No. 631,392. Patented Aug. 22, 1899.

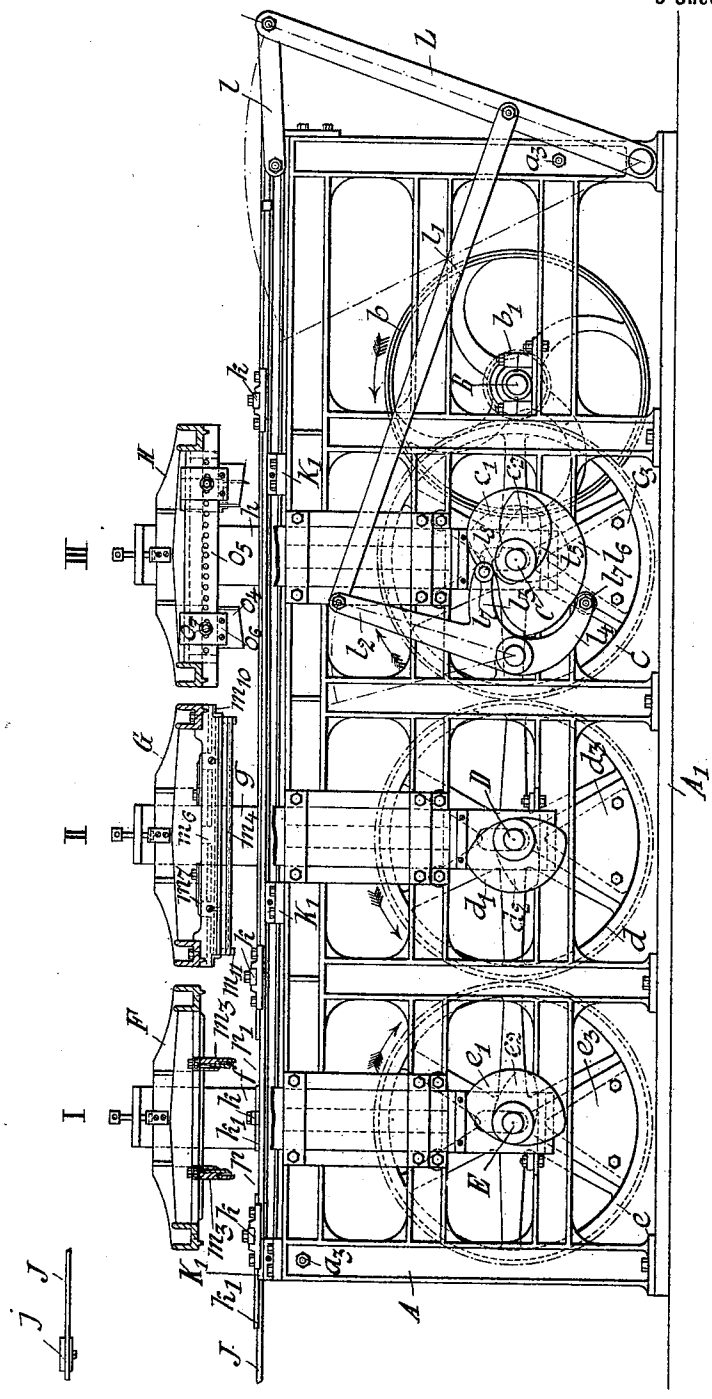
J. BINDER.

MACHINE FOR MAKING PAPER BOX BLANKS.

(Application filed Mar. 28, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses.
Josef Prohaska
Albert Ketterer.

Inventor.
Johann Binder
per Anton von Stern
Attorney

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(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

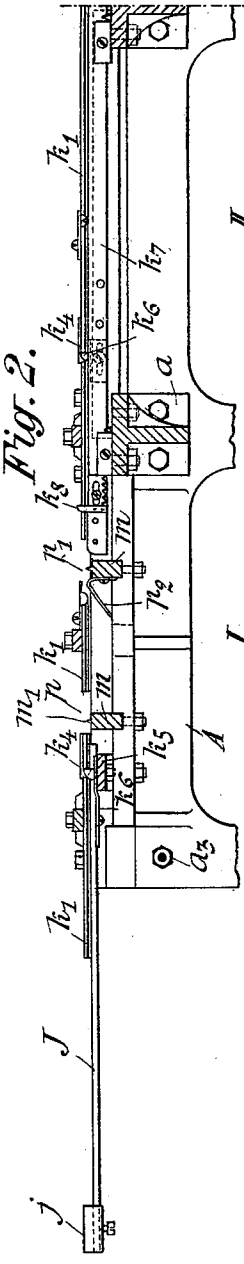
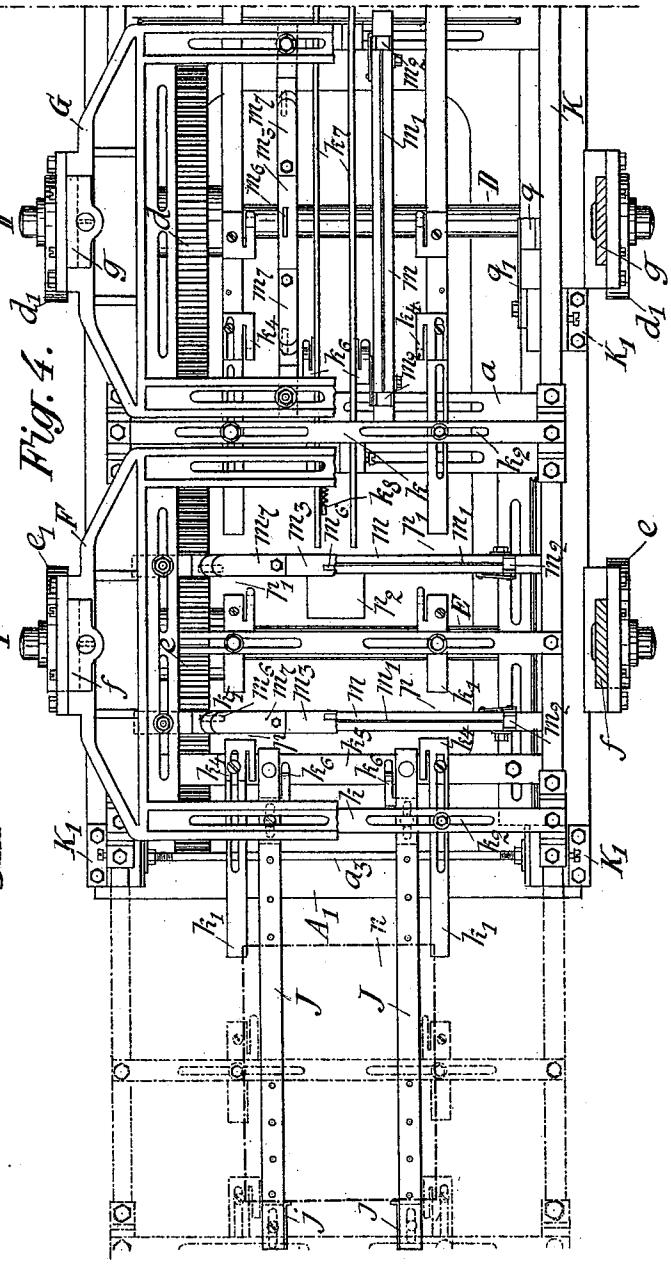


Fig. 4.



Witnesses.
Josef Prohaska
Albert Ketterer.

Inventor.
Johann Binder
per Anton von Stern
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

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(No Model.) 5 Sheets—Sheet 3.

Fig. 3

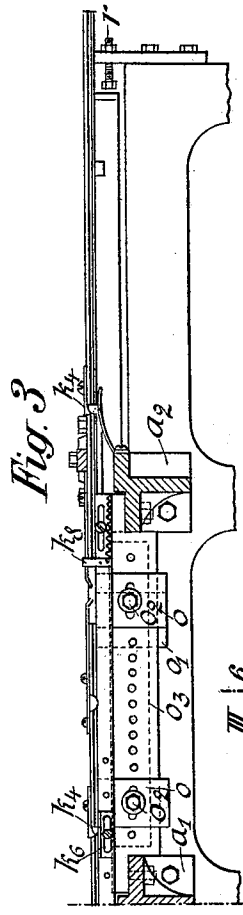
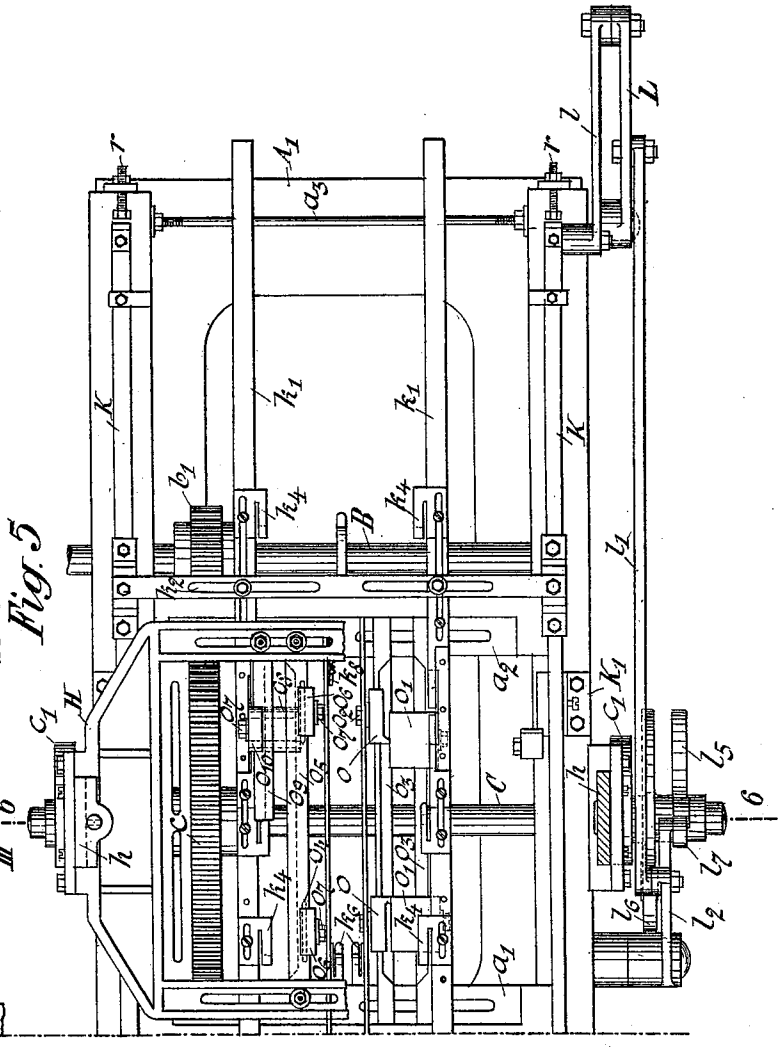


Fig. 5



Witnesses.
Josef Prohaska
Albert Ketterer.

Inventor.
Johann Binder
per Anton von Steer
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(Application filed Mar. 28, 1899.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 6.

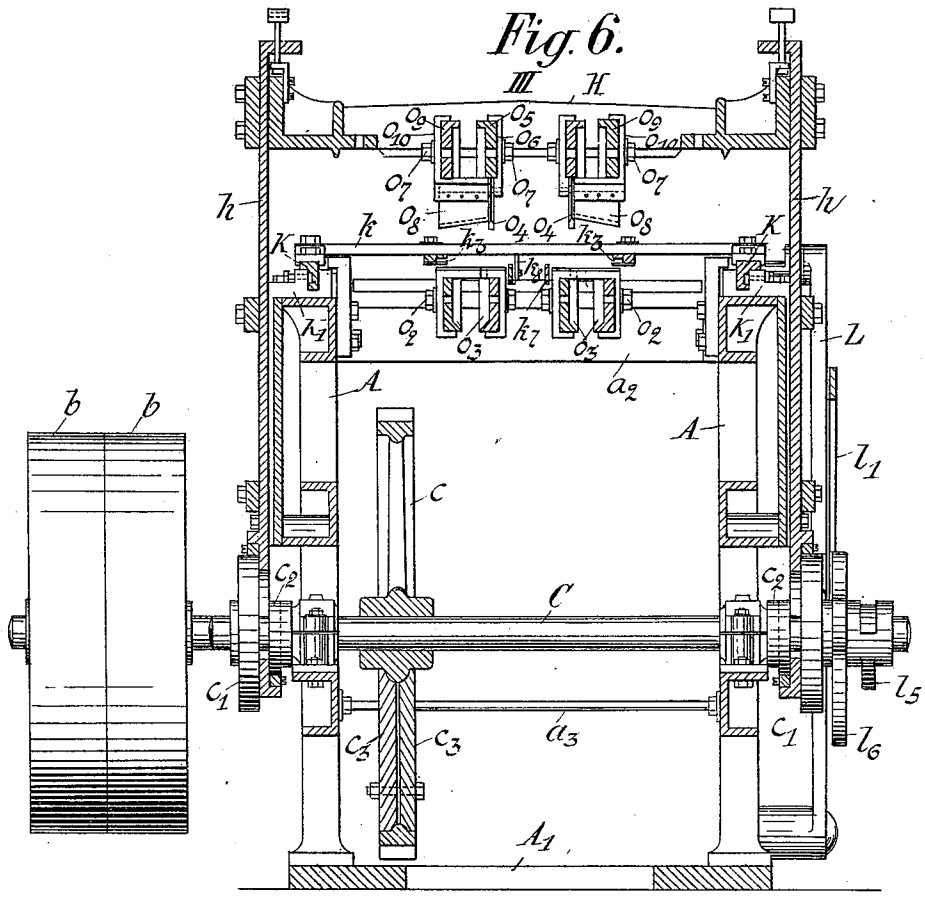


Fig. 7.

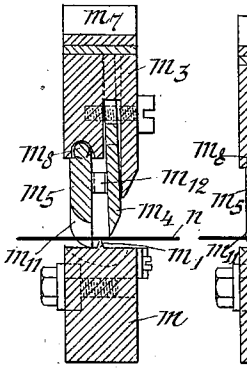


Fig. 8.

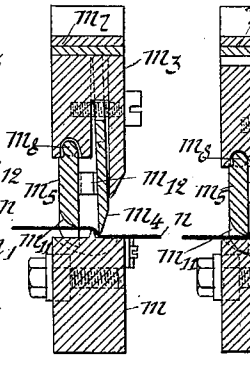


Fig. 9.

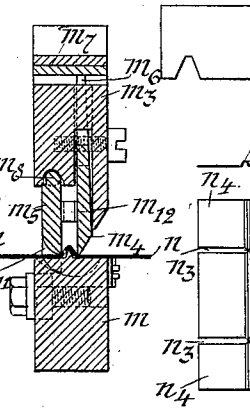


Fig. 10.

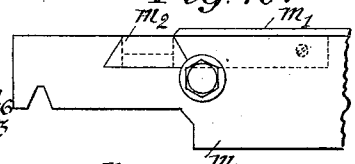


Fig. 11.

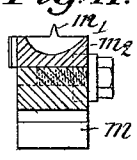


Fig. 12.

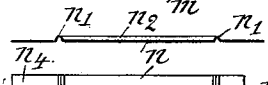
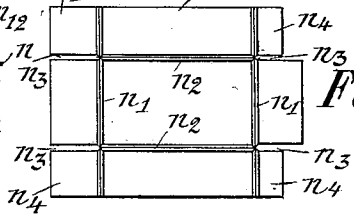


Fig. 13.



Witnesses.
Josef Prohaska
Albert Ketterer.

Inventor:
Johann Binder
per Anton von Herr
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

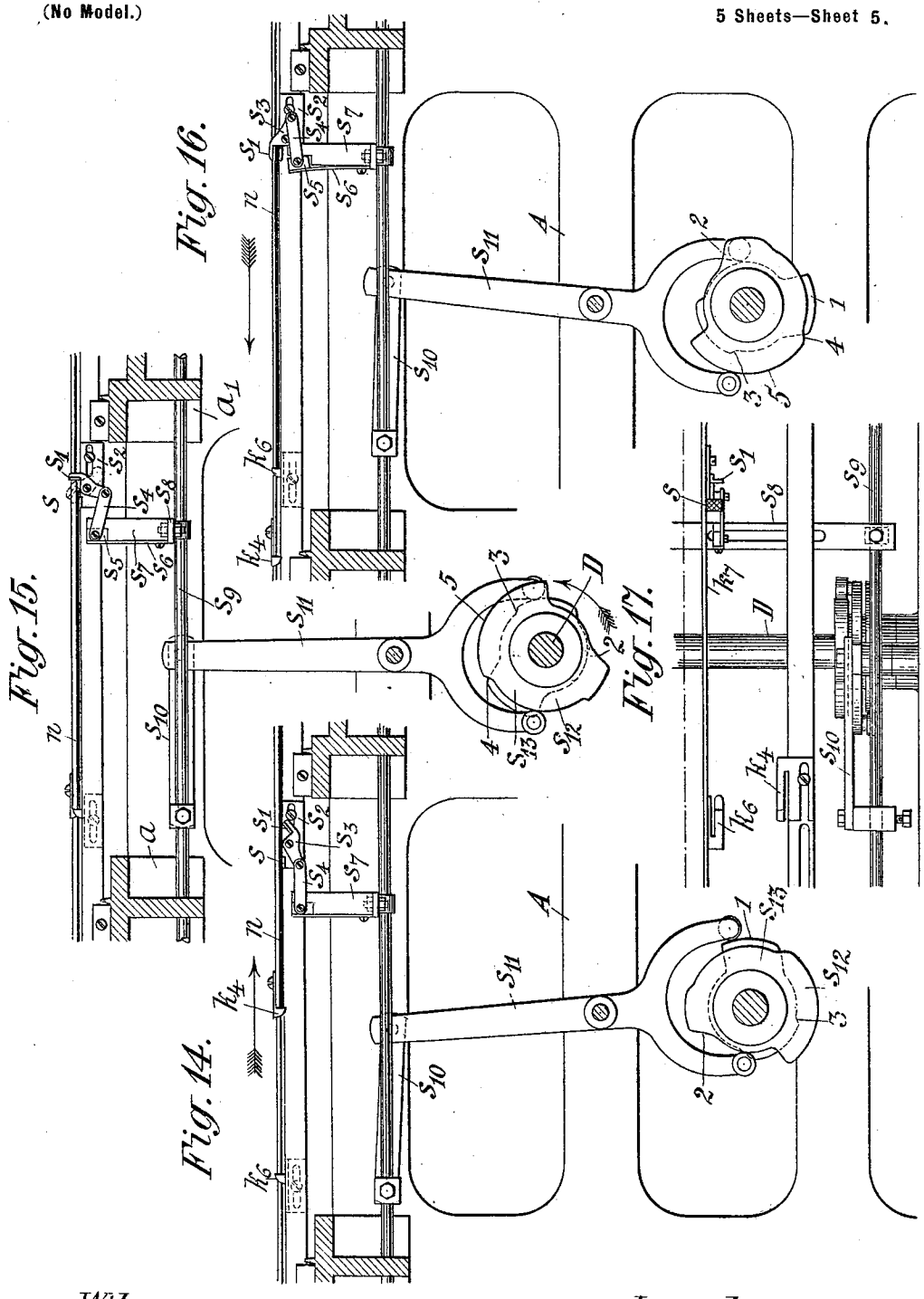
No. 631,392. Patented Aug. 22, 1899.

J. BINDER.

MACHINE FOR MAKING PAPER BOX BLANKS.

(Application filed Mar. 28, 1899.)

(No Model.) 5 Sheets—Sheet 5.



Witnesses
Josef Prohaska
Albert Ketterer.

Inventor:
Johann Binder.
per Anton von Herr
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHANN BINDER, OF VIENNA, AUSTRIA-HUNGARY.

MACHINE FOR MAKING PAPER-BOX BLANKS.

SPECIFICATION forming part of Letters Patent No. 631,392, dated August 22, 1899.

Application filed March 28, 1899. Serial No. 710,771. (No model.)

To all whom it may concern:

Be it known that I, JOHANN BINDER, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria and Empire of Austria-Hungary, have invented a new and useful Improvement in Machines for Making Pasteboard-Box Blanks, of which the following is a specification.

My invention relates to mechanical means for stamping two pairs of parallel grooves in cross directions in square pasteboard sheets and for punching out the slots running from the four intersections of the grooves to the edges of the sheet, so as to admit of the four sides of the box being fitted.

The invention has mainly for its object to provide grooving-dies, which permit two parallel grooves to be simultaneously stamped in the pasteboard without exerting a strain upon that portion of the material between the two grooves.

Furthermore, the invention has for its object to so construct a machine fitted with the improved grooving-dies that pasteboard sheets successively fed into one end of the machine leave the other end in the shape of grooved and slotted box-blanks.

According to my invention the grooving-dies, which, as usual, consist of a bottom die having a longitudinal rib and an upper die having two movable cheeks, are so constructed that in a pair of grooving-tools required for simultaneously stamping two parallel grooves in the pasteboard the inner cheeks of both upper dies first force downward the pasteboard resting upon the ribs of the two under dies, the outer cheeks of the upper dies not operating until later. Owing to this construction and consequent operation of the grooving-tools, the inner cheeks of the upper dies are enabled to draw the material required for forming the grooves from the outer sides of the ribs of the bottom dies across the said ribs. In order to effect this operation, the inner cheeks are so suspended from their carriers or die-bodies that they can move vertically in their seats to a certain extent, springs being provided for keeping them in their lowermost position when they are not pressed onto the pasteboard introduced between the upper and bottom dies. The outer cheeks are hinged to the carriers and have their ends provided with downwardly-extending projections, to which inclined surfaces formed in recesses or the like in the bottom die, near both ends of the said die, correspond. A spring keeps the cheeks of the upper die apart when the said die is not operating. Before the upper dies are lowered their inner cheeks extend farther downward than the outer cheeks, so that on the dies being lowered they first act on the pasteboard, then while the pressure on the upper dies continues the springs acting on the inner cheeks yield, and the cheek-carriers, with the hinged outer cheeks, descend. Under the action of their projections sliding along the inclines the outer cheeks, having forced downward the pasteboard, swing toward the ribs of the bottom dies. The wedge-shaped inner cheeks at the same time enter their seats in the carriers and are thereby equally pressed against the ribs of the bottom dies.

In the machine a frame-shaped carriage is intermittently reciprocated upon a work-table over which three frames, carrying transverse upper dies, longitudinal upper dies, and male punches, respectively, are arranged, these frames being provided with suitable mechanism whereby they are kept raised while the carriage is moving and lowered and subsequently raised while the carriage is at rest. The said frame-shaped carriage is provided with guideways for the lateral edges of the sheets of pasteboard and with downwardly-projecting spring-grips adapted to feed a sheet of pasteboard placed upon the rear end of the work-table upon which spring-stops for the said sheet are arranged. In its operation the said carriage first moves beyond the place where the sheet of pasteboard is to be operated upon and afterward a given distance backward, when the said sheet is stopped by the spring-stops in the requisite position.

In machines for working thin pasteboard, which is liable to crowding in the guideways for its lateral edges while the carriage moves backward in order to feed in a new sheet, I provide tongs adapted to seize the front edges of the sheets and to hold them fast while the carriage is moving backward.

Upon the work-table there are arranged at three successive points transverse bottom

dies, longitudinal bottom dies, and female punches.

As when making narrow boxes it is necessary to cut off a portion of the flaps outside the punched slots, provision is made for securing suitable knives to the frame carrying the male punches, and in order to allow these knives to pass by the female punches these latter are composed of two relatively adjustable parts.

In order to make my invention fully understood, I shall hereinafter describe the same in detail, with reference to the accompanying six sheets of drawings, in which—

Figure 1 is a side elevation of my improved machine, the rear ends of the bars upon which the pasteboard sheets to be operated upon are placed being shown separately and the frames carrying the upper dies and male punches being shown in section. Figs. 2 and 3 are the left-hand half and right-hand half, respectively, of a sectional side elevation of the work-table of the machine, drawn on a larger scale. Figs. 4 and 5 are the left-hand half and right-hand half, respectively, of a top view of the machine, one-half part of the frames carrying the upper dies and male punches being broken away for showing the underlying parts. Fig. 6 is a sectional end elevation of the machine on line 6 6, Fig. 5. Figs. 7, 8, and 9 are sectional side elevations, on a larger scale, of the grooving-tool in three successive positions. Figs. 10 and 11 are a side elevation and cross-section, respectively, of one end of a bottom die. Figs. 12 and 13 are an edge view and top view, respectively, of a pasteboard-box blank made by my machine. Figs. 14, 15, and 16 are sectional side elevations showing three successive positions of one of the tongs withholding the pasteboard sheets while the feeding-carriage is moving backward. Fig. 17 is a top view of the said tongs and the mechanism operating it.

Referring to Figs. 1, 2, 3, 4, and 5 of the drawings, the work-table mentioned above is formed of the two lateral frames A A, the cross-bars a a' a^2 connecting them, the stay-rods a^3 a^3, and the base-plate A'.

For operating, in the described way, the carriers of the upper dies and the male punches, and the feeding-carriage, the following mechanism is provided.

The driving-shaft B, carrying the belt-pulleys b b, transmits the movement by means of the pinion b' to the three toothed wheels c d e, meshing with one another, being of equal diameter and keyed to the shafts C, D, and E, respectively, which operate the tool-carriers. The said tool-carriers F, G, and H have the shape of frames extending across the work-table and having their lateral ends adjustably connected with slides f f g g h h, respectively, for which suitable guideways are formed on the outer faces of the frames A A. By means of the cams c' d' e', secured to the ends of the shafts C D E, respectively, the said slides are raised and kept in raised position during a certain time, whereafter they are lowered by the cams c^2 d^2 e^2, respectively, with which both ends of the said shafts are supplied. The weights c^3, d^3, and e^3, secured to the toothed wheels c, d, and e, respectively, counterbalance the tool-carriers F G H and the slides f g h.

The reciprocating frame, having for its office to feed the pasteboard sheets while the tool-carriers F G H are raised from the projecting bars J J to the working place I below the tool-carrier F, or thence to the working place II below the tool-carrier G, or, again, from the working place II to the working place III below the tool-carrier H, and finally out from the machine, consists of two longitudinal bars K K, suitably guided in chairs K' and connected with each other by a number of cross-bars k k k k. To the said cross-bars k are adjustably secured, by means of screws passing through slots k^2, the longitudinal bars k', in the inner sides of which are formed the guide-grooves k^3 (see Fig. 6) for the lateral edges of the pasteboard sheets and which carry the spring-grips k^4. When the feed-carriage K K k k k k is in its rearmost position, (shown in dots in Fig. 4,) the hindmost ones of the spring-grips k^4 are placed behind the rear edge of the sheet of pasteboard n (likewise shown in dots) and having its front portion introduced into the guide-grooves k^3. The operator, laying the pasteboard sheets upon the bars J J and introducing the front end of each sheet into the guide-grooves k^3 k^3, causes the rear edge of the sheet to abut against the adjustable angle-iron stops j j. By the following front stroke of the feed-carriage the rear edge of the pasteboard sheet is carried beyond the spring-stops k^6, which are secured to the flat sheet-supporting bars J J, these latter being adjustably connected with the cross-bar k^5 of the machine-frame, adapted to be shifted forward and rearward. A subsequent short backward movement of the feed-carriage causes the rear edge of the pasteboard sheet to abut against the stops k^6, whose position corresponds to that in which the pasteboard sheet is to be operated upon.

When the machine is run rapidly, the pasteboard sheet may, when the movement of the feed-carriage is reversed, slide farther forward under the action of its *vis viva*. In order to prevent that, the flat bars k^7 k^7, which are edgewise secured to the three anterior cross-bars k k k, have pivoted to them stops k^8, held in upright position by springs. To the said longitudinal bars k^7 are also adjustably secured the spring-stops k^6, corresponding to the working places II and III.

It has been stated hereinbefore that the feed-carriage first moves rearward in order to seize the pasteboard sheet with the spring-grips k^4, afterward, sufficiently forward to carry the rear edge of the pasteboard sheet beyond the spring-stops k^6, and finally rearward again such a measure as to cause the

rear edge of the pasteboard sheet to abut against the said stops. In order to impart to the feed-carriage the movements referred to, the same is, by a link l, connected to a lever L, pivoted to the machine-frame and geared by means of another link or connecting-rod l' with the arm l^2 of an angular lever. The other arm of this angular lever is formed by the fork branches l^3 and l^4, located in different planes and carrying at their ends anti-friction-rollers l^7, which bear against cams l^5 and l^6, respectively. The cams l^5 and l^6 are keyed to the shaft C. The cam l^6 keeps, by means of the portion of its circumference concentric to the axis, the feed-carriage in advanced position while the tools are working. This stage of the operation is illustrated in Fig. 1. The cam l^5 moves the feed-carriage backward to receive a new sheet of pasteboard and keeps it a short time in withdrawn position, whereupon the cam l^6 begins to work the advance. As soon as the front stroke is at an end the short eccentric portion l^8 of the circumference of the cam l^5 produces a short rearward movement of the feed-carriage for the purpose already explained.

The bottom dies m of the grooving-tools, which are provided with a longitudinal rib m' triangular in cross-section, are adjustably connected with the work-table in transverse positions at the working place I and in longitudinal positions at the working place II. As clearly visible in Figs. 10 and 11, steel prisms m^2 of dovetail section are at both ends of the rib m' inserted into correspondingly-shaped grooves of the bottom dies. The said prisms are provided with trough-shaped depressions, upon the inclined sides of which projections of the hinged cheeks of the upper dies slide on these dies being lowered, thereby pressing the said cheeks onto the rib m' of the bottom die. In a similar manner as the bottom dies are adjustably seated upon the work-table the upper dies are seated in corresponding positions in the frame-shaped carriers F and G. The said upper dies consist of a bar-shaped casing m^3 and the two cheeks m^4 and m^5 movable therein. The cheeks m^4, facing each other in a pair of coacting dies—*i. e.*, placed at the inner sides of the two dies—are upwardly-tapering-wedge shaped, and by screws passing through slots of the cheeks they are suspended in suitable recesses of the casing m^3, wherein they are vertically movable a certain rate. Projection m^6 of the top edge of each cheek m^4 extends to the outside through slots of the top side of the casing m^3 and bears against strong plate-springs m^7, secured to the top face of the casing. The outer cheeks m^5 of the upper dies have their top edge formed into a cylindric bulge m^8, inserted into a correspondingly-shaped groove in the bottom side of the casing m^3. Both ends of the bulge m^8 carry trunnions m^9, for which the bearings are formed in the brackets m^{10}, screwed to the casing m^3. Both ends of the lower edge of the cheek m^5 are provided with downwardly-extending projections m^{11}, corresponding to the trough-shaped depressions in the steel prisms m^2.

When the dies are not operating, their cheeks m^4 and m^5 are held apart by a spring m^{12}, and by the springs m^7 the sliding-cheek m^4 is forced downward, so that it reaches farther down than the hinged cheek m^5.

When both upper dies, destined to act simultaneously upon the sheet of pasteboard n, are lowered, the cheeks m^4 touch the pasteboard first, as illustrated by Fig. 7, between the ribs m' of the two bottom dies. While the lowering of the upper dies proceeds farther, as shown by Fig. 8, the portion of the pasteboard sheet n comprised between the two ribs m' of the bottom dies is by the cheeks m^4 pressed down between the said ribs before the outer cheeks m^5 of the upper dies begin to operate. Thereby possibility is afforded for the inner cheeks to draw the pasteboard from without across the ribs m'. Fig. 9 illustrates that during the last stage of the lowering of the upper dies the cheek m^4 overcomes the pressure of the plate-springs m^7, which are raised, and the cheek m^4 is, in consequence of its inclined outer surface sliding over the lower edge of the casing m^3, pressed onto the rib m' of the lower die m. At the same time the projecting heels m^{11} at both ends of the cheek m^5 slide upon the inclines of the trough-shaped depressions in the steel prisms m^2, whereby the said cheek is swung toward the rib m'. In this way transverse grooves n' are stamped into the sheet of pasteboard n at the working place I and longitudinal grooves n^2 at the working place II.

For cutting out the recesses n^3 female punches are at the working place III, adjustably secured to the machine-frame, and corresponding male punches are fixed to the tool-carrier H. In order to afford possibility for combining the said punches with a knife destined to cut off a portion of the flaps n^4, the female punches are composed of two relatively-adjustable parts o and o'. As clearly shown in Figs. 5 and 6, both parts are yoke-shaped and adjustably secured, by means of screws o^2, to slotted longitudinal bars o^3 o^3, which for their part are adjustably connected with the cross-bars a' and a^2 of the machine-frame. The male punches o^4, the lower edges of which are oblique, so that they gradually sever the strip of material to be removed, are secured, as clearly shown in Figs. 1 and 6, to longitudinal bridges o^5, which are so suspended from the tool-carrier H as to be laterally adjustable and which are provided with a series of holes admitting of the longitudinal adjustment of the punches o^4. The yoke-shaped parts o^6, carrying the punches o^4, are again fastened to the bridges o^5 by means of screws o^7. In order to admit of the knives o^8 for cutting off the flaps n^4 being fastened in the requisite position, bridges o^9, similar to the bridges o^5, are arranged by the side of these latter, and to the said bridges

the yokes o^{10}, carrying the knives o^8, are adjustably secured by means of binding-screws o^7. When the knives o^8 are to be used, the female punches must be adjusted, as shown, for the right-hand one in Fig. 5.

It will be seen in Figs. 2 and 4 that at the working place I the grooved guide-bars k' are interrupted at the points p and p' for admitting of the upper dies passing there. In order to have the pasteboard sheet, notwithstanding these gaps, surely brought upon the second bottom die, an inclined sheet-metal flap p^2 is riveted to the said die.

The brake-block q, which is set with leather and pressed onto the feed-carriage by the plate-spring q', secured to a guide-chair K', absorbs the *vis viva* of the carriage, and the stop-screws r r (shown in Figs. 3 and 4) limit its stroke.

The free space at the front end of the machine-frame is intended to be utilized for mounting there a printing-press, by means of which required inscriptions can be printed upon the box-blanks.

Figs. 14 to 17 illustrate the tongs which I combine with the described machine for preventing thin pasteboard from crowding in the guideways while the feed-carriage is moving backward. The said tongs are adjustably arranged in such positions that they are adapted to seize and hold the front edges of the pasteboard sheets after they have been operated upon at the working places I, II, and III of the machine. Each pair of tongs consists of a fixed lower jaw s and a movable upper jaw s'. The lower jaws s are made integral with slotted plates s^2, which are endwise adjustable upon the edgewise-arranged longitudinal bars k^7 of the machine-frame. Each movable jaw s' is formed at the free end of one arm of a bell-crank lever s^3, pivoted to the plate s^2 and having its other arm connected by a link s^4 to a block s^5, which a plate-spring s^6 connects to an intermittently-reciprocating standard s^7, both standards belonging to two coacting pairs of tongs being adjustably secured to a cross-bar s^8. The three cross-bars s^8, arranged in front of the three working places I II III of the machine, have their ends adjustably connected with longitudinal slide-bars s^9, guided in holes of the cross-bars a, a', and a^2 of the machine-frame. Each slide-rod s^9 is connected by a link s^{10} to a lever s^{11}, which is pivoted to the side frame A and suitably oscillated by the cams s^{12} and s^{13}, keyed to the shaft D.

Fig. 14 illustrates the stage of operation when the pasteboard sheet n is carried forward by the feed-carriage. Then a concentric portion i of the circumference of the cam s^{13} keeps the slide-rods in their rearmost position, and consequently the movable jaws of all tongs sufficiently lowered as to be out of the way of the advancing sheets n.

In Fig. 15 the rear edge of the sheet n has been caused by the short back stroke of the feed-carriage to abut against the spring-stops k^6. The movable jaws s' of the tongs assist the feed-carriage in this adjusting of the sheets n into the positions in which they are to be operated upon, as the eccentric portion 2 of the cam s^{12} causes the slide-rods s^9 to move forward, whereby the jaws s' are brought into the position shown in dots, in which they bear against the front edges of the pasteboard sheets. Soon afterward the short eccentric curve 3 of the cams s^{13} causes the movable jaws to recede into the position shown in full lines in Fig. 15, in which position they do not interfere with the pasteboard sheets n, which are consequently free to alter their dimensions under the action of the grooving-tools.

Fig. 16 shows the operation of the tongs during the back stroke of the feed-carriage. The eccentric portion 4 of the cam s^{12} causes the movable jaws s' wholly to fold down upon the fixed ones, s, and thereby to jam in the front edges of the sheets n. The concentric portion 5 of the cam s^{12} maintains the jaws s' in this position while the carriage is sliding backward. By the spring connection between the link s^4 and standard s^7 I provide for pasteboards of different thicknesses, as may be inferred from Fig. 16.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a tool for grooving pasteboard, the combination with a bottom die, having a rib and trough-shaped depressions at both ends of the rib, of an upper die body or casing, a cheek vertically movable in the said casing, a spring bearing against the top of the vertically-movable cheek, a cheek hinged to the casing and having at both ends of its lower edge projections adapted to enter the said trough-shaped depressions of the bottom die and a spring so arranged between the two cheeks as to keep them apart, the vertically-movable cheek extending farther downward than the hinged one when the tool is not operating, substantially as and for the purpose described.

2. In a machine for making pasteboard-box blanks, the combination with a work-table of a frame-shaped carriage adapted to be endwise reciprocated upon the said work-table, internally-grooved longitudinal bars secured to the under side of the said frame-shaped carriage, cross series of spring-grips arranged upon the under side of the carriage between the said longitudinal grooved bars, and corresponding spring-stops secured to the work-table, substantially as and for the purpose described.

3. In a machine for making pasteboard-box blanks, the combination with a work-table of a frame-shaped carriage adapted to be endwise reciprocated upon the said work-table, internally-grooved longitudinal bars secured to the under side of the said carriage, cross series of spring-grips arranged on the under side of the carriage between the said longitudinal grooved bars, corresponding spring-

stops secured to the work-table and tongs adapted to open when the carriage moves forward and to close when the carriage moves backward, substantially as and for the purpose described.

4. In a machine for making pasteboard-box blanks, the combination with a work-table of a frame-shaped carriage adapted to be endwise reciprocated upon the said work-table, internally-grooved longitudinal bars secured to the under side of the said frame-shaped carriage, cross series of spring-grips arranged upon the under side of the carriage between the said longitudinal grooved bars, corresponding spring-stops secured to the work-table, and suitable mechanism for so operating the carriage that it first makes a back stroke of given throw, secondly a forward stroke of longer throw, thirdly a back stroke bringing it into its original position, and fourthly remains stationary a certain time, substantially as and for the purpose described.

5. In a machine for making pasteboard-box blanks, the combination with a pair of transversely-arranged bottom grooving-dies, a pair of longitudinally-arranged bottom grooving-dies, and two pairs of longitudinally-arranged female punches, *seriatim* secured to a work-table, of corresponding upper grooving-dies and male punches, adapted to be lowered and raised, and suitable mechanism for carrying sheets of pasteboard, step by step, between the three groups of coacting tools, substantially as and for the purpose set forth.

In witness whereof I have signed this specification in presence of two witnesses.

JOHANN BINDER.

Witnesses:
VESTAR KEUPL,
ALVESTO S. HOGUE.