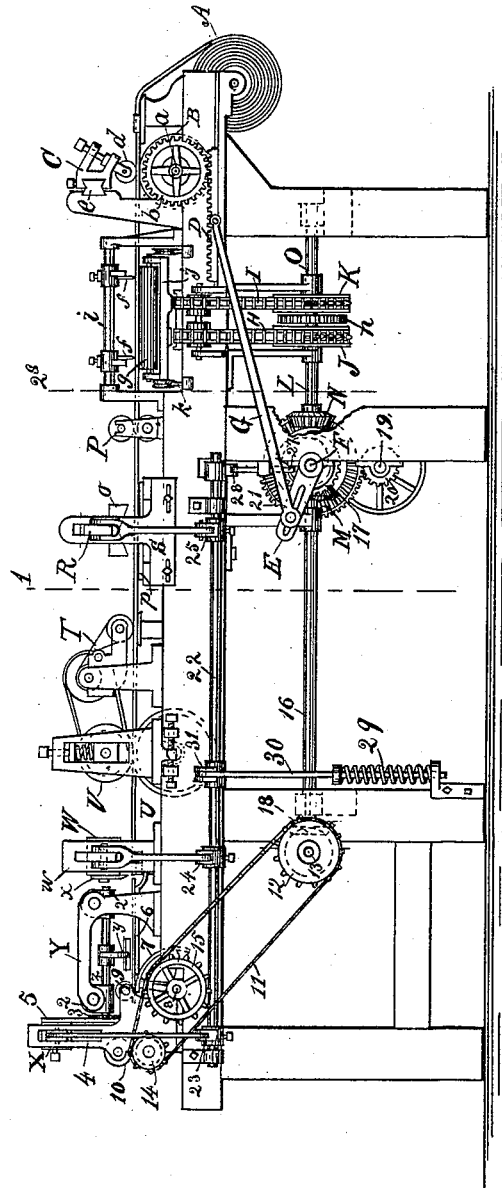
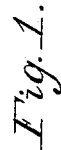


3 Sheets—Sheet 1.

No. 345,363.

Patented July 13, 1886.



WITNESSES:
 V M Hood
 Frank A. Jacob.

INVENTOR:
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(No Model.)

3 Sheets—Sheet 2.

I. T. BROWN.
PAPER BOX MACHINE.

No. 345,363.

Patented July 13, 1886.

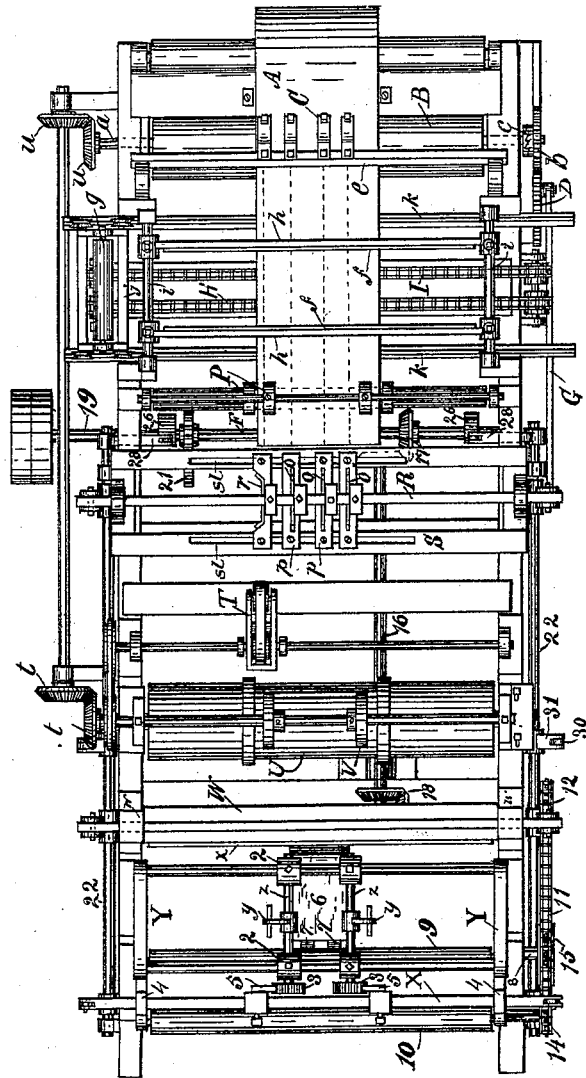


Fig. 2

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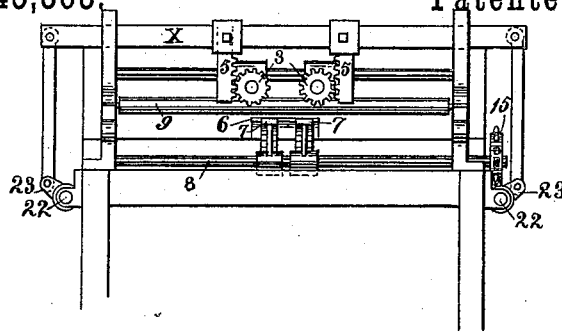


Fig. 3.

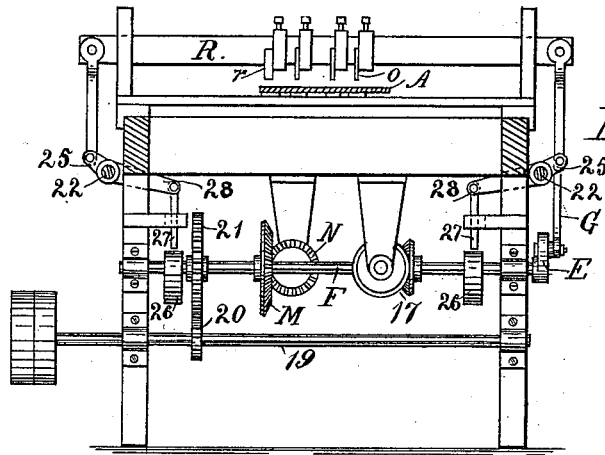


Fig. 4.

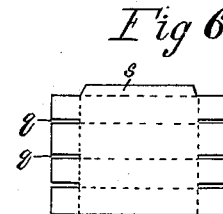


Fig. 6.

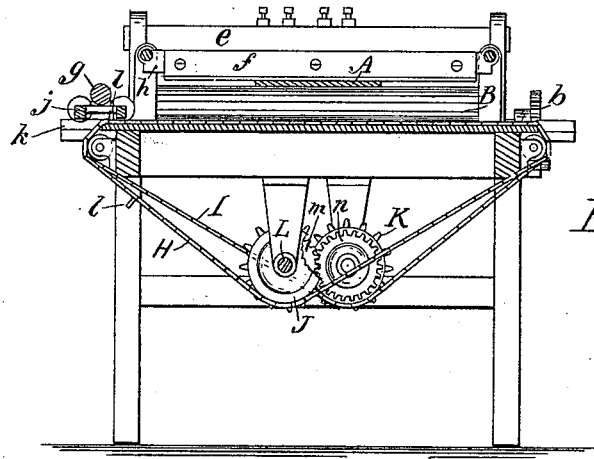


Fig. 5.

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INVENTOR:

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UNITED STATES PATENT OFFICE.

ISAAC T. BROWN, OF COLUMBUS, INDIANA.

PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 345,363, dated July 13, 1886.

Application filed January 20, 1885. Serial No. 153,413. (No model.)

To all whom it may concern:

Be it known that I, ISAAC T. BROWN, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Improvement in Paper-Box Machines, of which the following is a specification.

My invention relates to improvements in a machine for making boxes from a continuous sheet of pasteboard, for which Letters Patent No. 307,430 were issued to me, dated November 4, 1884.

The purpose of my invention is to combine in one machine improved devices for scoring a continuous sheet of pasteboard longitudinally and transversely to form the corners and overlapping parts of the boxes, cut the necessary kerfs between the pieces which form the ends of the box, apply paste to the overlapping edges, cut the box-blanks from the sheet, fold the blanks upon themselves, and press the overlapping edges together, these successive operations going on continuously as the pasteboard or like box material is fed from a roll through the machine, the boxes being discharged in a flat compact form, which is well adapted for packing and storing, and which may be quickly formed into a box by bending at the scored places.

The accompanying drawings illustrate my invention.

Figure 1 is a side elevation. Fig. 2 is a plan. Fig. 3 is an end elevation showing the means for operating the folding mechanism. Fig. 4 is a section at 1, Fig. 1. Fig. 5 is a section at 2, Fig. 1. Fig. 6 is a plan of a finished box-blank.

A is a roll of pasteboard, mounted horizontally on a suitable support on the main frame, so as to turn freely thereon.

B is a smooth cylinder, mounted on a shaft, *a*, having bearings in the main frame, on which shaft gear-wheel *b* is mounted, turning loosely thereon in one direction; but when turned in the opposite direction engaging the shaft and turning it by means of a clutch, *c*.

C is a well-known device for cutting or scoring box material. It consists of one or more sharp-edged wheels, *d*, mounted in adjustable supports on a transverse bar, *e*, and revolved

by contact with the pasteboard, and making longitudinal indentations or scores therein as it passes over the cylinder B. Cylinder B is turned intermittently forward by means of gear-wheel *b*, rotated alternately in opposite directions by a sliding rack-bar, D, actuated by a crank, E, secured to the main shaft F, and a connecting-rod, G.

The mechanism for forming the transverse scores consists of one or more straight knives, *f f*, and a pressure-roll, *g*. Said knives *f f* are secured to bars *h h*, which extend across the machine above the pasteboard, and are secured to the side bars, *i i*, so as to be adjustable longitudinally thereon, the edges of the knives being in contact with the upper surface of the pasteboard. The pressure-roll *g* is mounted on bearings in a truck-frame, *j*, which rests upon the transverse tracks *k k*.

For the purpose of propelling truck-frame *j* alternately in opposite directions across the main frame, two chain belts, H and I, having each a projecting lug, *l*, adapted to engage the frame, are carried in opposite directions under said truck-frame by means of a pair of sprocket-wheels, J and K, which engage said belts and are revolved in opposite directions.

J is secured to a short shaft, L, and is turned by means of bevel gear-wheel M on the main shaft and pinion N on shaft L, and K is secured to a short shaft, O, and is driven from shaft D by a pair of spur-gears, *m* and *n*.

P is a pair of guide-rolls, one of which has collars, which prevent the pasteboard from slipping edgewise.

o o are thick knives working through corresponding slots in plates *p p*, for the purpose of cutting out narrow kerfs *q*, Fig. 6, at each end of the box-blank, and *r* is a bent knife for forming the ends of the lap *s*, Fig. 6. Said knives *o* and *r* are adjustably secured to a transverse bar, R, adapted to slide vertically in a frame, S, to which the plates *p* are also adjustably secured, so as to correspond in position with the knives *o*. Said frame is adjustably secured to the main frame.

T is a well-known paste-distributing device for applying paste to the lap *s*.

U and V are a pair of feed-rolls, the lower one of which is connected by means of bevel-

gears *tt* and *uu* and shaft *v* with cylinder B, so as to move simultaneously therewith and at an equal rate of surface-speed. The object of said feed-rolls is to draw and hold smoothly the pasteboard during the processes of scoring, kerfing, pasting, and cutting into requisite lengths, and by their use in this position in relation to the devices for performing these operations the uncertainty in the movement of the pasteboard caused by the use of the conveyer-belts shown in my former machine is avoided.

W is a bar sliding vertically in standards *ww*, and carrying the shear-knife *x*, which separates the completed blanks from the sheet.

The folding mechanism consists of a pair of swinging arms, *yy*, secured to shafts *zz*. Said shafts rest at each end in bearings 2 2, which are adjustable along the bars of the supporting-frame Y. Spur gear-wheels 3 3 are secured to the outer ends of shafts *z*, and the shafts are partially rotated by the vertical movement of the bar X, which slides vertically in the standards 4 4 and carries the vertical rack-bars 5 5, which intermesh with the gear-wheels.

6 is a thin metal plate, for the purpose of receiving the completed blanks when severed from the sheet by knife *x*. The normal position of arms *y* is above the top line of plate 6 and the blank lying thereon, and when the rack-bars 5 5 move downward the arms are simultaneously moved downward and inward, thus folding the blank upon itself and around the plate. A pair of segmental wheels, 7 7, mounted on a shaft, 8, engage the end of the folded blank between themselves and a friction-roll, 9, and carry the blank forward to the pressure-rolls 10 10. Motion is imparted to shaft 8 and one of said pressure-rolls by means of a chain belt, 11, passing over a sprocket-wheel, 12, on shaft 13 and sprocket-wheels 14 and 15. Shaft 13 is driven by shaft 16 and miter-gears 17 and 18, connecting it with the main shaft. Said main shaft is driven by driving-shaft 19, carrying belt-pulleys, and pinion 20, intermeshing with gear-wheel 21. Sliding bars X, W, and R are actuated simultaneously during the intervals between the movements of the feed-rolls, while the sheet of box material is at rest, by the partial rotation of a pair of shafts, 22, there being one of said shafts mounted in bearings on each side of the main frame. Short levers 23, 24, and 25 are secured to said shafts opposite the ends of the bars, and the bars are connected therewith by links at each end. The shafts 22 are rotated outward, so as to draw the bars downward, by means of a pair of cams, 26, secured to the main shaft, one near each end. Said cams engage the ends of rods 27, which are pivoted to the inner ends of the inwardly-projecting levers 28 28, which are also secured one to each shaft 22. Shafts 22 are rotated in the opposite direction, so as to raise the bars, by means of a pair of springs, 29, one on each side, connected with the shaft by a rod, 30,

which is jointed at its upper end to a lever, 31, secured to the shaft.

The operation of my machine is as follows: The sheet of pasteboard is drawn from roll A over cylinder B, and worked by hand through the machine until engaged by the feed-rolls U and V. The main shaft is then put in motion. With the first half-revolution of said shaft rack-bar D is carried forward, gear-wheel *b* engages shaft *a* through clutch *c*, and the pasteboard is carried forward the length of one box-blank. At the same time the longitudinal scores are formed by wheels *d*, and the lug *l* on chain belt H has been brought into engagement with the inner side of truck-frame *j*, as shown in Fig. 5. Cams 26 have also been brought to the point of engagement with their respective rods 27. The completion of the revolution of the main shaft retracts rack D and draws truck-frame *j* with roll *g* across the main frame underneath the sheet of box material, forcing said material strongly upward against the transverse knives *f f*, thereby scoring the sheet of box material transversely. When the truck-frame *j* has reached the limit of its necessary movement, lug *l*, passing downward over the edge of the main frame, is disengaged from frame *j*, and the frame remains at rest until engaged by the lug *l* on chain H, moving in the opposite direction, which engagement takes place after the box material has been fed forward another stage.

In my former machine the transverse scoring-carriage was propelled by means of a chain permanently connected with the carriage, and passed around a pulley, which was rotated alternately in opposite directions by means of a segmental bevel gear-wheel. It was therefore necessary that the carriage should be stopped at an exact and fixed point against an unyielding stop, in order that the segmental gear-wheel might mesh properly with its pinion when re-engaging. Such sudden stoppage of the scoring-carriage was destructive to the machine, and is avoided in my present construction. At the same time that frame *j* is moving, and while the sheet of box material is still at rest, cams 26 have forced rods 27 upward, thereby rotating shafts 22 outward, and simultaneously bringing down the bars R and W, with their kerfing and cutting knives, and bar X, thereby operating the folding-arms *y*.

In my former folding device the plate 6 was inclined, so that the folded blanks were discharged therefrom by the force of gravitation. In my present improved machine the folded blanks are drawn from the plate 6 by means of the friction-roll 9 and wheels 7 7. It is necessary that said wheels 7 should be out of the way while the blank is folding, and they are therefore segments. It is also necessary that the folding-arms should remain in position for an instant after completing their closing movement, so that the folded box-blank may be engaged by the segment-wheels

7 before it is released by the folders. For this purpose a portion of the periphery of cams 26 is made concentric, so as to hold rods 27 at their highest point of movement for an instant before the cams pass from under the rods. The finished and folded blank is carried forward by wheels 7 7 till engaged by the pressure-rolls 10, which press the overlapping pasted edges together firmly as the blanks pass between them.

It is my intention to widen the main frame and duplicate the longitudinal scoring-wheels, the kerfing-knives, the folding-arms, and the wheels 7, so as to produce two boxes at once side by side from the same sheet of material; but to avoid complication in the drawings I have shown but one set of said scoring-wheels, knives, and wheels 7.

I claim as my invention—

1. In a machine for making boxes from a continuous sheet of material, a supporting-frame, a pair of feed-rolls, a cylinder, scoring-wheels opposed to said cylinder and arranged to score said sheet of box material longitudinally while passing over said cylinder, scoring-knives mounted transversely above said sheet of material and between said feed-rolls and scoring-wheels, and a pressure-roll arranged to operate substantially as described, for pressing said material against said transverse scoring-knives, all combined and adapted to co-operate substantially as specified.

2. The supporting-frame, the transverse scoring-knives, the transverse track on said frame, the truck-frame carrying a pressure-roll and adapted to move on said track, two belts passing over suitable pulleys beneath said truck-frame, and each having a projecting lug for engaging said truck-frame, shafts carrying said pulleys, a main shaft, and intermediate connecting mechanism, whereby said belts are caused to move continuously in opposite directions beneath said truck-frame, substantially as and for the purpose specified.

3. In a machine for making boxes from a

continuous sheet of material, the combination, with a vertically-moving bar carrying a series of kerfing-knives, a vertically-moving bar carrying a shear-knife, a suitable supporting-frame, and a main shaft mounted in bearings on said frame, of a pair of shafts mounted longitudinally on opposite sides of the supporting-frame, levers secured to said shafts opposite said bars, links connecting said levers and bars, and intermediate mechanism connecting said main shaft and said longitudinal shafts, whereby the longitudinal shafts are rocked at each revolution of the main shaft, and said kerfing and shear knives are operated simultaneously, substantially as and for the purpose specified.

4. In a machine for making boxes from a continuous sheet of material, a main supporting-frame, a main shaft, a series of kerfing-knives, a shear-knife, and a folding device of the class shown and described, all mounted in successive order on the main frame, a pair of shafts mounted longitudinally, one on each side of the main frame, levers secured to said shafts opposite to and connected by links with said kerfing-knives, shear-knife, and folding device, and intermediate mechanism connecting said main shaft and said longitudinal shafts, whereby the longitudinal shafts are rocked at each revolution of the main shaft, and the kerfing-knives, shear-knife, and folding mechanism are operated simultaneously, all combined and adapted to co-operate substantially as specified.

5. Frame Y, shafts *z z*, having spur gear-wheels 3 3 and arms *y y* secured thereto, adjustable bearings 2 2, plate 6, bar X, and adjustable-rack bars 5 5, all combined substantially as and for the purpose specified.

6. The combination, with pressure-rolls 10 10 and plate 6, of shaft 8, wheels 7 7, and friction-roll 9, for the purpose specified.

ISAAC T. BROWN.

Witnesses:

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J. A. SIBLEY.