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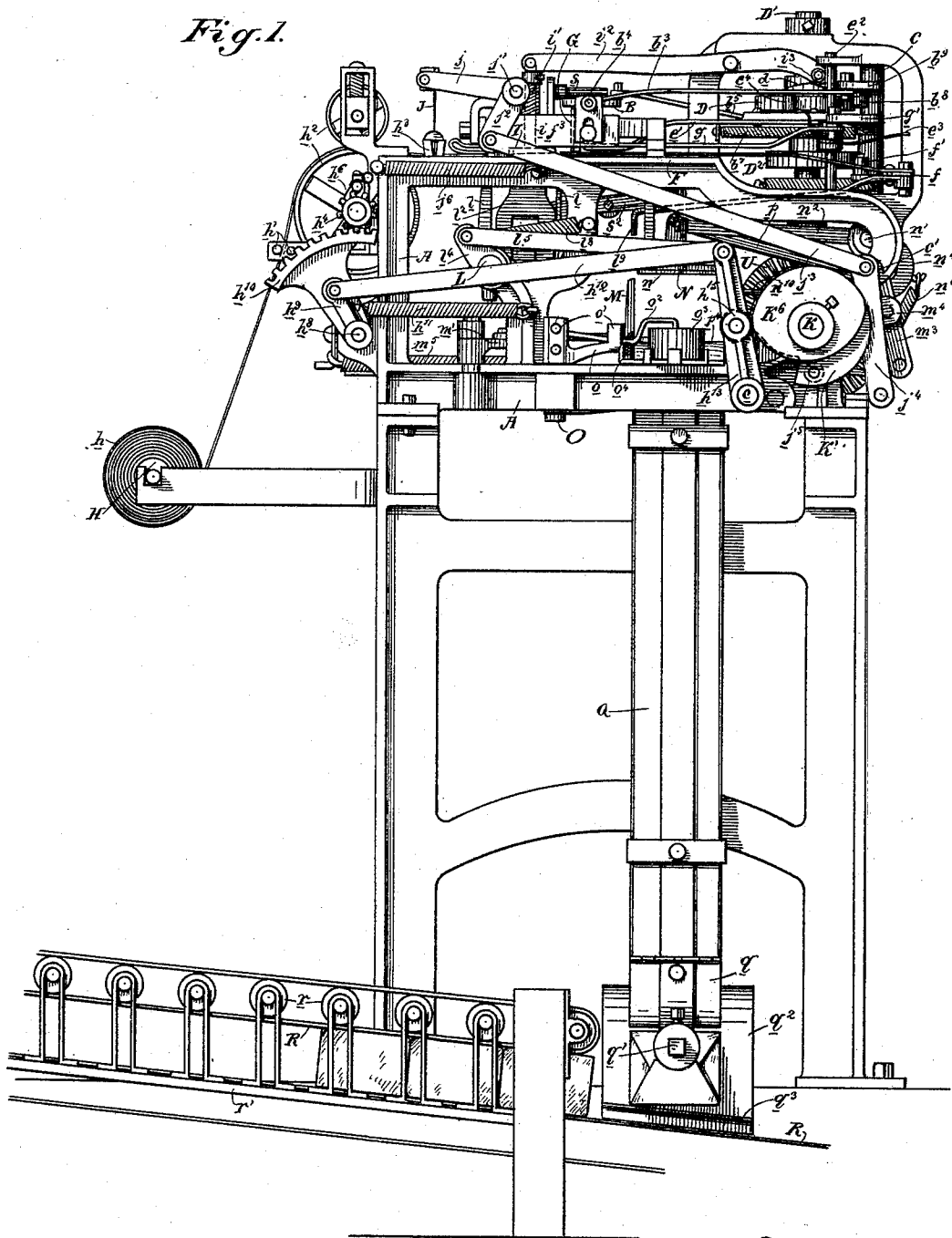
6 Sheets—Sheet 1.

G. GRISEL.
MATCH PACKING MACHINE.

No. 498,899.

Patented June 6, 1893.

Fig. 1.



Witnesses,
J. H. Nurse
J. F. Aschbeck

Inventor,
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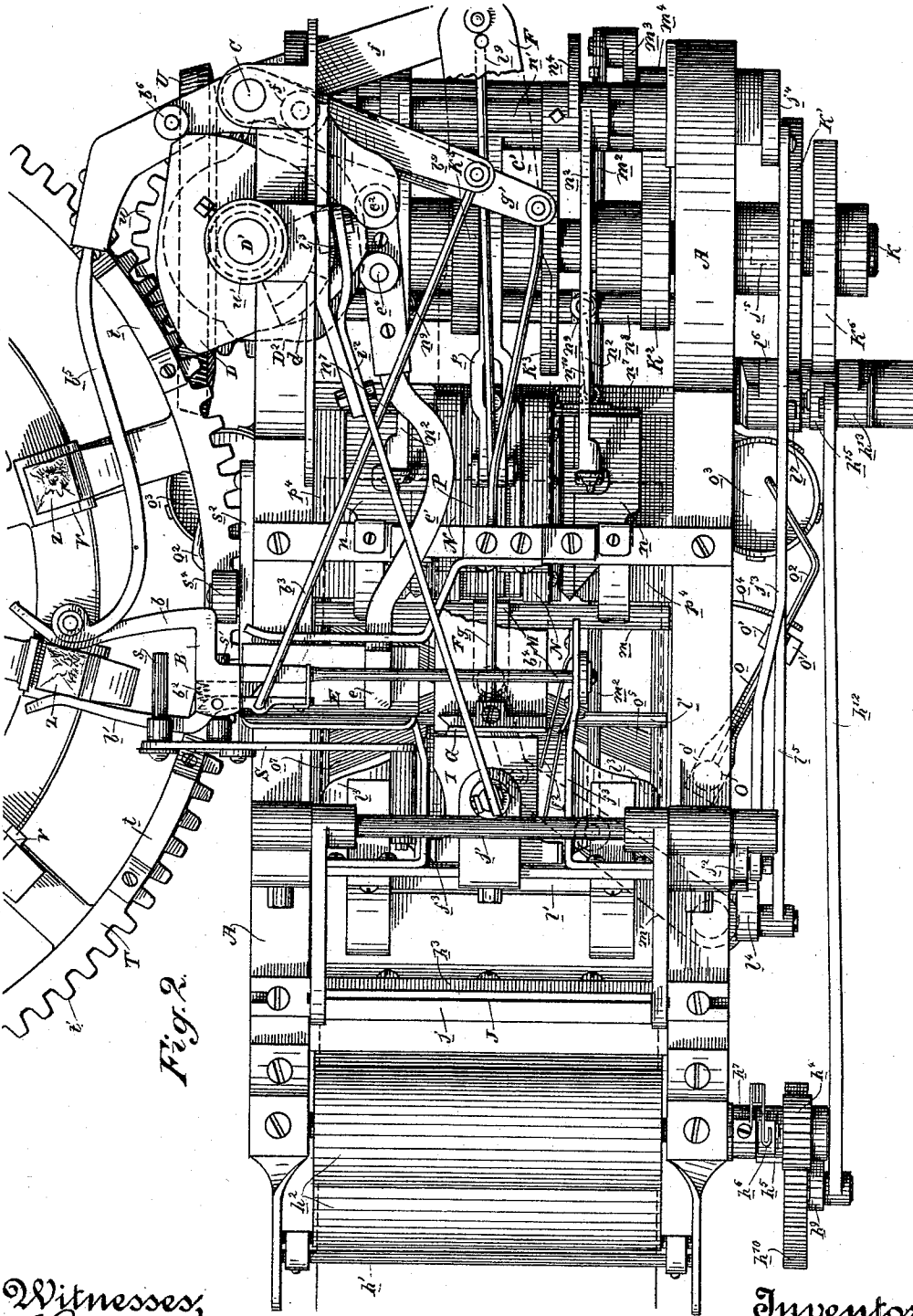
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6 Sheets—Sheet 2.

G. GRISEL.
MATCH PACKING MACHINE.

No. 498,899.

Patented June 6, 1893.



Witnesses,
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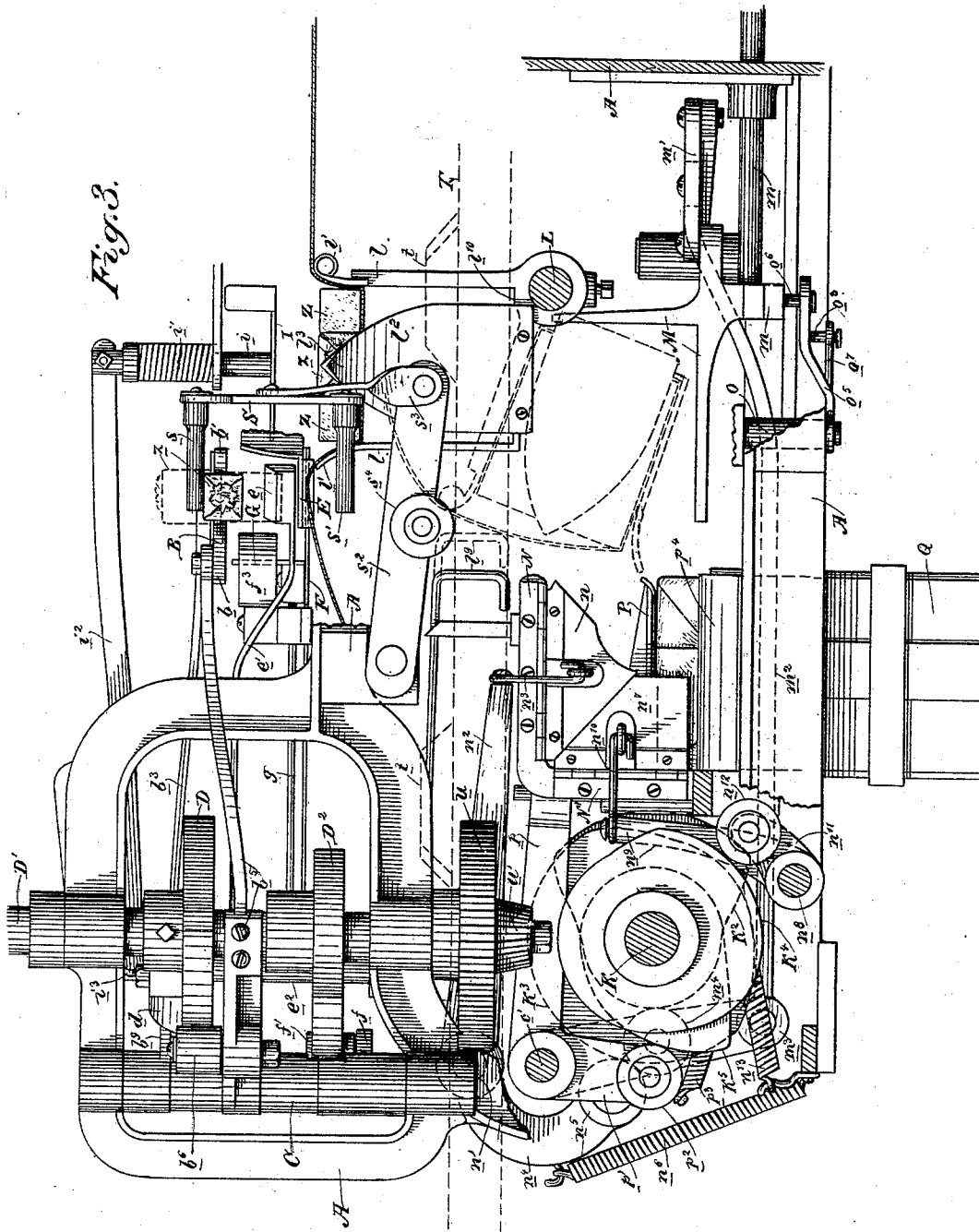
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6 Sheets—Sheet 3.

G. GRISEL.
MATCH PACKING MACHINE.

No. 498,899.

Patented June 6, 1893.



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(No Model.)

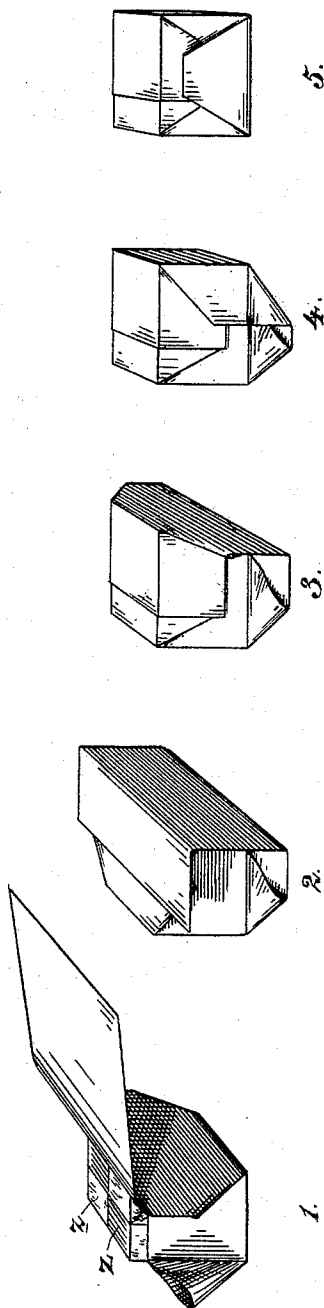
6 Sheets—Sheet 5.

G. GRISEL.
MATCH PACKING MACHINE.

No. 498,899.

Patented June 6, 1893.

Fig. 6.



Witnesses,
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UNITED STATES PATENT OFFICE.

GEORGE GRISEL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO JOSEPH D. CASE AND FRANK SEVERIO, OF SAME PLACE; ELIZA A. CASE ADMINISTRATRIX OF SAID JOSEPH D. CASE, DECEASED.

MATCH-PACKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 498,899, dated June 6, 1893.

Application filed December 28, 1891. Serial No. 416,357. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GRISEL, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Match-Packing Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of machines for packing articles in bundles, and it is especially intended for the packing of what are known as block matches, and wrapping them in bundles. Block matches are those formed from a single block of wood by splitting the block in different directions, the splints being held together at their lower ends by a thin web of wood, and said blocks are dipped into the material for making them into matches. In practice the blocks are divided into smaller blocks of one hundred splints or matches each. These small blocks are wrapped around their composition ends with paper for protection, and they are then made into bundles of any required number, say, twelve, and wrapped with paper into packages.

The object of my present machine is to take these small match blocks after they have been each wrapped with the protecting piece of paper and lay them up in bundles of twelve, more or less, and then wrap these bundles with paper and deliver them.

Although my machine may be supplied with these small blocks of matches by any suitable means, I have adapted it for taking them directly from the machine in which their ends are wrapped.

General reference for such a machine is hereby made to my previous Patent No. 419,851, dated January 21, 1890, and to my joint application with Frank Severio, Serial No. 381,968, filed February 18, 1891, for an improvement upon the previous machine.

In the present case I need not show the match wrapping machine, except a small portion of it in order to illustrate how it supplies the match blocks, and how it is made the means of transmitting power to my present packing machine.

My invention consists of the constructions

and combinations of devices hereinafter described and claimed.

Referring to the accompanying drawings for a more complete explanation of my invention,—Figure 1 is a front elevation or general view of my machine. Fig. 2 is a plan. Fig. 3 is a rear elevation. Fig. 4 is a detail of the lower end of the discharge chute. Fig. 5 is a perspective view of the former and transfer arm. Fig. 6 is a view showing the several stages in the wrapping of the bundle. No. 1 shows the bundle when first pressed down in the former. No. 2 shows it when tilted by the former and the front of the paper folded down by rod 19. No. 3 shows it after the top folds of the ends have been pressed down by the top flaps of the folder. No. 4 shows it after the front end folds have been pressed in by the side flaps; and No. 5 shows it fully folded by being pressed down into chute Q. Fig. 7 is a transverse vertical section taken on a line just to the left of platform E and gripper B, looking toward these parts. Fig. 8 is a detail bottom view showing the power connections of pins O for operating the glue arms.

A represents generally the frame of the machine. Upon the upper and about the middle portion of the frame is transversely mounted, the gripper B. This consists of a fixed jaw b , and an opposing pivoted jaw b' . These jaws are horizontal and their outer ends are flaring to readily fit over the match blocks. The pivoted jaw is controlled by a spring b^2 which holds it closed, and it is opened by a rod b^3 . The gripper has a shank b^4 which is mounted sufficiently freely in a guide on the top of frame A to permit said gripper to be reciprocated in a horizontal plane by the arm b^5 . This reciprocation is effected by means of an arm b^5 connected with the fixed jaw, as shown, said arm being pivoted upon a vertical post C. The arm carries a stud b^6 against which a cam D operates, said cam being mounted upon a vertical powershaft D'. As this shaft rotates, the cam coming in contact with the stud b^6 forces the arm b^5 outwardly, thereby carrying the gripper outwardly; and as the cam relieves the stud, a spring b^7 forces the arm inwardly and causes the retraction of the gripper. At the inner end of the stroke of

the gripper, the rod b^3 is pulled upon to effect the opening of the pivoted jaw. This is effected by the same cam D acting against a stud b^8 which is carried by an arm b^9 pivoted on the vertical post C, and connected at its outer end with the rod b^3 .

The operation of the gripper is as follows:— Commencing where it starts on its forward movement, the shaft D' rotating causes cam D to impinge on stud b^6 , and thereby to force arm b^5 outwardly, which movement carries the gripper to the limit of its outward stroke. As the shaft D' continues to rotate, its cam D relieves stud b^6 and the spring b^7 which on the previous movement had been compressed, now expands, and throws the arm b^5 in the opposite direction, thereby bringing the gripper back again. When it has nearly reached the limit of its return stroke, the cam D impinging on stud b^8 , forces the arm b^9 back, and which, pulling on rod b^3 opens jaw b^1 , and a moment after and just as the gripper starts on its outward movement, the cam relieves the stud b^8 of arm b^9 , and thereupon the spring b^2 closes the jaw.

Z is a match-block. On the outward movement the gripper takes the match-block vertically and on its inward movement carries it in, and drops it horizontally by the opening of its jaw. This is effected by the tilting of the block as will be hereinafter described. It drops it upon a stationary platform E. From this it is moved bodily farther inwardly to and upon the end of a movable platform F. This is effected by a pusher e which operates horizontally over platform E. This pusher has a shank e' pivoted on a vertical post e^2 . It is held outwardly by a spring e^3 , and is moved inwardly by the cam D which impinges upon a stud e^4 on the shank e' of the pusher. The movement is so timed, that just after the gripper has dropped the match-block upon the platform E, the pusher moves inwardly and coming in contact with the end of the block, pushes said block bodily upon the platform F. Then as the cam relieves stud e^4 , the spring e^3 throws the pusher out again, ready for the next block to be dropped in front of it by the gripper. The platform F is at right angles to the platform E, and over the former platform operates a second pusher G. This is reciprocated by means of the rod g connected with the arm g' pivoted on post C. This arm is connected with or forms part of the arm b^5 of the gripper, and is operated and controlled by the same cam D, stud b^6 and spring b^7 , and being on the opposite side of the pivot post to the arm b^5 , it works in an opposite direction to said arm. This provides for the proper time of movement of the second pusher G with relation to the movement of the gripper. Now, as the match block is pushed over on to the platform F by the first pusher e , the second pusher advancing, forces the block sidewise and forwardly on said platform. At the same time said platform is moving forwardly. This op-

eration being repeated, a second match block is laid beside the first and a third is laid beside the second, each pushing the previous one farther forward on platform F. This forms one row, and thereupon the platform F withdraws from under the row. The projection and withdrawal of the platform are effected by means of an arm f connected with the outer end of the platform and pivoted on post C. This arm carries a stud f' against which a second cam D² on shaft D' impinges. While the platform F is withdrawn, the row of blocks is temporarily supported by friction springs f^2 in fixed side guides f^3 . The disposition and course of the wrapping paper should, at this point, be described.

H is a reel. Upon this is wound a roll h of paper. The paper passes upwardly through directing rollers h' and frictional feed drums h^2 . It thence passes under the knife guide h^3 and thence under the sliding platform F and above the former presently described. Therefore when the sliding platform withdraws from under the row of match blocks, said row lies directly over the paper. This row is now depressed below the level of the platform and down upon the underlying paper. This is done by a plunger I lying directly above the row. It is carried by a stem i controlled by spring i' , and operated by a pivoted arm i^2 , the outer end of which has a stud i^3 under which a cam track d on cam D bears. When this cam comes under the stud i^3 , it depresses the inner end of arm i^2 and thereby forces the plunger I down. This forces the row of match blocks down from between the frictional springs f^2 of the side guides f^3 and said row bearing down upon the paper, the latter yields and bends to receive and support the row. Then the plunger rises under the action of spring i' . These operations are continued until the required number of rows is had, say, four rows, each row pressing the previous ones down. After the first row has been depressed and while the second is being laid up, the paper is cut off. This is done by a knife J which operates through the knife guide h^3 and cuts across the paper. The knife is carried by a frame j which is secured to a rock shaft j' , one end of which has a crank j^2 , to which is connected a rod j^3 , the outer end of which is connected with the upper end of an arm j^4 , the lower end of which is pivoted to the frame. Against this arm impinges a stud j^5 carried by a cam K' on a crossshaft K.

A spring j^6 is attached to the connecting rod j^3 and serves to return it. Now when the stud j^5 comes in contact with the arm j^4 , it will force said arm backwardly, and this movement through the connecting rod j^3 and crank j^2 causes the shaft j' to rock and to carry the knife downwardly and cut the paper. When the stud j^5 relieves the arm j^4 , the spring j^6 returns the parts and rocks the shaft in the other direction, thereby lifting the knife. As each row of match blocks is finished, it is pressed down and forces the preceding rows

farther down. In this downward movement they gradually bend the paper beneath them into the former now to be described, and said former serves to compose them all in a compact bundle, bending the paper about the sides of the bunch and partially upon its ends as will be described. The former consists of a hollow open topped frame or receptacle. It is composed of front and back walls l having wide tops l' , end walls l^2 with outwardly flaring upper ends l^3 , and a bottom l^4 . The front wall and bottom are both slotted as shown. Across the wide tops l' of the former, the paper passes and upon them it lies. Now when the rows of match blocks are successively forced downward they enter this former and press the paper down under them so that the paper is folded about the sides of the bundle by the front and back walls of the former, and the lower portions of the side edges of the paper are bent by the end walls of the former upon the ends of the bunch, and the paper is thus caused to partially envelop the bundle. When the required number of rows is complete to form the full bundle, the former is turned or tilted downwardly through a quarter revolution in order to allow the bundle to be discharged from it, and to turn it into proper position to have the ends of the paper acted on by the folder. This movement of the former is accomplished as follows:—It is carried upon a rock shaft L having a crank l^4 . With this crank is connected a rod l^5 , the other end of which is connected with an arm l^6 , the lower end of which is pivoted upon an outwardly projecting pivot post c . The arm carries a stud l^7 against which impinges the cam K' heretofore mentioned and carried on the cross shaft K . A spring l^8 is connected with the crank of the rock shaft L . The cam K' is of such a character that during the greater portion of its revolution it holds the arm l^6 forwardly and thereby holds the former in a vertical position, but at the moment of operation the cam relieves the stud of the arm l^6 , whereupon the spring l^8 acts to tilt the former to a horizontal position.

To discharge the partially wrapped bundle from the former when it has been tilted to a reclining position, I have the reciprocating transfer arm M . This consists of an L-shaped piece which operates through the slotted bottom and slotted front wall of the former, the vertical portion of the transfer arm pressing against the back of the bundle, and the horizontal portion acting as a support under it. This transfer arm is mounted and reciprocated as follows: It is carried by a sliding frame m with which a pivoted arm m' is connected. From this arm extends a rod m^2 , the outer end of which is connected with an arm m^3 pivoted on a horizontal pin c' and carrying a stud m^4 . Against this stud impinges a cam K^2 on the cross shaft K heretofore mentioned. A spring m^5 is connected with the rod m^2 . When the cam K^2 bears on the stud m^4 , it forces the arm m^3 backwardly and

through the rod m^2 , and swinging arm m' , it brings forward the frame m thereby carrying forward the transfer arm M . This removes the partially wrapped bundle from the former which thereupon rises to a vertical position, and shortly thereafter the spring m^5 draws back the transfer arm to its initial position; but before this arm is drawn back and while it is projected, it has carried the partially wrapped bundle into the folder and temporarily supports it therein.

The folder has a frame, of which N represents the top. To each side of this top is hinged a top flap n , each adapted to be moved from a horizontal position down to a vertical position and back again. These movements are effected by the following mechanism:—Mounted at the end of the machine is a rock shaft n' , and upon this are secured the arms n^2 which project inwardly and are connected with the top flaps n by links n^3 . The rock shaft n' has an arm n^4 which carries a stud n^5 . Against this stud impinges a cam K^3 on the cross shaft K heretofore mentioned. A spring n^6 is connected with the frame of the machine and with the arm n^4 . Now, as the partially wrapped bunch is supported upon the horizontal portion of the transfer arm M it lies directly under the top N of the folder. The cam K^3 impinging on the stud n^5 forces the arm n^4 backwardly and thereby rocks the shaft whereby its arms n^2 are carried downwardly, and through the links n^3 gradually turn the top flaps n down to a vertical position. In this movement the top flaps fold inwardly the upper portion of the ends of the paper down upon the ends of the bunch and binding upon said bunch, they hold it temporarily, while the transfer arm M withdraws. The top flaps remain in this position until the subsequent steps of the folding are complete as will presently be described, and then the spring n^6 returns them to a horizontal position.

Secured to the vertical portion N' of the frame of the folder are the vertical side flaps n^7 which are adapted to be moved from a position at right angles to the bunch to a position parallel therewith and against its ends and back again. These movements are effected by the following mechanism: In the lower portion of the frame of the machine is mounted a rock shaft n^8 upon which are secured the vertical arms n^9 , the upper ends of which are connected with the side flaps n^7 by links n^{10} . The rock shaft is also provided with an arm n^{11} carrying a stud n^{12} against which impinges a cam K^4 on the shaft K heretofore described. A spring n^{13} is connected with one of the arms n^9 , and with the frame of the machine and serves to return the parts. After the top flaps n have come down upon the ends of the bunch, as heretofore described, the side flaps n^7 begin to close on the ends of the bunch and to fold in the forward ends of the paper to overlap its previous folds. A drop of mucilage, glue or other adhesive material is now to be placed upon the inner surface of

the yet unfolded lower portion of the paper. The mechanism for accomplishing this is as follows:—Journaled in the lower portions of the sides of the main frame, one on each side, is a vertical oscillating pin O, to the head of which is attached a bracket *o* with slotted guide arms *o'*. In one of these is pivoted a glue arm *o²* and is guided in the other. The end of this arm is adapted to be inserted into and to be removed from a glue vessel *o³*, and in order to rise over the edge of this vessel, the arm *o²* travels over a double inclined cam *o⁴*, and as said arm is a gravity one the cam rises and allows it to drop, as will be presently described.

The vertical pin O and its bracket *o* are oscillated for the purpose of operating the glue arm by the following mechanism: Attached to the lower end of the pin O on one side is a lever *o⁵*, the other end of which is slotted over a pin *o⁶* carried by the sliding frame *m* of the discharge arm M. Attached to the vertical pin O on the other side, is a lever *o⁷*, the end of which is slotted over a pin *o⁸* carried by the lever *o⁵*. Now, after the top flaps *n* have come down upon the ends of the bunch and as the discharge arm M begins to withdraw, its sliding frame *m* swings backwardly, the connected levers *o⁵* and *o⁷* thereby rocking the vertical pins O and their brackets inwardly. These brackets carry the glue arms inwardly, and these arms traveling up on the cams *o⁴*, rise out of the glue vessels *o³* and ride over their rims. Their inward motion continues until they come in contact with the final folds of the paper, and they deposit on the inner surfaces of these folds, a drop of glue which they have carried with them from the glue vessel. In due time, upon the return of the sliding frame *m*, the glue arms are brought back again outwardly and dipped once more into the glue vessels ready for a repetition of the operation.

In the folder is a vertically movable discharge plunger P. This is operated by means of an arm *p* attached to its top, and pivoted upon the horizontal cross pin *c'* heretofore mentioned. This arm has a downwardly extending portion *p'* which carries a stud *p²* against which impinges a cam *K⁵* on the cross shaft K. A spring *p³* is connected with this arm to return the plunger. Now when the paper is folded about the bunch, with the exception of the last fold, and while the top and side flaps are still holding it, the plunger descends upon the top of the bunch and forces it down from between the flaps into the fixed guides *p⁴* which join the upper end of a vertical chute Q. The final fold of the paper on each end is raised to place by these guides as the bunch is forced down between them and as these folds carry the glue the proper adhesion is effected. The chute Q extends downwardly, and has hinged to its lower end a gate *q* controlled by a weighted arm *q'*. Under the lower end of the chute are the carriers and pressers R. These consist of belts having their adjacent folds moving in the

same direction. Above the upper one of these folds are the rollers *r*, and below the lower one of these folds is a fixed plate *r'*. The chute Q when full of the bundles, one being pressed down by the other, sustains the column by the pressure of its bottom gate *q* on the lowermost bundle, but by the pressure of a fresh bundle on the top of the column, the lowermost bundle presses upon the weighted gate and is discharged. In passing down the chute, the bundle is turned up sidewise, and in order to deliver it between the belts R, with its folded ends adapted to lie between the two belts, it is necessary to partially turn the bundle as it falls from the chute. This is effected by a plate *q²* having a rib *q³* against which the bundle, in issuing from the chute, impinges, and by which it is tilted over to the desired position; an opposing plate *q⁴* prevents it from turning too far. The bundle is thus delivered between the traveling belts R, with its folded ends confined between them, and as the bundle is carried along throughout the course of the belts, it meets with the pressure of said belts, supplemented by the rollers *r* and the underlying plate *r'* whereby the folded ends are kept pressed down, and by the time it reaches the ends of the belts, the glue is sufficiently dried to hold the paper.

The carrier belts R are to be driven by any suitable power. As the former tilts forwardly to a horizontal position it is necessary that the forward end of the paper which is being carried down with the former, shall be raised over the top of the bunch, and prevented from dropping down. To accomplish this, there is a rod 19 secured to the outer end of the movable or sliding platform F, and just as the former is being brought down to a horizontal position this rod is moving forwardly carried by the sliding platform, and it bears upon the end of the paper in front of it and raises it up around the front of the bunch. After the paper is cut off by the knife, as heretofore described, and after the former has been turned down to a reclining position, the paper begins to be fed forward again ready to sustain the first row of match blocks being then laid up. This feed is accomplished as follows:—Upon the shaft of the lower of the feed rollers *h²* is mounted loosely a pinion *h⁴* which is connected with and adapted to rotate the shaft of said feed roller in one direction by the engagement of a ratchet *h⁵* connected to or formed with the pinion with a spring controlled pawl *h⁶* carried by a collar *h⁷* secured to said shaft. Secured to the frame A is a short shaft *h⁸* upon which is pivoted an upwardly extending crank arm *h⁹* which carries a segmental gear *h¹⁰* meshing with the pinion *h⁴*. Connected with the crank arm *h⁹* is a spring *h¹¹*. Connected with the crank arm also is a rod *h¹²*, the other end of which is connected with the top of a pivoted arm *h¹³* carried by the horizontal pin or shaft *c*. The arm *h¹³* also carries a stud *h¹⁵* against which impinges a cam *K⁶* on the shaft K.

By the operation of this cam the arm h^{13} is moved, and through the connecting rod h^{12} , the crank h^9 is moved thereby causing, through its segmental gear h^{10} , the rotation of the pinion h^4 , and in this direction the pinion being connected by the ratchet and pawl with the shaft of the feed roller h^2 , said roller is turned and the paper is fed forwardly. When the limit of engagement of the segmental gear and pinion is reached, and the cam K^6 relieves the stud h^{15} , the spring h^{11} returns the segmental gear to its initial position, and in this return movement it rotates the pinion h^4 in that direction in which it does not engage with the shaft of the feed roller, whereby said roller remains stationary and does not withdraw the paper.

Block matches of the kind represented by Z in the present case are thicker at the composition end than at the web end of the block. This results from the composition end being split and the several splints being separated, while the web end is still tight. Therefore, in laying these blocks side by side, it is well to lay them with their composition ends alternately reversed so that they shall lie well together and make a square or rectangular bundle. Another advantage of this is that the composition ends shall be separated in alternate bundles, reducing the danger of fire being communicated from one bundle to the other. Now, in order to accomplish this laying up of alternate ends, I have the following mechanism:—The bundles are taken by the gripper while said bundles are in an upright position having previously had the small pieces of paper z wrapped around their composition ends. Pivoted to the top of the frame of the machine is a gravity bracket S, the end of which carries an upper contact pin s and a lower contact pin s' .

Pivoted to the side of the frame is a lever s^2 , the end of which is connected by a link s^3 with the gravity arm S. The lever s^2 carries a stud s^4 under which travels a rotating ring T provided with a series of separated cams t . Now, while the plain surface of the ring T is traveling under the stud s^4 , the gravity bracket and connected parts are all down, the upper pin s lying just above the path of the gripper B. When the gripper is projected and seizes the match block it withdraws it at first in a vertical position, but in withdrawing, the block comes in contact above its point or line of seizure by the gripper with the upper pin s and in passing said pin, the block is thereby tilted so that its composition end extends outwardly, and it passes under the pin in a horizontal position. Now, a cam t of the rotary ring having come under the stud s^4 , the bracket S is thereby raised, whereby its upper pin is lifted entirely out of the way, while its lower pin is brought up just under the path of travel of the gripper. When the gripper seizes the next block and withdraws it in a vertical position, said block comes in contact with the lower pin at a point below its line or point of

seizure by the gripper, whereby the block is turned to a horizontal position with its composition end inwardly. Thus the blocks are alternately tilted in opposite directions.

Now, although the source from which the match blocks are taken may be of any suitable character, I intend, as I before mentioned, to use this machine in connection with my previous machines wherein I wrap the composition ends of the blocks with the small pieces of paper z .

It will be necessary to describe but a small portion of this previous machine, and this only to show the means for supplying the match blocks and for transmitting the general power to the present machine.

For further description a reference may be had to the prior inventions hereinbefore mentioned.

Of the previous machine I here show the main wheel which I have heretofore called the ring T, which said ring I now provide with the cams t as mentioned. This ring or wheel is provided with external gear teeth t' . These teeth mesh with a pinion u on the main power shaft D' whereby said shaft is driven. This pinion has connected with it a bevel gear u' which meshes with a gear U on the shaft K, heretofore mentioned. The relative sizes of these gears are such as to provide for the timely operation of the parts of the machine. The main wheel or ring T also carries a series of match block holders, some of which are represented by V, and these holders successively carry the match blocks around into position to be taken by the gripper.

The general operation of the machine is as follows:—The gripper is projected and seizing a match block from one of the holders V removes it from said holder, and as said match block comes in contact with one of the tilting pins of the bracket S it is turned to a horizontal position within the gripper jaws with its composition end lying in one direction. It is then dropped by being released from the gripper onto the fixed platform E, and thereupon the first pusher e moving up behind it, forces it forward horizontally and endwise upon the inwardly moving end of the sliding platform F, while at the same time, the second pusher G advancing comes in contact with its side and pushes it forwardly sidewise between the side guides f^3 . The gripper in the meanwhile has taken a second match block which has been tilted in the opposite direction, and said second match block is treated similarly to the first and is pushed forward into the side guides. A third match block is taken and is tilted in a direction the reverse of the second and is forced into position beside the other two between the side guides. Thereupon the sliding platform F withdraws, and the first row of match blocks is held temporarily by the frictional springs f^2 ; then the plunger I descends and forces this row down upon the underlying paper which has been fed for-

wardly and lies in position. This paper temporarily supports the row. A second row is similarly laid up and is forced by the plunger downwardly, pressing the first row farther down and causing it to enter between the walls of the former. A third row is similarly treated, and likewise a fourth row, and by this time the four rows are forced down as a bundle into the former which incloses them, and the underlying paper has been bent by the walls of the former partially around the bundle, the paper, as before described, having been cut off into a suitable length. The former being filled now tilts downwardly with its contents, to a reclining position, and as it turns the rod 19, moving forwardly, bends the front of the paper well up around the front of the bundle. The former having reached a horizontal position, the L-shaped transfer arm M moves forwardly and carries the bundle out of the former into position under the folder in which position it temporarily supports it. The top flaps of the folder now descending, fold in a portion of the ends of the paper around the bundle, and the side flaps then closing bring the front folds of the paper into position. The drop of glue is then deposited by the arm α^2 . The plunger P descends into the folder and pushes the wrapped and glued bundle down into the vertical chute Q, the final folds of paper closing in and adhering. A second bundle is likewise forced down into the chute and when the chute is full, the bundles are successively discharged from the lower end upon the carrier belt by which they are removed, the glue being dried while the bundles pass through the carrier. A fresh piece of paper is fed forward at proper times during the course of this operation.

The several studs herein mentioned and against which the cams operate, are preferably, as shown, in the form of antifriction rollers.

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

1. In a match packing machine, the combination of a hollow casing or frame constituting a former, a platform resting normally over said former to support successive rows of match-blocks, a pusher operating over the platform to lay the blocks of each row side by side thereon in position over the former and means for withdrawing the platform from under successive rows and forcing the rows of blocks into the former.

2. In a match packing machine, the combination of a hollow casing or frame constituting a former, a platform resting normally over said former to support successive rows of match-blocks, a pusher operating over the platform to lay the blocks of each row side by side thereon in position over the former, means for withdrawing said platform from under successive rows, and a plunger for depressing each row as relieved by the platform

into the former, substantially as herein described.

3. In a match packing machine, the combination of a hollow casing or frame, constituting a former, a platform resting normally over said former to support successive rows of match-blocks, means for feeding and directing the wrapping paper between the former and platform, a pusher operating over the platform to lay the blocks of each row side by side thereon in position over the former, means for withdrawing said platform from under successive rows, and a plunger for depressing each row and the paper underlying the first row into the former, substantially as herein described.

4. In a match packing machine, the combination of a hollow casing or frame constituting a former, a platform resting normally over said former, a reciprocating gripper and intermediate mechanism for supplying said platform with successive match-blocks, a pusher operating over the platform for laying the blocks up side by side in rows thereon, in position over the former, means for withdrawing the platform from under successive rows, and a plunger for depressing said rows successively into the former.

5. In a match packing machine, the combination of a fixed platform upon which the match blocks are successively deposited, a pusher operating over said platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, and a plunger for depressing successive rows when relieved by the sliding platform, substantially as herein described.

6. In a match packing machine, the combination of a fixed platform upon which the match blocks are successively deposited, a pusher operating over said platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, a plunger for depressing successive rows when relieved by the sliding platform, and a hollow frame or casing constituting a former to receive the rows and compose them into a bunch, substantially as herein described.

7. In a match packing machine, the combination of a fixed platform upon which the match blocks are successively deposited, a pusher operating over said platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively

whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, a plunger for depressing successive rows when relieved by the sliding platform, means for feeding a strip of wrapping paper under the blocks, and a hollow frame or casing constituting a former to receive the blocks and underlying paper and bend the paper up about the bunch, substantially as herein described.

8. In a match packing machine, the combination of a reciprocating gripper for taking hold of and releasing the match blocks, a fixed platform on which they are successively deposited, a pusher operating over the platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, and a plunger for depressing successive rows when relieved by the sliding platform, substantially as herein described.

9. In a match packing machine, the combination of a reciprocating gripper for taking hold of and releasing the match blocks, a fixed platform on which they are successively deposited, a pusher operating over the platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, a plunger for depressing successive rows when relieved by the sliding platform, and a hollow frame or casing constituting a former to receive the rows and compose them into a bunch, substantially as herein described.

10. In a match packing machine, the combination of a reciprocating gripper for taking hold of and releasing the match blocks, a fixed platform on which they are successively deposited, a pusher operating over the platform to advance the blocks therefrom, a sliding platform to receive the blocks and support successive rows thereof, means for withdrawing said platform from beneath said rows successively whereby they are relieved a pusher operating over the sliding platform for laying up the blocks in rows, a plunger for depressing successive rows when relieved by the sliding platform, means for feeding a strip of wrapping paper under the blocks and a hollow frame or casing constituting a former to receive the blocks and underlying paper and bend the paper up about the bunch, substantially as herein described.

11. In a match packing machine, the combination of a reciprocating gripper for taking successive match blocks, and a mechanism for tilting successive blocks in opposite directions, substantially as herein described.

12. In a match packing machine, the combination of a reciprocating gripper for taking successive match blocks, and a mechanism acting on successive blocks at points alternately above and below the point of seizure in the gripper whereby successive blocks are turned in opposite directions, substantially as herein described.

13. In a match packing machine, the combination of the horizontally reciprocating gripper adapted to take successive match blocks, and the vertically movable contact pins against which successive blocks come in contact, the one above and the other below the line of their seizure by the gripper whereby they are turned in opposite directions, substantially as herein described.

14. In a match packing machine, the combination of the horizontally reciprocating gripper, adapted to take successive match blocks, the swinging bracket with its contact pins against which successive blocks come in contact, the one above and the other below the gripper, whereby said blocks are turned in opposite directions, and the rotating ring with its series of cams for operating the swinging bracket, substantially as herein described.

15. In a match packing machine, the gripper having the shank and fixed and spring controlled movable jaw, in combination with the pivoted arm b^5 connected with the fixed jaw, the pivoted arm b^9 and rod b^3 connecting said arm with the movable jaw, and the cam D operating against said arms to actuate them, substantially as and for the purpose herein described.

16. In a match packing machine, the reciprocating gripper B and pusher G operating at right angles, in combination with the pivoted angular arm $b^5 g'$ having one end connected with the gripper and the other end connected with the pusher, the rotary cam for moving said arm and the spring for returning it, substantially as herein described.

17. In a match packing machine, the reciprocating gripper having the movable jaw, the swinging pusher e , the reciprocating pusher G and the vertically movable plunger I in combination with a rotary shaft, the cam D thereon and connections operated by said cam for operating the gripper, the pushers and the plunger, substantially as herein described.

18. In a match packing machine, the combination of the sliding platform upon which successive rows of match blocks are laid up and supported, means for withdrawing said platform from beneath said rows successively by which they are relieved, the side guides and the frictional springs in said guides for temporarily supporting the match row when the platform withdraws, substantially as herein described.

19. In a match packing machine, the tilting former for bunching the blocks, said former consisting of an open topped frame hav-

ing the end walls l with wide tops l' and the side walls l'' with flaring tops l''' , substantially as herein described.

20. In a match packing machine, the combination of a vertically disposed open topped and slotted former for receiving and bunching the match-blocks, means for tilting said former to a horizontal position and a reciprocating transfer arm passing through said former when in a horizontal position to force the bunch out, substantially as herein described.

21. In a match packing machine, the combination of a vertically disposed open topped and slotted former for receiving and bunching the match-blocks, means for tilting said former to a horizontal position and a reciprocating transfer arm passing through said former when in a horizontal position to force the bunch out, said arm consisting of an L-shaped piece, the vertical portion of which pushes the bunch, and the horizontal portion supports said bunch when clear of the former, substantially as herein described.

22. In a match packing machine, the combination of the tilting former having the slotted bottom and front wall and the reciprocating transfer arm M operating through said slotted walls to force the bunch out and support it, substantially as herein described.

23. In a match packing machine, the combination of the tilting former for receiving the match blocks being laid up into the bunch and the wrapping paper, and the reciprocating rod l^p adapted to approach the former as it tilts it to bend the loose end of the paper up about the front of the bunch, substantially as herein described.

24. In a match packing machine, the combination of the tilting former in which the blocks are bunched and partially wrapped, the folder frame having suitable swinging flaps to complete the folding and the reciprocating transfer arm M operating between the former and folder to carry the bunch from one to the other, substantially as herein described.

25. In a match packing machine, the combination of the reciprocating transfer arm M for feeding the match bunch to the folder and supporting it, and the folder having the swinging top flaps for folding in the paper over the ends of the bunch and holding said bunch while the transfer arm M withdraws, substantially as herein described.

26. In a match packing machine, the folding mechanism comprising the fixed frame, the swinging top and side flaps thereof, the reciprocating transfer arm M for feeding the match bunch to the folder and holding it until supported by its flaps, and the vertically operating plunger in the folder frame, substantially as herein described.

27. In a match packing machine, the com-

bination of fixed glue receptacles, horizontally swinging gravity arms o^2 and fixed inclines or cams o^4 over which said arms travel in swinging whereby they ride over into and out of the glue receptacles, substantially as herein described.

28. In a match packing machine, the combination of the folder containing the partially wrapped match bunch and having swinging flaps for folding the ends of the paper on said bunch, fixed glue receptacles, horizontally swinging gravity arms o^2 adapted to transfer glue from the receptacles to the ends of the wrapping paper before being folded, and fixed inclines or cams o^4 over which said arms travel over into and out of the glue receptacles, substantially as herein described.

29. In a match packing machine, the fixed glue receptacles, the inclines or cams o^4 and the swinging gravity arms traveling over said cams whereby they ride over into and out of the glue receptacles, in combination with the means for swinging said arms consisting of the pivoted brackets by which they are carried, the pivot pins of said brackets, the levers on said pins and the sliding frame m to which the levers are connected, substantially as herein described.

30. In a match packing machine, the mechanism for feeding the wrapping paper consisting of the feed roller h^2 , the loose pinion on its shaft, the pawl and ratchet connection between the pinion and said shaft, the segmental gear engaging the pinion, the pivoted arm h^{13} and connections therefrom to the segmental gear, the cam K^6 for operating the arm and the spring for returning it, substantially as herein described.

31. In a match packing machine, the combination of the discharge chute, and the plate q^2 at its lower end whereby the match bunch is turned over as it is discharged from the chute, substantially as herein described.

32. In a match packing machine, the carrier belts having folds moving in the same direction and adapted to receive the wrapped bunches between them, the pressure rollers above one fold and the pressing plate below the other, substantially as herein described.

33. In a match packing machine, the combination of the discharge chute down which the wrapped match bunches pass the plate below by which each bunch is turned over as it falls from the chute, and the carrier belts between the folds of which the wrapped bunches are received, pressed, and carried off, substantially as herein described.

In witness whereof I have hereunto set my hand.

GEORGE GRISEL.

Witnesses:

S. H. NOURSE,
J. H. BAYLESS.