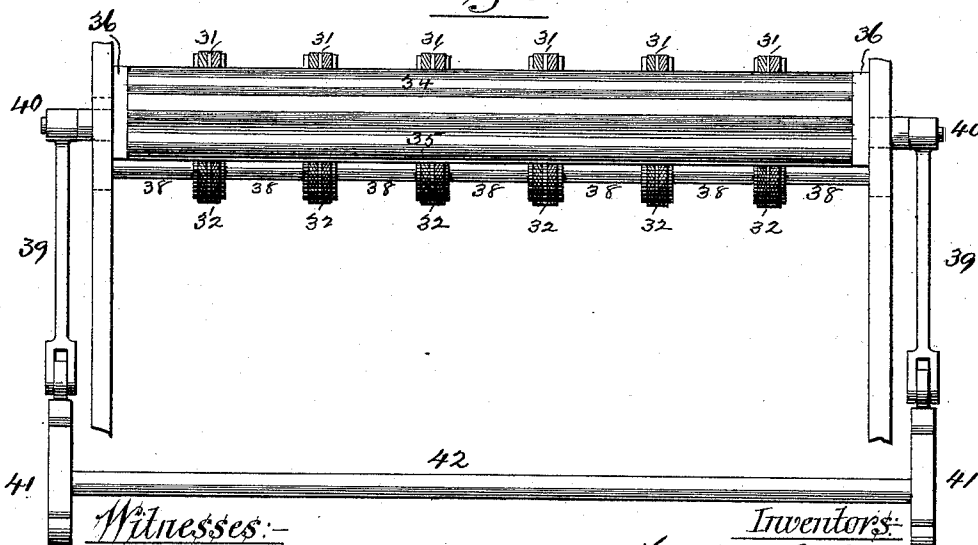


Fig. 8.



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UNITED STATES PATENT OFFICE.

FREDERICK L. GOSS, OF CHICAGO, AND SAMUEL G. GOSS, OF ENGLEWOOD,
ILLINOIS.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 399,987, dated March 19, 1889.

Application filed September 30, 1887. Serial No. 251,085. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK L. GOSS, residing at Chicago, county of Cook, State of Illinois, and SAMUEL G. GOSS, residing at Englewood, in the county of Cook and State of Illinois, and citizens of the United States, have invented a new and useful Improvement in Paper-Folding Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of our improved folding devices, showing so much as is necessary to be used in giving a single fold to a sheet, except that only a portion of the tape-pulleys is shown. Fig. 2 is a plan of the same. Fig. 3 is an elevation showing the parts which would be seen looking to the left at line $x x$ of Fig. 1, the levers which operate the guides and some other parts being omitted. Fig. 4 is a detail showing the position of a sheet ready to be operated upon by the folding knife or blade. Fig. 5 is a detail showing the position of a sheet and the knife when the latter has been thrust forward and the sheet is being folded the first time. Fig. 6 is a vertical longitudinal section showing a series of four folders, each adapted to fold a sheet three times, also showing a switch and means for directing the sheets to the several folders, the guides, levers, and some other parts being omitted. Fig. 7 is a vertical section at line x of Fig. 6 looking to the right. Fig. 8 is a vertical section at line x of Fig. 6 looking to the left. Figs. 1, 2, and 3 are all on the same scale. Figs. 4 and 5 are on a reduced scale, and Figs. 6, 7, and 8 are still more reduced.

The gear-wheels used for driving the mechanism are not shown in any of the figures and but very little of the frame.

Our invention relates to a mechanism for folding paper, and is primarily designed to be used in folding newspapers and other sheets issuing from a printing-machine.

Our invention consists in various improvements in the folding devices and in certain combinations of devices, all of which will be hereinafter fully set forth, and definitely pointed out in the claims.

In the drawings, 1 represents one of a series of tapes, which tapes run over suitable tape-

pulleys, one of which, 2, is shown in Fig. 1, the other series of the tape-pulleys for these tapes being represented by 3, Fig. 6.

4, Fig. 1, represents one of a second series of tapes which run over suitable pulleys, one of which, 5, is shown in Fig. 1. A suitable arrangement of the other pulleys for this series of tapes is represented in Fig. 6, in which these tapes 4 run over the pulleys 5, 6, 7, 8.

9 are a series of sheet-supports beneath the tapes supported on posts 10.

11 are guides rigidly secured to a shaft, 12, supported in suitable bearings.

13 are other guides rigidly secured to a shaft, 14, which is supported in suitable bearings.

15 is an arm or lever rigidly secured upon one end of the shaft 12.

16 is an arm or lever rigidly secured upon one end of the shaft 14.

17 is a rod or bar which connects the outer ends of the two arms or levers 15 16.

18 is another arm or lever secured to one end of the shaft 14.

19 is a bar pivoted at its upper end to the outer end of the arm 18. Its lower end carries a roller, which engages with a cam, 20, secured to a suitable shaft.

21 is a coiled spring the upper end of which is connected with the arm 18, and the lower end is connected with the frame of the machine.

22 is a folding blade or knife which passes through a guide, 23, which is suitably supported. The rear end of this blade is pivoted, by means of a stud in a slot, to the upper end of a lever, 24, which lever is pivoted at 25. The lower end of this lever carries a roller which engages with a cam, 26, secured to a suitable shaft.

27 is a compression-spring. The forward end of the knife is slotted so as to pass over the tape-pulleys 2, and when the knife is carried forward the tapes 1 will not come in contact with any part of the knife.

28 is one of another series of tapes running over suitable pulleys, one of which, 29, is shown in Figs. 1 and 6. These tapes 28 may run over other tape-pulleys, as indicated by 30, Fig. 6.

The cams 20 and 26 are so arranged that the former operates to open the guides 11 and 13 just before the other cam operates the blade.

5 In Fig. 6 we have shown a series of four folding-machines, one above the other, each adapted to make three folds, certain parts being omitted, the first and second folds being made by devices similar to those shown in 10 Fig. 1, and the third fold being made in the usual way by forcing the sheet between two rollers. In this figure 31 32 represent tapes which carry the sheets from a printing-machine. 33 represents a switch which consists 15 of two long plates or pieces of metal, 34 35, secured at their ends to metal plates 36, which plates are pivoted to the frame, as shown at 37. As shown, the plates or pieces 34 35 are placed upon rods 38, which rods are secured 20 to the plates 36.

39 are two bars. (See Figs. 6 and 8.) The upper end of each bar 39 is pivoted to a pin or stud, 40, upon one of the plates 36, which pins or studs pass through slots in the frame. 25 The lower end of each arm 39 carries a roller which engages with a cam, 41, which cams are secured to a suitable shaft, 42.

43 44 45 46 are four passages formed by suitable pieces of metal secured, as shown, 30 by set-screws upon suitable rods, 47, so that such pieces can be adjusted. These four passages lead one to each of the four folding-machines, which are duplicates of each other.

48, Fig. 6, represents one of two rollers, 35 between which the paper passes to be folded the third time.

49 is a folding-blade arranged and operated in the usual manner to force the sheet between the two rollers 48.

40 50 is one of a series of tapes which carries the sheets to the rollers 48.

51 is a second knife, which is the same as the knife 22.

We now designate the upper folding-machine in Fig. 6 by the letter A. The other 45 three folding-machines, B C D, are constructed in all respects the same as A, and therefore B C D need not be specifically described, and it is not necessary to indicate the several 50 parts by figures.

The cams 20, 26, and 41, as well as all other parts of the machine, are to be driven by gear-wheels or otherwise in any well-known manner.

55 The operation is as follows: We will first describe the operation of making one fold by means of the devices shown in Fig. 1. The sheet to be folded is supposed to pass between the tapes 1 and 4, being delivered to 60 such tapes as shown in Fig. 6 or in any other suitable manner. Tape 1, it will be observed, passes over the tape-pulleys 2, while the tape 4 passes on beyond the pulleys 2 to other tape-pulleys. The guides 11 and 13 being in the 65 position shown in Fig. 1, the paper will, when it reaches these guides, be deflected and guided downward, and a portion of it will

pass between the sheet-supports 9 and the tape 1. The cam 20 is to be so adjusted that at the proper time the guides 11 and 13 will be 70 opened, as indicated by dotted lines, through the action of this cam and the arms and levers 19, 18, 16, 17, and 15, and immediately thereafter, by the action of the cam 26 and the lever 24, the knife 22 will be thrust forward and will 75 come in contact with the sheet at the line where it is to be first folded, and will carry the sheet doubled forward to the pulleys 5 and 29 and tapes 4 and 28, by which the fold will be completed, as indicated in Fig. 5. At the proper 80 time the action of the springs 27 and 21 will return the knife and the guides to their former position, ready for the next sheet. Thus each sheet will be first carried over the tape-pulleys 2, and the first fold in each sheet will 85 be made, as before described, by the action of the knife 22, pulleys 5 and 29, and tapes 4 and 28, the sheet being taken and folded directly from the tape-pulleys 2 without arresting or retarding the movement of the 90 sheet. A second fold can be made in substantially the manner already described, the knife 51, for making such fold, being shown in Fig. 6. Of course it will be necessary to provide guides corresponding with 11 and 13 95 to act in connection with pulleys 30, also suitable devices for operating such guides, and also for operating the knife, the same as shown in Fig. 1. A third fold can be made by the devices shown in Fig. 6, the sheet, having been twice folded, being carried by tapes 100 to and over horizontal rollers, one of which, 48, is shown in Fig. 6, and then being forced down between said rollers by a knife, 49, in the usual manner.

In Fig. 6 we have shown four folding-machines, arranged one above the other, with devices for delivering the sheets to the several folding-machines, which devices operate 110 as follows: When the parts are in the position shown in this figure, a sheet from the printing-press will be delivered to and between tapes 31 32 in any well-known manner, and from these tapes each sheet will pass into and through the passage, through the switch 115 33. When the parts are arranged as shown in Fig. 6, the sheet delivered from the switch will pass up through the channel 43 to the tapes 1 and 4, and will be carried along and folded, as before described. The cam 41 is of 120 peculiar form, and is so arranged that at the proper time the switch will operate, the first movement of the forward end of the switch being down far enough to direct a sheet into the passage 44, the second movement of the switch 125 being down far enough to direct a sheet into the passage 45, the third movement carrying the front end of the switch down far enough to direct a sheet into the passage 46, and then the switch will be returned to the position 130 shown in Fig. 6. The sheets delivered to the several folding-machines B C D through the passages 44 45 46 will be folded in the manner before described.

When two or more folding-machines are used, one above the other, the cams 20 and 26 for the several machines can all be placed below the lowest folding-machine and be arranged in any suitable manner.

The principal parts of our folding-machine, except the cams, are in line and occupy but little vertical space, and hence four or more folding-machines can be arranged, one above another, in places where it would be impossible to use more than two folding-machines of the ordinary construction, one above the other.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a paper-folding machine, a series of tape-pulleys, as 2, and two series of tapes, as 1 and 4, in combination with movable guides 11 and 13 and a reciprocating folding-blade, substantially as and for the purposes specified.

2. In a paper-folding machine, a series of tape-pulleys, as 2, and two series of tapes, as 1 and 4, in combination with movable guides 11 and 13, a reciprocating folding-blade, and a series of tapes, as 28, substantially as and for the purposes specified.

3. In a paper-folding machine, a series of tape-pulleys, as 2, and two series of tapes, as 1 and 4, in combination with movable guides 11 and 13, sheet-supports 9, and a folding-blade, substantially as and for the purposes specified.

4. In a paper-folding machine, a series of tape-pulleys, as 2, and two series of tapes, as 1 and 4, in combination with movable guides 11 on a shaft, 12, movable guides 13 on a shaft, 14, cam 20, and levers and connecting-bars for operating the guides, substantially as and for the purposes specified.

5. In a folding-machine, two series of tapes, as 1 and 4, and a series of tape-pulleys, as 2, in combination with guides 11 and 13, cam 20, intermediate devices, substantially as described, for operating the guides by means of said cam, a reciprocating folding-blade, lever 24, and cam 26, substantially as and for the purposes specified.

6. In a folding-machine, the combination of tape-pulleys 2, guides 11 and 13, reciprocating blade, devices, substantially as described, for operating the guides which first conduct the forward end of the sheet around the tape-pulley and then are moved out of the path of the folding-blade and the sheet to be folded, devices for operating the folding-blade, substantially as described, two folding-rollers, as 48, a folding-blade, 49, and suitable conducting-tapes, 1, 4, 28, and 50, substantially as and for the purpose specified.

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