Aug. 6, 1946. H. E. SEELEY 2,405,373

SHEET DELIVERING AND PRINTING MECHANISM

Original Filed May 21, 1940 4 Sheets-Sheet 1

Fig. 1.

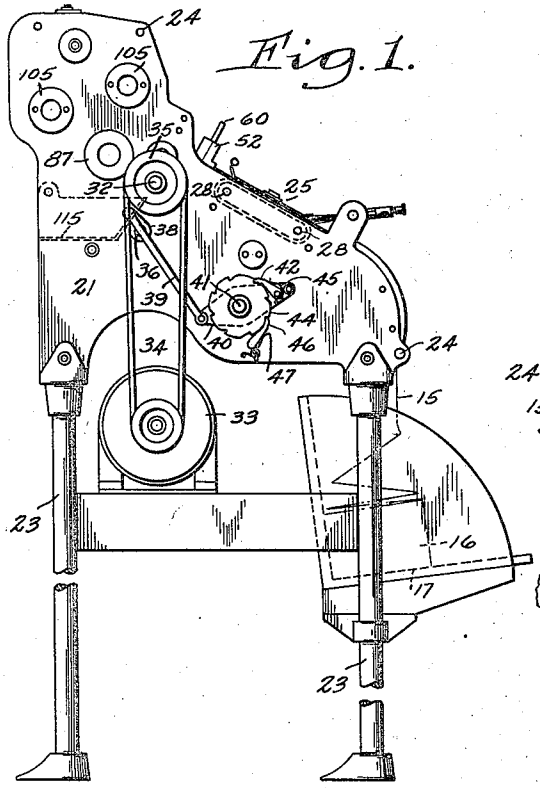
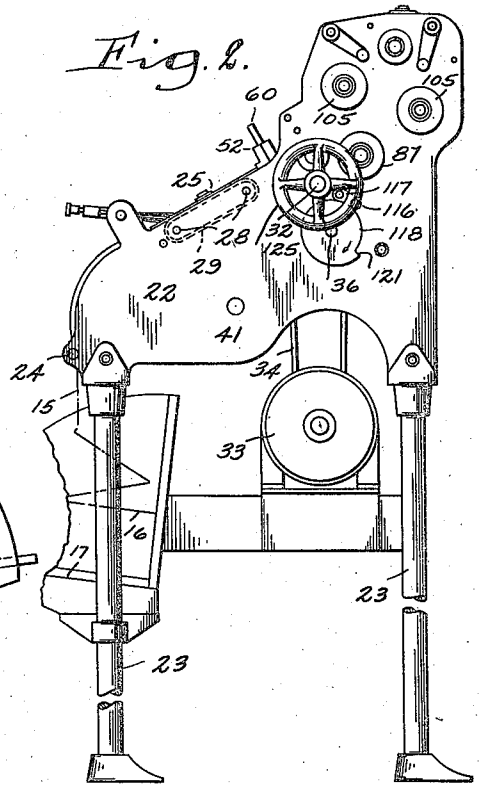


Fig. 2.



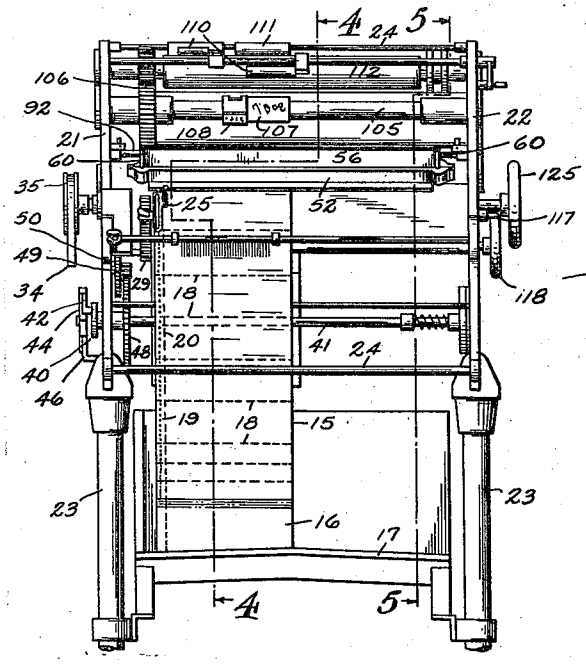


Fig. 3.

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SHEET DELIVERING AND PRINTING MECHANISM

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Fig. 4.

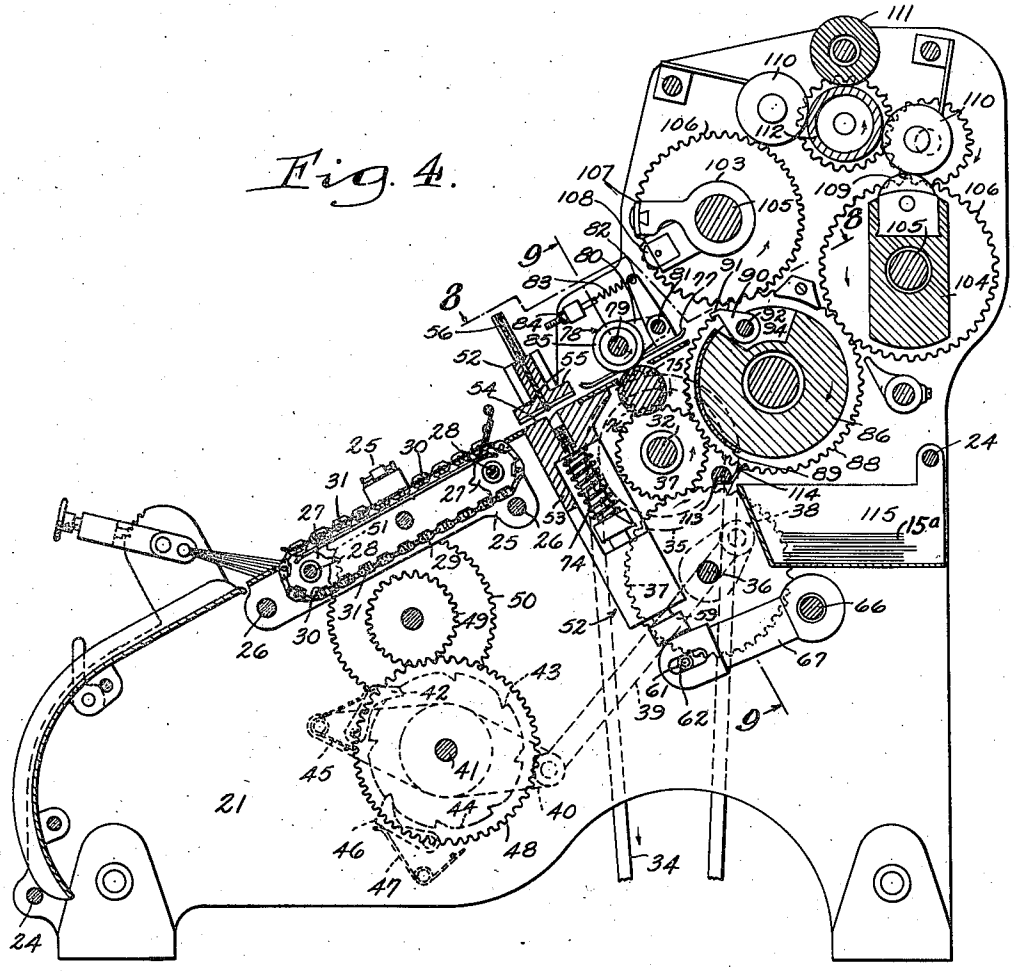
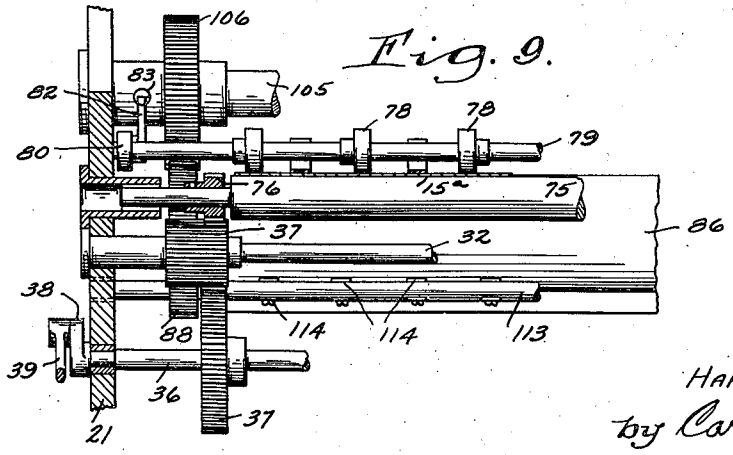


Fig. 9.



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SHEET DELIVERING AND PRINTING MECHANISM

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Fig. 5.

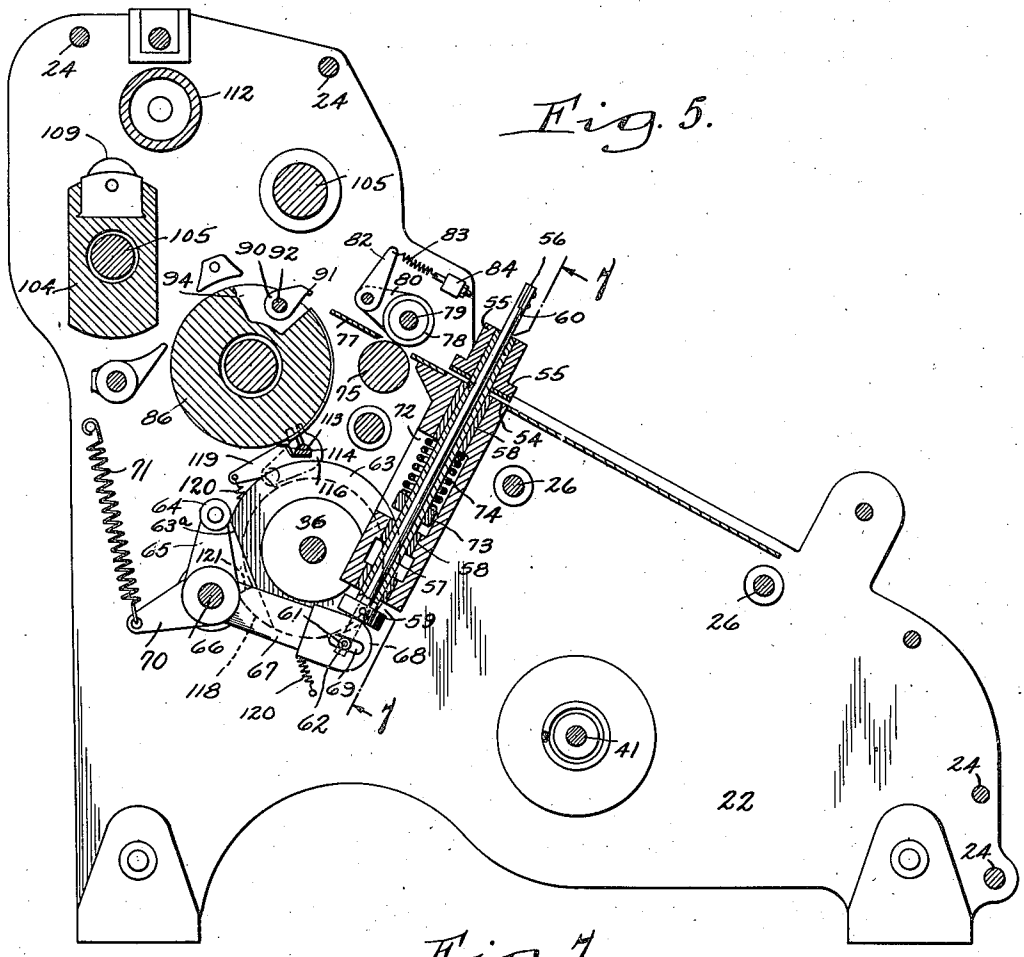
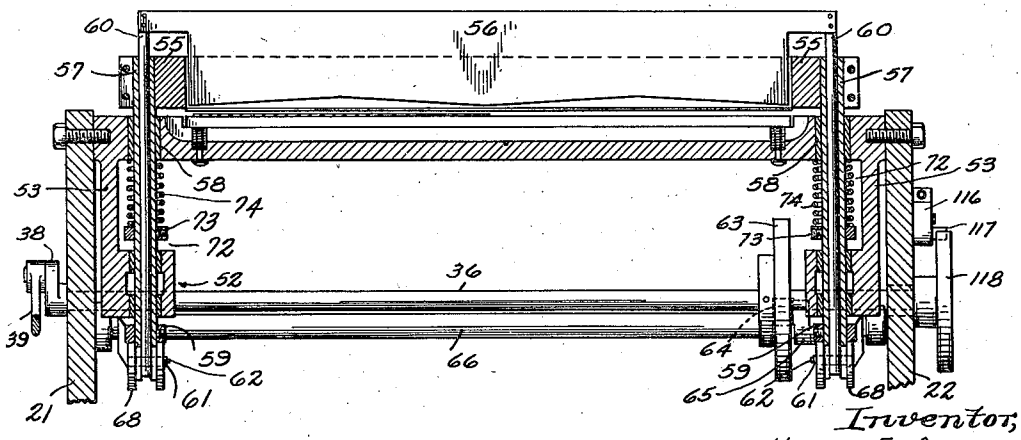


Fig. 7.



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SHEET DELIVERING AND PRINTING MECHANISM

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Fig. 6.

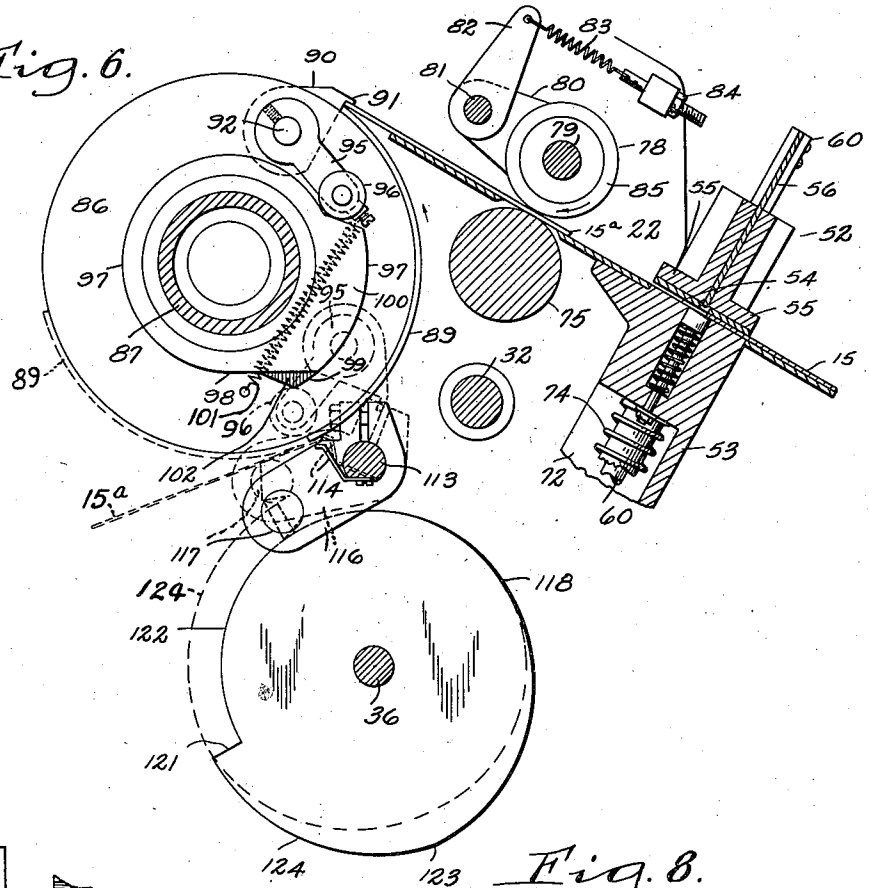
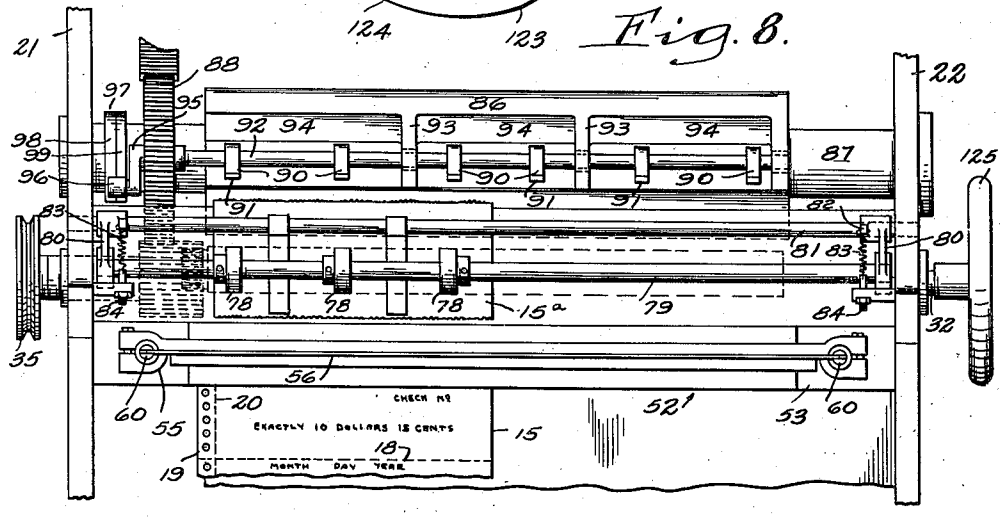


Fig. 8.



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Patented Aug. 6, 1946

2,405,373

UNITED STATES PATENT OFFICE

2,405,373

SHEET DELIVERING AND PRINTING MECHANISM

Harry E. Seeley, Niagara Falls, N. Y., assignor to Moore Business Forms, Inc., a corporation of Delaware

Original application May 21, 1940, Serial No. 336,413. Divided and this application December 9, 1942, Serial No. 468,387

2 Claims. (Cl. 101—228)

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The invention herein disclosed and claimed is fully disclosed in applicant's prior copending application, Serial No. 336,413 for Unit feed printing machine, filed May 21, 1940, Patent No. 2,331,351, issued October 12, 1943. Therefore, the present application is a division of that earlier filed.

This invention relates to improvements in machines for operating upon long continuous strips of paper and like material, and intended to be divided into units of substantially equal length and to receive printed data and having blank spaces or blank forms for receiving the same. More particularly in some of its aspects the invention relates to improvements in machines for feeding the record strips and for severing them into unit lengths or checks and delivering the latter sequentially to an impression cylinder and holding them in position thereon during the application of certain printed data, such as the signature, date, and numbers ordinarily applied to checks, drafts, and the like.

The general object of this invention is to provide for machines of the class mentioned, an improved feeding and delivering mechanism functioning for separating units from a continuous strip of paper or like material and delivering the units one after another into position upon a rotary carrier or cylinder on which they may receive printed impressions.

A further object is to provide an improved auxiliary feeding and delivering mechanism for the severed units or checks, embodying a simple quick acting unit delivery having an impositive frictional feeding engagement with the units so as to slide idly over the units when held by the gripping device, but to automatically feed them forwardly for delivery to the rotary printing cylinder immediately upon release of the unit gripping device.

A further object is to provide in machines of the class mentioned an improved auxiliary strip feeding or strip delivery mechanism operating in coordination with the breaker mechanism to deliver the units or checks quickly and easily as soon as they are released from the breaker mechanism.

Another object is to provide an improved strip gripping and holding mechanism for holding the units or checks in impression receiving position upon an impression cylinder and operating in coordination with the delivery mechanism for receiving the units delivered by the latter.

Another object is to provide an improved arrangement for the printing elements operating

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in conjunction with the impression cylinder for applying the printed data to the blanks or checks that are gripped and retained in impression receiving position upon the cylinder.

Other objects and advantages of the invention will be in part pointed out in the following detailed description of an illustrative but preferred embodiment of the invention, and will be in part obvious as the disclosure proceeds.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a more comprehensive disclosure of the nature, objects and advantages of the invention reference is made to the following detailed description and to the accompanying drawings in which:

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a similar view of the opposite side of the machine;

Fig. 3 is a front elevation of the machine shown in Figures 1 and 2;

Fig. 4 is an enlarged vertical section showing parts of the mechanism in elevation, the section being taken approximately on the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is an enlarged section taken approximately on the line 5—5 of Fig. 3 looking in the direction of the arrows;

Fig. 6 is an enlarged fragmentary sectional and elevational view of the strip gripping and separating element and the mechanism for delivering the separated units or checks to the impression cylinder;

Fig. 7 is a fragmentary sectional view showing the strip breaker mechanism, the section being located substantially on the line 7—7 of Fig. 5 looking in the direction of the arrows;

Fig. 8 is a fragmentary plan view of parts positioned below the line 8—8 of Fig. 4, the parts above this line being omitted;

Fig. 9 is a fragmentary sectional and elevational view of the auxiliary feeding or delivery mechanism, the section being located substantially on the line 9—9 of Fig. 4 looking in the direction of the arrows;

Prior to the detailed description of the illustrative embodiment it will be helpful to give a general outline of the various operating mechanisms and the functions thereof. These are outlined as follows:

A strip feeding mechanism feeds the long continuous strip of checks or similar units that are separated by transverse weakened severance lines. The feeding mechanism is preferably of the pin feed type having pins entering strip apertures and feeding the strips with accuracy. Intermittent drive for the pin feed mechanism advances the strip with a step by step movement by unit or check length intervals.

Just beyond the pin feed mechanism is the strip separator or breaker embodying a strip clamping device having two closely spaced gripper bars actuated intermittently to grip the strips at opposite sides of the transverse weakened lines thereof upon the halt or cessation of strip advancement by the feed mechanism. The strip is thus held in its gripped position during the separation or breaking along the weakened lines thereof. A unit separator or breaker blade moves between the clamping bars in substantial alignment with the weakened lines of the strip. The breaker is not claimed per se herein but is particularly claimed in the prior copending parent application above identified.

After the breaking of the check or unit from the strip along the weakened line, an auxiliary feed or delivery mechanism becomes operative immediately upon release of the gripper to advance and deliver the check into position for subsequent processing, as upon an impression cylinder. The cylinder is provided with gripping mechanism operated synchronously with the delivery mechanism so as to grip the check in position upon the cylinder to retain it in impression receiving position thereon. Although the impression cylinder rotates continuously the gripping mechanism thereon is operated in timed sequence or synchronism with the intermittent delivery of the units or checks by the delivery mechanism. Rotation of the impression cylinder brings the checks held in impression position thereon into impression receiving relation with the printing mechanism for printing the signature, dates, numbers, etc.

For a detailed description of the illustrative embodiment of the invention reference is had to the accompanying drawings. As there shown, the strip **15** as seen in Figs. 3 and 8 ordinarily embodies a long continuous strip of paper or similar material folded into a zigzag pack **16** that may be conveniently supported as by a housing and protecting shelf **17** attached to the frame of the machine. The strip shown is divided into units of substantially equal length by transverse weakened severance lines **18**, the weakening being by any well known means such, for example, as slitting, perforating and the like. These units in the illustrative embodiment are intended to be used for checks, drafts and the like and may have the usual printed data thereon with spaces or blank forms for receiving additional data such as the signatures, dates, numbers, amounts, etc. A feed band **19** preferably integral with the strip, as shown, extends along one longitudinal margin of the strip and is provided with a series of pin feed apertures for cooperation with the feed pins of the feed mechanism. This feed band is separated from the body of the strip by a longitudinal weakened severance line **20** formed by slitting, perforations, etc., thus providing for easy separation of the feed band after it has served its feeding function.

The operative mechanism of the machine is mounted in a suitable frame which, as shown, may include longitudinally disposed plates or frame members **21** and **22** and mounting legs or pedestals **23** so that the machine can be mounted upon a floor or platform. Transverse frame members or tie rods **24** extend between the frame members **21** and **22** to support them firmly in position.

The strip feeding mechanism, best shown in detail in Figs. 3 and 4 embodies a unit or frame **25** supported on transverse bars or rods **26** mounted in machine frame. Feed sprockets **27** longitudinally spaced apart are mounted upon rotary shafts **28** running in bearings in the feed unit, one of these being a drive shaft for the feed mechanism.

Mounted upon the feed sprockets **27** is an endless flexible feed chain **29** carrying pin supporting brackets **30** on which the feed pins **31** are respectively mounted. As shown in Fig. 4 the brackets **30** are positioned to mount the feed pins at or below the pitch line of the chain **29**, which is ordinarily constructed of a series of pivotally connected links. This arrangement of the feed pins functions to feed the strips accurately so as to bring the severance lines **20** of the strip into definite positions for operation thereon as later brought out more clearly. Since the construction, operation and advantages of this feed mechanism are fully set forth in the Mabon Patent No. 2,171,003, issued August 29, 1939, it is unnecessary to describe it further here, and reference is made to this patent for a full disclosure of the feed mechanism.

The main drive shaft **32** of the machine extends transversely being rotatably mounted in bearings in the longitudinal side frame members **21** and **22**. This drive shaft is driven in any convenient manner as by a driving motor **33** connected through a belt **34** to a pulley **35** fixed to the shaft. The various operating units including the strip feed mechanism, above described, are driven through connections to the main drive shaft.

As best shown in Figs. 1 and 4 the pin feed mechanism, above described, is driven intermittently for advancing the strip in a step by step movement. The mechanism is adjusted to advance the strip the length of one of the units or checks at each feeding interval or step. A transverse rotary shaft **36** driven by intermeshing gears **37** mounted respectively upon the drive shaft **32** and the shaft **36**, carries a crank arm **38** connected by a rod or pitman **39** with a reciprocating driving arm **40**. The pawl arm is mounted for rotary reciprocation upon a rotary shaft **41** and carries a driving pawl **42** pivotally connected thereto and engageable at its free end with the teeth **43** of a driving disk **44** affixed to the shaft **41**. The driving pawl **42** is yieldingly urged into operative position by a tensioned spring **45**. A locking pawl **46** is pivoted to the frame member **21** and yieldingly urged by a spring **47** to cause its free swinging end to engage the teeth **43** thereby to prevent retrograde movement of the shaft **41**.

Interposed between the intermittent rotary shaft **41** and the driving shaft **28** of the pin feed mechanism, is a train of intermeshing toothed gears **48**, **49**, **50**, **51**, the gear **48** being attached to the shaft **41** and the driving pinion **51** to the drive shaft **28**. The toothed gears **49** and **50** are idlers rotating as a unit upon a spindle or bearing attached to the frame **21**. Through these driving connections the pin feed mechanism is driven intermittently through action of the driving pawl **42** to feed the strip **15** intermittently in steps of equal length. In cases where it is desired to feed the strip in different step lengths, this may be

interchangeable feeding feed gears of different ratio or by a different length of pawl arm 48 and driving disk 44, or by other means.

Positioned just beyond the feeding unit in the direction of strip feed is the strip breaker or separator unit indicated generally at 52 and operating in timed sequence with the feeding mechanism for separating the strip into units. This breaker unit, as best disclosed in Figs. 4, 5, 6 and 7, embodies a relatively heavy metallic cross bar or frame unit 53 extending transversely of the machine and securely attached to the frame plates 21 and 22. The cross bar 53 is formed at its upper edge with a flat bed 54 having its upper surface in alignment with the path of strip feed and forming a gripper bed upon which the strips are held during separation of the strip units. Reciprocating grippers or gripper bars 55 are mounted in opposing relation to the bed 54 so that the path of strip feed lies between the bed and the grippers. The two gripper bars 55 extend transversely of the machine and are preferably spaced apart slightly longitudinally of the strip path forming a space or passageway for receiving the strip breaker or breaker blade 56. But the gripper bars are firmly connected together in a unit and may be integral with each other if desired, and their gripping surfaces are preferably faced with yielding material such as sheets of rubber as shown.

As best seen in Fig. 7, the gripper bars 55 are mounted for reciprocation upon the cross bar 53 by means of hollow sleeve rods 57 slidably mounted in bearings 58 in supporting formations at the opposite ends of the cross bar 53. These sleeve rods are firmly attached at their upper ends to the opposite ends of the gripper bars 55 so as to move as a unit therewith. At the lower ends, the sleeve rods 57 protrude from the cross bar 53 and are provided at their terminals with collars 59 secured thereto and functioning as operating elements. By means of these sleeve rods the gripper bars 55 are mounted for sliding reciprocation on the cross bar 53.

The breaker blade 56 is also mounted for sliding reciprocation upon the cross bar 53 but can move independently of the gripper bars 55. For this purpose reciprocating mounting rods 60 extend through the inner openings of the sleeve rods 57, which thus provide bearings for slidably mounting them. They extend at the lower ends beyond the sleeve rods where they are provided with operating connections including operating rollers 61 rotatably mounted upon cross pins 62 secured to the lower ends of the rods. The blade 56 is connected at its opposite ends to the upper ends of the operating rods 60. It will be noticed that the breaker blade 56 is positioned intermediate the gripping surfaces of the gripper bars 55, the purpose of which is later set forth.

For operating the gripper bars and breaker blade a cam mechanism is used, as best shown in Fig. 5, embodying a disk cam 63 secured on the shaft 36 for rotation therewith. A cam roller 64 engages the periphery of the cam 63 and is mounted upon an arm 65 affixed to a shaft 66 rotatably mounted in suitable bearings in the frame. Also, affixed to the rotary shaft 66 is a pair of longitudinally spaced actuating arms 67 each having a bifurcated terminal 68 underlying the corresponding operating collar 59, and provided with opposing elongated slots 69 in its terminal branches for receiving the rollers 61 that are attached to the operating rods 60 for the breaker blade 56. The upper surface of each bifurcated terminal 68 is adapted to contact with the under surface of the corresponding collar 59 for controlling the operation of the gripper bars 55. The cam 63 has a flattened peripheral surface 63a cooperating with the roller 64 for effecting reciprocation of the actuating arm 67. A control arm 70 is also fixed to the shaft 66 and a tensioned spiral spring 71 anchored to the frame is connected to the outer end of the arm 70 for controlling the operation of the cam driving mechanism.

Each of the sleeve rods 57 extends through a recess 72 formed in the frame unit or cross bar 53, and secured in position upon the sleeve rod in each recess is a control collar 73 normally seated against one end of the recess. A spiral compression spring 74 bears upon the upper surface of each collar 73 and at its opposite end against the upper wall of the recess 72, the springs being compressed to tend to urge the sleeve rods, together with the gripper bars 55, into strip gripping position. When the cam roller 64 engages the circular surface of cam 63, as shown in Fig. 5, the breaker blade 56 is raised through the actuating rods 60 and the actuating arms 67, while at the same time the bifurcated terminals 68 of the actuating arms engage the operating collars 59 of the sleeve rods to raise the grippers 55 to non-gripping position. During this operation the collars 73 in the recesses 72 are raised from their seats to compress the spiral springs 74. When the cam roller 64 engages the flattened surface 63a of the cam 63, the actuating arms 67 are retracted by operation of the springs 71, thus sliding the actuating rods 60 downwardly in their mountings and adjusting the breaker blade 56 into its downward operative position. During this movement, the bifurcated terminals 68 move away from the terminal collars 59 whereupon the compression springs 74, through the collars 73 and sleeve rods 57, move the gripper bars 55 into gripping position.

An auxiliary feed mechanism is positioned just beyond the breaker mechanism for continuing the feed of the checks or units after they have been separated from the strip 15. As best shown in detail in Figs. 4, 5, 6, 8 and 9, this auxiliary feed mechanism includes a continuously operating feed or pull roll 75 rotatably mounted in the frame and driven continuously by a spur gear 76 meshing with the toothed gear 37 mounted on the drive shaft 32. The feed roll 75 has an uninterrupted peripheral friction surface for its entire length extending in frictional engagement with the lower side of the units or checks 15a through an opening in a plate or table 77 attached to the forward edge of the gripper bed 54 and forming a smooth uninterrupted continuance of the latter.

Pressure rollers or trucks 78 are mounted upon a swinging rotary shaft 79 rotatable in bearings carried by swinging arms 80 attached to a supporting shaft or bar 81 suitably mounted for oscillatory rotation in the frame. An arm 82 is attached to the shaft 81 and one or more control springs 83 are attached to the arm 82 to regulate the pressure of the rolls or trucks 78 upon the upper surface of the strip or checks. An adjusting device 84 is provided for adjusting the tension of the spring 83 so as to control the pressure of the truck rolls 78 against the strip. The truck rolls 78 are preferably faced with friction material, such as rubber bands 85 or the like positioned to bear against the strip surface. It will be noticed that the feed roll 75 rotates

...only during check advancement. The tension of the trucks 78 is so adjusted that this constant pull of the feed roll 75 is insufficient to sever or damage the strip but functions to advance the separated units or checks 15a immediately upon release thereof by the grippers 55 following severance of the checks from the continuous strip by the blade 56. During the time that the units are held by the grippers the pressure rolls or trucks 78 do not rotate but continue to exert pressure upon the strip against the feed roll 75. The trucks 75 and mountings therefor are light with little inertia and anti-friction bearings are provided for mounting the same.

Positioned beyond the auxiliary feed mechanism is a receiving cylinder 86 to which the separated checks or units 15a are delivered by the auxiliary feed mechanism. This receiving cylinder with associated mechanism is best shown in detail in Figs. 4, 5, 6 and 8. While the receiving cylinder 86 may be utilized for different purposes in processing the separated units or checks 15a, it is herein disclosed as a rotary impression cylinder upon which the checks are received and supported during the reception thereon of printed data.

The impression cylinder 86 is suitably rotatably mounted on a shaft or support 87 carried by the frame and is driven by a toothed gear 88 meshing with the drive gear 37. The impression cylinder is preferably provided with an impression bed or blanket 89 for receiving the checks or units 15a, the bed being preferably of resilient or yielding material, such as the sheet of rubber shown. The rubber bed 89 is secured upon the periphery of the cylinder in position for receiving the separated units as they are delivered by the auxiliary feeding mechanism.

Rotary gripper jaws 90 having gripping extensions 91 for engagement with the forward edges of the checks, are fixed to a supporting shaft 92 rotatably mounted in bearings provided in supporting flanges or walls 93 formed in a recess 94 opening through the surface of the cylinder 86 in which the shaft 92 is disposed. As best seen in Fig. 6, the jaws 90 with the gripping extensions 91 are positioned to receive and grip the forward edges of the separated units 15a against the forward edge of the bed 89 as they are delivered thereto by the auxiliary feeding mechanism. It will be noted that the gripping extensions 91 of the gripper jaws 90 are so disposed relatively to the center of rotation of the mounting shaft 92 that they will be retracted peripherally of the impression cylinder from gripping position when the jaws are open to release the grip upon the strip. Similarly, when the jaws are closed into gripping position the gripping extensions 91 advance toward the edge of the strip and pass thereover into gripping position overlying the strip edge which is adjusted into this position by means of the auxiliary feeding mechanism. When the grippers 90 have been rotated into releasing position, as seen in Figs. 4 and 5, the gripping extensions 91 have been retracted along the periphery of the cylinder so as not to overlie or interfere with the edge of the strip or unit as it is advanced into position to be gripped on the cylinder by the auxiliary feeding mechanism.

At one of its ends the gripper shaft 92 has an ...engaging the periphery of a cam 97 supported in stationary position upon the support 87 of the impression cylinder. This cam preferably includes two cam plates or disks 98 and 99 that may be angularly adjustable with reference to each other so as to vary the gripping and releasing operations of the grippers 90. As seen in Fig. 6, the lobe 100 of the cam plate 98 cooperates with the arm 95 to open or release the gripping jaws 90 at a definite period in the rotation of the impression cylinder 86, while the jaws are moved into gripping position by means of a tension spring 101 immediately upon passage of the roller 102 beyond the lobe 100. The cam lobe 102 of the cam plate 99 is utilized for releasing the grip of the grippers upon the units at the time of unit ejection as later described.

While the separated checks or units 15a are gripped in impression receiving position upon the bed 89 of the impression cylinder 86, they are carried to receive their printed impressions past rotary printing units 103 and 104 rotatably mounted by shafts or supports 105 mounted in the frame. The printing units 103, 104 are driven by toothed gears 106 meshing with the gear 88 of the impression cylinder. While any desired data may be printed upon the units or checks, in the embodiment shown the rotary printing element 103 carries a signature plate 107 and a date plate 108. The signature and date plates may be of any desired construction and arrangement and need not be described here in detail. The rotary printing unit 104 carries a numbering plate 109, also of any desired construction and arrangement. As the check or unit 15a is carried on the bed of the impression cylinder, the signature, date and numbering plates are moved in synchronism and the impressions are printed on the check in appropriate spaces provided therefor. Inking mechanism embodying inking rolls 110 is mounted for applying ink to the surfaces of the printing plates. An ink carrying roll 111 deposits ink upon the surface of a vibrator roll 112 from which it is transferred to the inking rolls 110 and thence to the printing plates. This inking mechanism may be of any desired known construction and arrangement and need not be described in detail.

Ejector mechanism is provided for stripping and ejecting the checks or units from the impression cylinder after the processing is completed and for depositing them in a suitable receptacle. This mechanism, as best shown in Figs. 4, 5 and 6, embodies an ejector shaft 113 rotatably mounted in the frame and carrying one or a plurality of ejector fingers 114 preferably made of thick strong metal and having free terminal ends shaped for engagement with the edges of the checks or units so as to impart an impulse thereto to strip them from the impression cylinder and to deposit them in the receptacle 115 mounted on the frame adjacent to the impression cylinder. These ejector fingers 114 are provided with attaching shanks engaging a flattened side of the shaft 113 and detachably secured in position by attaching screws or similar means.

Operating means for the unit ejector or stripper include an operating arm 116 attached to the ejector shaft 113 and having a cam roller or pin 117 at its free swinging end, positioned for engagement with the peripheral cam surface of

a cam disk 118 fixed in operative position upon the rotary shaft 36. A control arm 119 is attached to the ejector shaft 113 and a tensioned coil spring 120 is stressed to tend to cause the shaft 113 to rotate in a counter-clockwise direction, as viewed in Figs. 5 and 6. The cam 118 has a shoulder or stepped portion 121 and a surface 122 of gradually increasing radius leading from the inner or lower edge of the shoulder 121. The radius of the surface 122 gradually increases substantially to the point 123 and the surface 124 beyond this point is substantially concentric with the shaft 36.

The operation of the improved mechanism is partially included in the above detailed description, but is herewith briefly summarized in order to set out the various operations in coordinated sequence. The strip 15 is threaded into the pin feed mechanism and over the gripper bed 54 and beneath the gripper jaws 55. The machine may be operated slowly for short distances by hand through the hand wheel 125 attached to the main drive shaft 32. Thus the machine may be operated by hand to raise the gripper bars slightly from the bed, as shown in Fig. 4, whereupon the strip can be threaded beneath the bars with the forward edge or unit thereof between the feed roll 75 and pressure rolls 78 of the auxiliary feed mechanism. The driving motor can then be started.

Due to the step by step action of the pin feed mechanism above described, strip 15 is fed forwardly intermittently a distance equal to the length of a check or unit 15a at each step or feeding impulse. During the interval of feeding movement the grippers 55 are raised from the bed 54 to permit passage of the strip and also the separator blade 56 is raised, as shown in Figs. 4, 5 and 7. At the end of each feeding impulse or at the halt in feeding, one of the weakened severance lines 18 of the strip will be aligned in position directly above the centrally disposed recess in the gripping bed 54. The pin feed mechanism, as described, is designed to feed the strip in exact graduated lengths to bring each successive weakened line substantially in mid-position above the central recess. Slight variations in this feeding movement will not interfere with the effective separation along the weakened lines, because the breaker blade will operate effectively to break the strip along the lines even though the edge of the blade engages the strip slightly in advance or slightly to the rearward of the lines as well as directly at the lines. As soon as the strip feed halts the gripper bars 55 are caused to descend by their operating cams 63 and the actuating springs 74 to grip the strip both forwardly and rearwardly of the severance lines and forwardly and rearwardly of the space in the bed. Further descent of the breaker blade 56 severs the strip along the weakened line.

During the period of breaking the strip, just described, the forward edge portion of the unit 15a is disposed between the continuously operating tractor feed roll 75 and the pressure rolls or trucks 78. But the feeding effort of these rolls is ineffective to feed the unit because held by the grippers 55, and it is of insufficient force to tear or mar the strip or to have any other unfavorable effect. The surface of the feed roll 75 merely slides on the strip surface and the trucks 78 remain idle. But just as soon as the grip of the bars 55 is released by actuation of the operating mechanism including the cam 63, arms 67 and terminal blocks 68 engaging the heads or collars 59 of the sleeve rods 57, the feed roll 75 and pressure rolls 78 immediately become effective to advance the severed unit as indicated in Fig. 6. The release of the grippers 55 is effected synchronously or in timed sequence with operation of the feeding mechanism and with operation of the grippers 90 of the impression cylinder. The tractive effort of these auxiliary feed rolls can be adjusted by means of the spring 83 to provide the best tension to accomplish the desired result.

By the feeding action of the auxiliary feeding mechanism the check or unit 15a is advanced to introduce its forward edge into position on the bed 89 of the impression cylinder 86 so as to be gripped by the gripper jaws 90 of said cylinder. Just as soon as the unit is thus introduced the gripper jaws 90 are caused to close, because at this moment the cam roll 96 passes beyond the cam lobe 100 and the jaws are closed by action of the tension spring 101. It will be noticed that the forward edge of each unit is positioned by action of the auxiliary feeding mechanism substantially even with the forward edge of the bed 89 of the impression cylinder and flush with the adjacent wall of the recess 94 of the cylinder. During this introduction of the unit the gripper jaws 90 and the gripping extensions 91 thereof are in their retracted positions as seen in Figs. 4 and 5, so that the unit edge can be introduced into its final position in which it is gripped without any obstruction by the gripping jaws or the gripping extensions. This position of the operative elements permits the rate of unit advancement by the auxiliary feed mechanism to be substantially the same as the peripheral speed of the impression cylinder and of the grippers 90; this is an advantageous operating condition. It will, of course, be understood that the impression cylinder rotates continuously and that the introduction of the units into position upon this cylinder and the gripping thereof in such position is effected during cylinder rotation. The release of each severed unit by the breaker grippers 55 is effected in timed sequence with rotation of the impression cylinder and with operation of the grippers 90 thereof, so that the forward edge of each unit, as soon as introduced into position on the cylinder is immediately gripped and held by the actuation of the grippers 90, as shown in Fig. 6. The continued feed of the unit is then effected by the rotation of the impression cylinder 86 on which it is held by the grippers 90. Continued rotation of the impression cylinder carries the check 15a past the rotary printing units 103, 104 so as to impress the signature, date, numbers, etc., thereon.

When the printed matter has been applied the completed check or unit is carried substantially to the position indicated in dotted lines in Fig. 6. At this point the cam roller 95 engages the releasing cam lobe 102 to release the grip of the gripping jaws 90 upon the unit 15a. Substantially at this moment the cam roller 117 of the ejector mechanism passes over the abrupt shoulder 121 of the cam 118 whereupon the ejector fingers 114 are given a quick ejecting action by operation of the ejector spring 120. At the instant of initiation of this ejecting action the free terminals of the ejector fingers 114 are positioned so as to engage the forward edge of the unit adjacent to the recess 94 of the cylinder as seen in dotted lines in Fig. 6. Due to this quick action the completed unit is stripped from the im-

pression cylinder and ejected into the receptacle 115 as appears in Fig. 4. Following this ejection the ejector fingers 114 are gradually returned to their normal position by the cam surface 122 for engagement with the forward edge of the next succeeding unit adjacent to the gripper jaws 90, as shown in dotted lines in Fig. 6. It is held in this operative position by the concentric surface 124 until the cam shoulder 121 comes again into operative position.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. In a machine of the character described, in combination, a continuously rotating impression cylinder for carrying separate units or slips to be printed, a unit gripper for said units mounted on said cylinder so as to move continuously therewith and being movable thereon into unit gripping and releasing positions, intermittent unit delivery means for delivering said separate units to said cylinder and to said unit gripper thereof, said delivery means including an intermittent unit holding device and a continuously operating friction feeding device spaced between said unit holding device and said unit gripper when the latter is in position for receiving a unit, said friction feeding device yieldingly engaging said separate units so as to continuously urge them forwardly and to feed them forwardly toward said unit gripper when they are released by said unit holding device but to slide idly thereon when they are held by said holding device, said friction feeding device being positioned and arranged with reference to said unit gripper on said impression cylinder to feed the separate units forwardly into engagement with the gripper during its said continuous movement with said cylinder, means for intermittently releasing said unit holding device to release the units one at a time, and means for intermittently setting said unit gripper in unit gripping position on said impression cylinder in timed relation with release of said unit holding device and during the time that each separate unit is being fed forwardly by said friction feeding device into position to be gripped by said unit gripper, in which position each separate unit is gripped by the gripper and held on the cylinder for receiving the impression.

2. In a machine of the character described, in combination, a continuously rotating impression cylinder for carrying separate units or slips to be printed, a unit gripper for said units mounted on said cylinder so as to move continuously therewith and being movable thereon into unit gripping and releasing positions, intermittent unit delivery means for delivering said separate units to said cylinder and to said unit gripper thereof, said delivery means including an intermittent unit holding device and a continuously operating friction feeding device spaced between said unit holding device and said unit gripper when the latter is in position for receiving a unit, said friction feeding device includng a continuously rotating feed roll and a shaft mounted for movement toward and away from said feed roll and carrying a plurality of pressure rolls spaced therealong and each having a friction face positioned for engagement with said feed roll, adjustable means continuously yieldingly urging said movable shaft toward said feed roll and causing said pressure rolls to engage said separate units and to press them against said feed roll so as to continuously urge them forwardly and to feed them forwardly toward said unit gripper when they are released by said unit holding device but to slide idly thereon when they are held by said holding device, said friction feeding device being positioned and arranged with reference to said unit gripper on said impression cylinder to feed the separate units forwardly into engagement with the gripper during its said continuous movement with said cylinder, means for intermittently releasing said unit holding device to release the units one at a time, and means for intermittently setting said unit gripper in unit gripping position on said impression cylinder in timed relation with release of said unit holding device and during the time that each separate unit is being fed forwardly by said friction feeding device into position to be gripped by said unit gripper, in which position each separate unit is gripped by the gripper and held on the cylinder for receiving the impression.

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