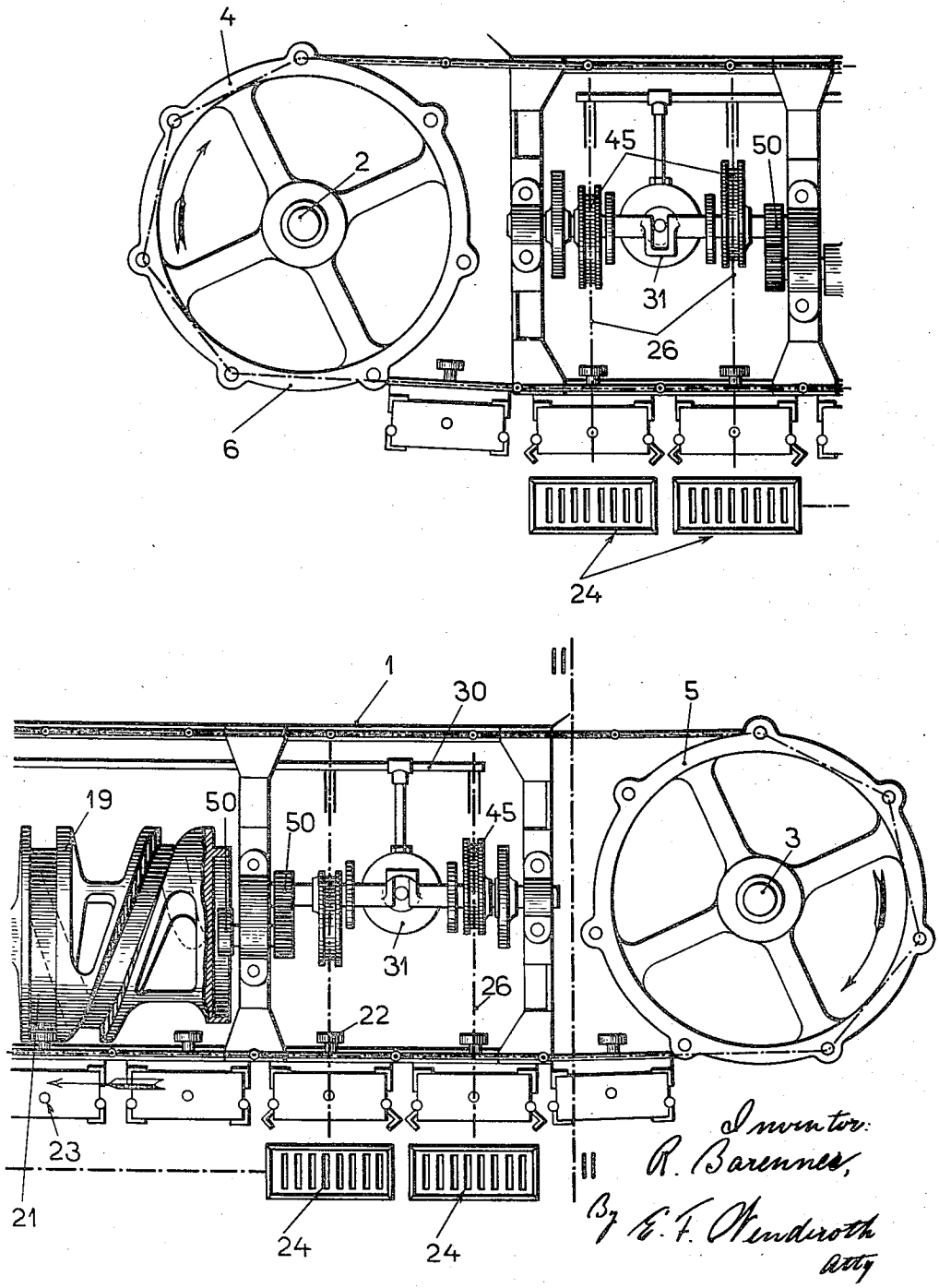
April 30, 1935. R. BARENNES 1,999,953

MACHINE FOR ASSEMBLING PRINTED GATHERINGS OR SIMILAR OBJECTS

Filed Feb. 8, 1933 3 Sheets-Sheet 1

FIG. 1



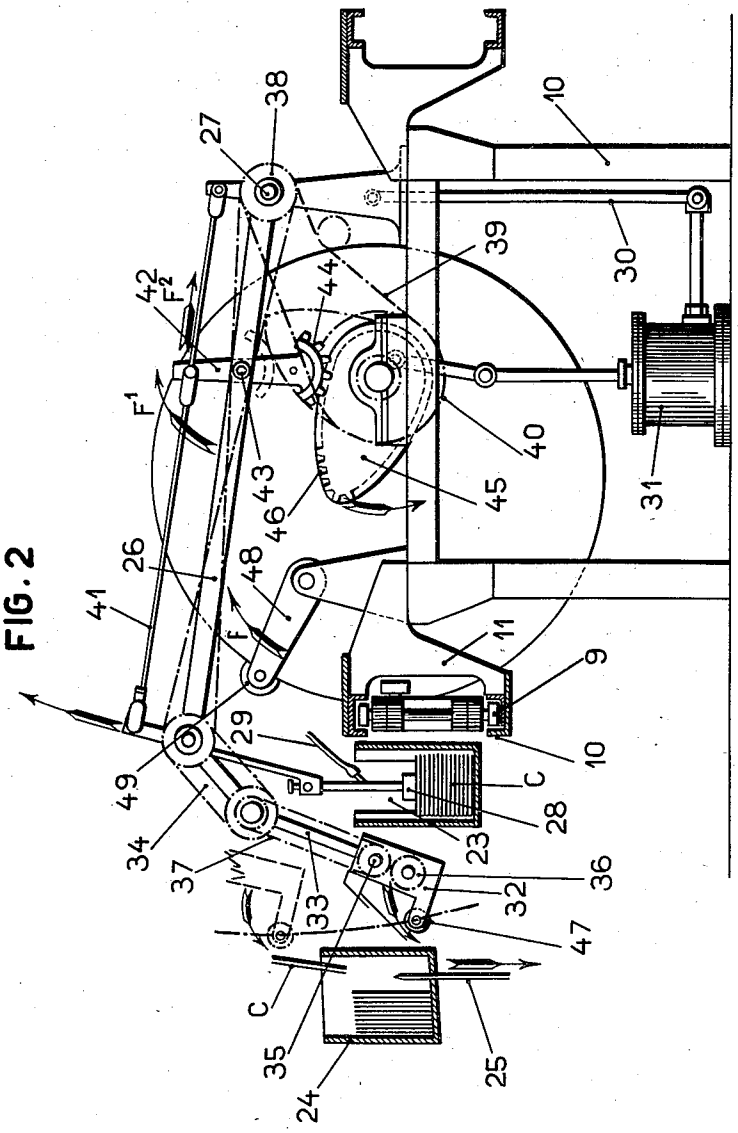
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MACHINE FOR ASSEMBLING PRINTED GATHERINGS OR SIMILAR OBJECTS

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FIG. 2



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MACHINE FOR ASSEMBLING PRINTED GATHERINGS OR SIMILAR OBJECTS

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FIG. 5

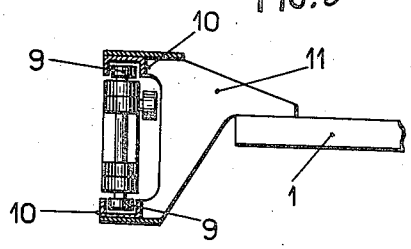


FIG. 3

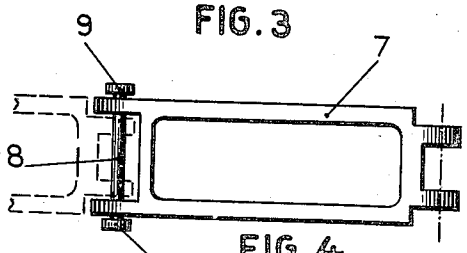


FIG. 4

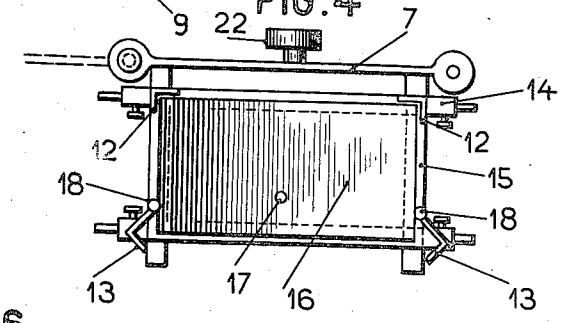


FIG. 6

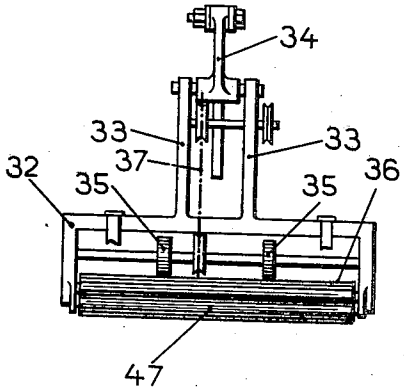
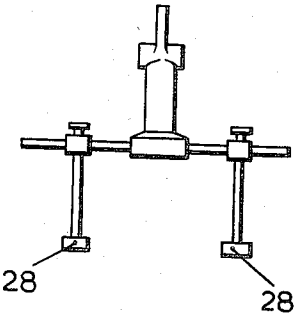


FIG. 7



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Patented Apr. 30, 1935 1,999,953

UNITED STATES PATENT OFFICE

1,999,953

MACHINE FOR ASSEMBLING PRINTED GATHERINGS OR SIMILAR OBJECTS

Robert Barennes, Bordeaux, France

Application February 8, 1933, Serial No. 655,863
In France February 22, 1932

18 Claims. (Cl. 270—58)

The object of the present invention is a machine which makes it possible to assemble the gatherings of printed sheets of a book in the requisite order for sewing or binding. This machine is also applicable to the assembling of all similar objects.

The assembling by hand of the folded sheets or gatherings of a work necessitates the employment of an important amount of labor and therefore entails heavy expense. Attempts have already been made to effect this operation by means of machines but said machines function irregularly or take up so much space that their use is considerably restricted.

The designing of the machine which forms the subject matter of the invention has been studied with a view to ensuring regular automatic operation and to occupying as restricted a space as possible.

This machine presents the following essential features:

1. The gatherings of sheets to be assembled move around the machine and are thus brought to the assembling stations;

2. The movement of the boxes or baskets in which the gatherings it is desired to assemble are placed is an intermittent movement;

These two peculiarities differentiate the machine which forms the subject matter of the invention from similar devices already in existence in which the gatherings do not move along the table and in which, on the other hand, the movement of the organs is continuous and not intermittent;

3. Control of the intermittent movement of the baskets containing the gatherings is obtained by means of a single cam provided with a groove, the form of said groove being calculated in such a manner as to cause the baskets to move forward by a distance equal to the length of said baskets, then to arrest their movement during the time necessary for the removal of the gatherings and their conveyance to the assembling stations;

4. The gatherings are picked-up from the baskets by suckers borne by articulated arms, said arms being devised in such a manner that, after having picked up the gatherings, they move in such a way as to transfer said gatherings and bring them above the assembling stations;

5. The above mentioned picking-up arms are mounted in such a way as to be capable of picking up the said gatherings in the baskets whatever the number of said gatherings may be in said baskets, that is to say whatever may be the height formed by said gatherings;

6. The gatherings which are positioned horizontally in the baskets are brought into a vertical position by the picking-up arms and drop vertically (and not on the flat) into the assembly stations;

7. The gatherings are received in the assembling of which there may be any number desired and which may be positioned along one side only or along both sides of the machine.

In the attached drawings a form of embodiment of the machine which forms the subject matter of the invention has been shown in diagram and only as an example.

In these drawings:

Figure 1 is a plan view of the whole of the machine;

Figure 2 is a vertical cross section to a larger scale through II—II of Figure 1;

Figure 3 represents in elevation and to a larger scale, one of the units or links of the chain which carries the baskets and causes their displacement;

Figure 4 is a plan view of one of the baskets mounted on its link;

Figure 5 is a view of a transverse section of the basket chain guiding device;

Figures 6 and 7 are representations in detail, in elevation, of the outer end of one of the picking-up arms.

As is shown in Figure 1 the machine is essentially constituted by a frame 1 at the ends of which two large drums 4 and 5 forming large chain wheels turn loose about vertical shafts 2 and 3. On said drums 4 and 5 a chain 6, made up of a suitable number of units 7 (Figure 3) is positioned, said units 7 being articulated one to another by means of vertical spindles 8 as shown in Figure 3.

Chain 6 is guided in its movement on the one hand by drums 4 and 5, and on the other hand by rollers 9 carried by the link articulating spindles, said rollers running in the groove of U channel irons 10 fixed to frame 1 by brackets 11.

A basket for the conveyance of gatherings is fixed to each of links 7, said basket being constituted essentially by four vertical angle irons 12—13 supported by bars 14—15. Said bars are movable and can be fixed in any desired position in order to adapt the baskets to the size of the gatherings to be assembled. Each basket is closed, underneath, by a bottom 16 made of a plate of sheet metal. Said plates 16 are cut out beforehand to suit the different sizes of gatherings it is intended to assemble. Consequently in order to prepare the machine for any given work

it is sufficient to place corresponding plate 16 and to bring angle irons 12 and 13 into contact with said plate. In order to ensure that the plates corresponding to the different sizes are positioned correctly, a stud 17, intended to register with a hole drilled for this purpose in plate 16, has been provided on the armature of the basket.

Angle iron pieces 13 positioned on the outer face of the baskets are capable of rotation about axes 18 in order to permit the gatherings to be withdrawn as will be explained further on. Springs (which have not been shown) tend to return said angle iron pieces 13 to the closed position.

The movement of the baskets round the machine is obtained in the manner which is about to be explained.

A motor (which is not shown) causes the continuous rotation of a cam 19 provided with an horizontal axis; said cam is drum shaped (preferably hollow in order to reduce its weight) and is provided, on its outer surface, with a groove the form of which has been designed in such a way as to procure the intermittent movement desired. For this purpose said groove comprises a helical portion 20 and a portion 21 cylindrical in shape. Each of the links 7 of the chain supports a roller 22 turning loose about an horizontal axis and the positions of the various rollers 22 is calculated in such a manner that when the machine is functioning, said rollers successively come into engagement with groove 20—21. During the period a roller 22 is engaged within part 20 of said groove, said roller is driven in the direction of arrow F. In consequence the whole of the chain, that is to say all the baskets 23, moves in the direction of arrow F.

When, in the course of this motion, roller 22 which is in engagement with the cam arrives in part 21 of the groove, the forward movement is interrupted, this stoppage corresponds to the picking up of the gatherings from the baskets and the dropping of said gatherings onto the assembly stations as will be seen further on.

At the moment when the roller in engagement with groove 21 is about to arrive at the end of said groove by reason of the rotation of the cam the next following roller 22 comes into engagement with the other extremity of the cam groove and the chain is again displaced.

This succession of forward movements and stoppages continues as long as cam 19 is rotationally actuated.

The dimensions of the cam and the shape of groove 20—21 are calculated in such a way as to obtain movements of travel forwards corresponding to the length of links 7 of the chain and stoppages during a period corresponding with the time necessary for the withdrawal of the gatherings.

The effect of the motion of the chain and baskets, obtained in the manner which has just been set forth, is to bring each one of baskets 23 opposite an assembling station. In the form of embodiment illustrated as an example there are four of these assembling stations 24 and they are positioned on one of the sides of the machine; but it would be feasible to modify the number of said assembling stations and in case of need to position a certain number on either side of the machine without departing from the principle of the invention.

Each one of said assembling stations 24 is constituted (refer to Figure 2) by a box intended to receive gatherings C dropping vertically; in combination with said box is a comb 25 which is given an up and down motion, said motion being combined with that of the other parts of the machine.

The mechanism by means of which the machine picks up gatherings C from baskets 23 to convey them into assembling stations 24 has yet to be described.

This mechanism, the details of which are shown in Figures 2, 6 and 7, is essentially constituted by an arm 26 oscillating about a pin 27 supported by the frame. At the extremity of this arm opposed to its point of articulation are mounted the picking-up device proper, composed of suckers 28 and the device employed for the purpose of causing the gatherings to drop into the assembling stations.

Each picking-up arm is preferably provided with two suckers 28 (in order to obtain a more regular grip on the gathering), said suckers being connected by flexible piping 29 to a vacuum pipe 30. A vacuum is set up within piping 30 by means of exhausters 31 (in the form of embodiment illustrated one exhauster has been provided for each set of two picking-up arms). On piping 30, along each arm 26, are mounted cocks actuated by any suitable device, so that a vacuum may be set up in the suckers at the moment when the picking-up arm comes up against the gathering which is to be picked up, and so that this vacuum may be maintained till the moment when the gathering has been brought above assembling station 24, and then suppressed in order to allow the gathering to drop into said station.

At the extremity of the picking-up arm opposed to its oscillation point 27 a device is mounted which serves to guide the gathering towards the assembling station at the moment when it drops. This device, details of which are shown in Figures 2 and 6, is constituted by a frame 32 connected to arm 26 by parts 33 and 34. Rollers 35 (made of rubber or fiber for instance) rotate within frame 32 and in turn transmit a rotational motion to a rubber roller 36. The rotational motion is transmitted to rollers 35 by transmission 37 (a round belt for instance) running on pulleys and receiving its motion from a pulley 38 made fast on the same shaft as a sprocket wheel which is, in turn, actuated by chain 39 passing around wheel 40 which is driven by the motor.

The device illustrated in Figure 7 which supports suckers 28 is capable of pivoting about the extremity of arm 26 under the action of a rod 41 which is itself actuated by arm 42 pivoted around axis 43 supported by arm 26.

Arm 42 is terminated at its lower end by a quadrant 44; said quadrant is provided with teeth and, on either side of said teeth, with smooth portions.

Quadrant 44 rests on a cam 45 provided with a recessed channel around the whole of its periphery one part only of said recessed channel being provided with teeth 46. So long as quadrant 44 rests on the smooth part of the cam, the movement of said cam which is actuated by the motor, determines the upward oscillation of arm 26 or allows it to drop by its own weight. But when toothed portion 46 of said cam engages with the teeth on the quadrant arm 42 pivots in the direction of arrow F^1 and this determines the traction of rod 41 in the direction of arrow F^2. This causes the pivoting of the sucker holder. Said sucker holder which is at the same moment clear of basket 23 from which

it has drawn a gathering conveys said gathering outwards and brings it into frame **32** between rollers **35** and roller **36**. The gathering then drops into the assembling station as illustrated in Figure 2 after passing over a small loose guiding roller **47**.

At the moment when a gathering thus drops into assembling post **24** comb **25** is positioned in its high location, in which position it retains the gatherings which had dropped previously. The proper sequence of the gatherings in assembling station **24** is thus obtained. Once the gathering has dropped completely comb **25** is withdrawn so that the gathering may come up against those which had been previously deposited.

By reason of the manner in which it is constructed the picking-up arm rests, by means such as suckers **28** on the heap of gatherings C contained in the basket whatever the height of this heap may be.

On the other hand when it is desired to put one of the picking-up arms out of action it is sufficient to raise crank **48** in the direction of arrow *f*. Arm **26** is thus made to rest on roller **49** and ceases to function.

The various cams and eccentrics which actuate the picking-up arms, the exhausters and all the parts necessary for the functioning of the machine derive their motion from the driving shaft of the motor by means of a transmission represented in diagram at point **50**.

The operation of the machine is very simple:

The gatherings to be assembled are distributed among the successive baskets **23**, each basket of course only receiving gatherings bearing the same "signature" and the machine is set in motion (in Figure 1 of the drawings only a few baskets have been shown for the sake of simplicity but it is obvious that one basket **23** is attached to each link **7** of the chain). When the basket containing gatherings "1" reaches the first assembling station the corresponding picking-up arm takes one gathering and deposits it in said assembling station during the stoppage of the motion of the chain. Said chain starts up again and brings said basket opposite to the second assembling station at the same time as it brings the next following basket (which contains gatherings "2") opposite to the first assembling station. At the next stop of the chain the first picking-up arm deposits a gathering "2" against gathering "1" previously deposited at the first assembling post while the second picking-up arm deposits a "1" gathering in the second assembling station. Operation is continued until the first assembling station has received the whole of the gatherings composing the work. At this moment said gatherings are removed and the first assembling station is ready to receive a fresh series.

At the moment when the baskets arrive opposite to the assembling stations the cam device hereinabove mentioned causes the pivoting of angle irons **13** in order to allow the gathering to be removed. When the baskets leave the assembling station zone the return springs bring angle irons **13** back to their original position of closing.

The machine of course comprises as many picking up arms as there are assembling stations. In the example illustrated there are four of said arms and stations.

What I claim is:

1. A machine for assembling signatures in proper sequence comprising an endless carrier, means for holding signatures upon said carrier in horizontal position, means for removing and changing the relative position of individual signatures and means for receiving said individual signatures in vertical position.

2. A machine for assembling signatures in proper sequence comprising an endless carrier, baskets mounted upon said endless carrier for holding signatures in horizontal position, means for removing and changing the plane of individual signatures from said baskets and means for receiving said individual signatures in vertical position.

3. A machine for assembling signatures in proper sequence comprising an endless carrier, adjustable receptacles for holding signatures of different sizes in horizontal position mounted upon said carrier, means for removing individual signatures from said receptacle and means for receiving said individual signatures in proper sequence.

4. A machine for assembling signatures in proper sequence comprising an endless carrier, means for intermittently operating said endless carrier, said endless carrier being composed of a plurality of articulated links, receptacles mounted upon said links for holding signatures, means for removing individual signatures from said receptacle and means for receiving said individual signatures in proper sequence.

5. A machine for assembling signatures in proper sequence comprising an endless carrier composed of a plurality of articulated links, receptacles mounted upon said links for holding signatures in horizontal position, means for removing individual signatures from said receptacles and means for receiving said individual signatures in vertical position.

6. A machine for assembling signatures in proper sequence comprising an endless carrier, a pair of drums about which said endless carrier rotates, means for intermittently operating said endless carrier, signature receptacles mounted upon said endless carrier and means for removing an individual signature from said receptacles.

7. A machine for assembling signatures in proper sequence comprising an endless carrier, a pair of drums about which said endless carrier rotates, means for holding signatures upon said carrier, means for intermittently operating said carrier and means for removing an individual signature from said means for holding signatures.

8. A machine for assembling signatures in proper sequence comprising an endless carrier composed of articulated links, receptacles mounted upon said links for holding signatures, means for intermittently operating said endless carrier and pneumatic means for removing signatures from said receptacles.

9. A machine for assembling signatures in proper sequence comprising an endless carrier composed of articulated links, signature holders mounted upon said links and means cooperating with said links for giving an intermittent motion to said endless carrier.

10. A machine for assembling signatures in proper sequence comprising an endless carrier having articulated links, signature holders mounted upon said links, a roller mounted upon each link, and cam means cooperating with said roller for giving an intermittent motion to said endless carrier.

11. A machine for assembling signatures in proper sequence comprising an endless carrier having articulated links, adjustable signature holders mounted upon said links, means cooperating with said links for giving an intermittent

motion to said endless carrier, pneumatic means for removing signatures from said holders and means for receiving said signatures in proper sequence from said pneumatic means.

12. A machine for assembling signatures in proper sequence comprising an endless carrier having articulated links, signatures holders mounted upon said links, means for giving an intermittent motion to said endless carrier, a pneumatic picker for taking individual signatures out of said holders and means for changing the relative position of said individual signatures.

13. A machine for assembling signatures in proper sequence comprising an endless carrier, means for rotating said endless carrier, adjustable signature holders mounted upon said endless carrier and a removable bottom for said signature holders.

14. A machine for assembling signatures in proper sequence comprising an endless carrier composed of articulated links, adjustable signature holders mounted upon said links, said holders having movable walls and a removable bottom.

15. A machine for assembling signatures in proper sequence comprising an endless carrier composed of articulated links, adjustable signature holders mounted upon said links, said holders having movable side walls and a removable bottom, pneumatic means for removing individual signatures from said holders and means for receiving said signatures in proper sequence from said pneumatic means.

16. A machine for assembling signatures in proper sequence comprising an endless carrier, signature holders mounted upon said carrier, means for intermittently operating said carrier, pneumatic means for removing individual signatures from said holders and means for rendering said pneumatic means inoperative.

17. A machine for assembling signatures in proper sequence comprising an endless carrier, signature holders mounted upon said carrier, a pivoted pneumatic picker adapted to remove individual signatures from said holders and a pivoted arm cooperating with said pivoted picker for swinging said picker into inoperative position.

18. A machine for assembling signatures in proper sequence comprising an endless carrier, signature holding means upon said carrier, said carrier having articulated links, a pair of drums about which said endless carrier travels, guide channels through which said endless carrier is guided and signature receptacles mounted upon individual links.

ROBERT BARENNES.