Aug. 2, 1955 A. P. BATTEY 2,714,268

FOIL FEEDING MECHANISM FOR ROTARY BLOCKING MACHINES

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FIG. 1.

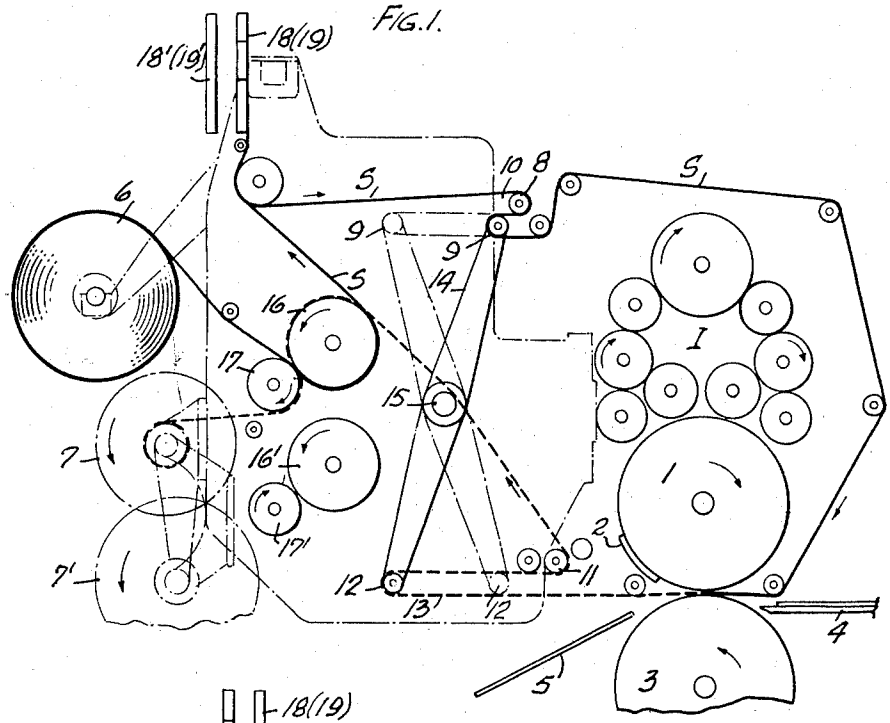
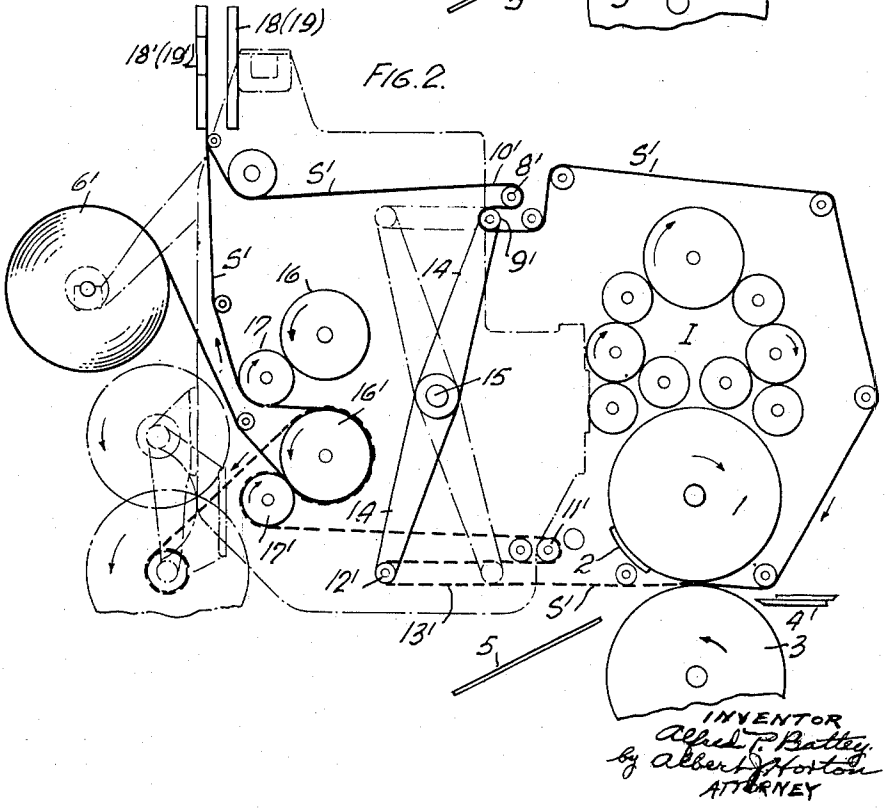


FIG. 2.



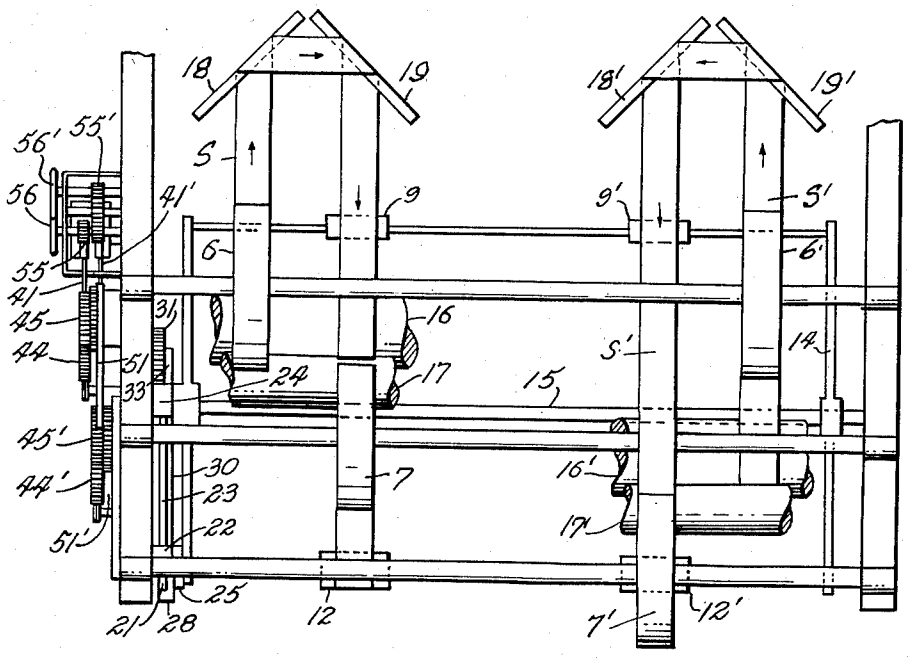
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FIG. 3.



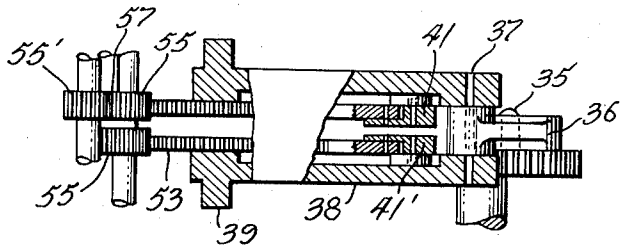


FIG. 7.

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FIG. 4.

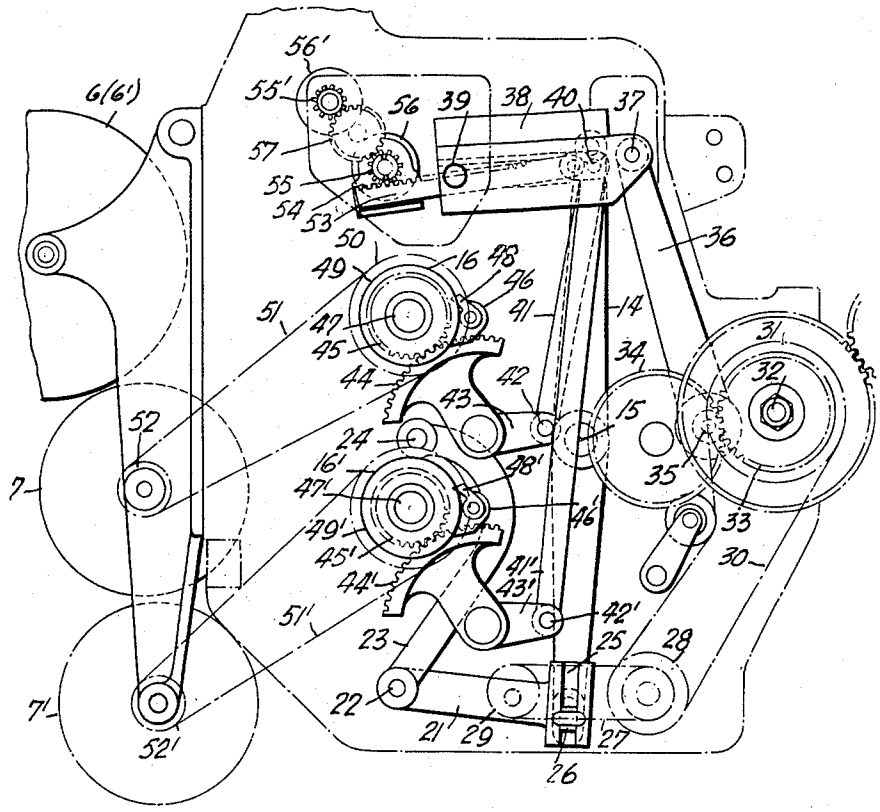


FIG. 5.

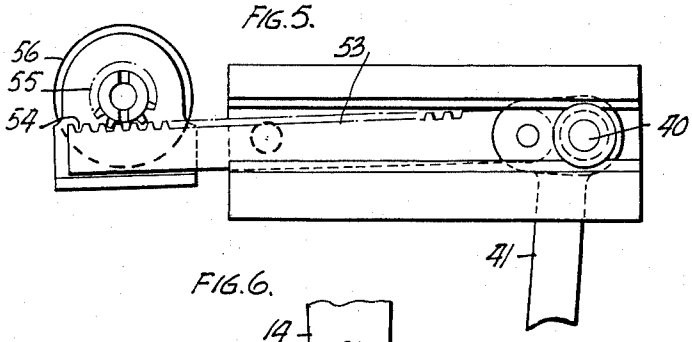
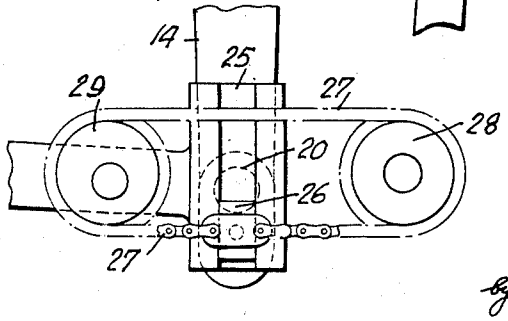


FIG. 6.



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FOIL FEEDING MECHANISM FOR ROTARY BLOCKING MACHINES

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Application July 31, 1951, Serial No. 239,601

7 Claims. (Cl. 41—7)

This invention relates to the mechanism for feeding foil in rotary blocking machines, the foil having a coating such as gilt which is to be applied to the article (such as a book-case) as a pattern or wording is impressed on the article.

Rotary blocking machines comprise a die cylinder and an impression or abutment cylinder between which the foil in the form of a long strip is trained from a supply roll to a rewind roll, the cylinders being constantly rotated while the machine is in use. The die cylinder carries a curved die which, as the cylinder rotates, comes into impression cooperation with the impression cylinder and so effects an imprint on the article fed between the cylinders, the coating on the foil strip being also applied at this time.

It is obvious that the demand on the strip is intermittent, i. e. it arises only during the impression period of the die which takes place through only a part of a complete rotation of the die cylinder. The main object of this invention is to provide an improved foil feeding mechanism which will enable the foil to be fed forward by and during the intermittent rolling impression between the die and the impression cylinder without subjecting the strip to snatch on the strip which would cause irregularity in feed and possible breakage of the strip.

This object is achieved according to this invention by taking the foil strip to the cylinders over a looping mechanism which is operated first in one sense to increase and then in the other sense to reduce the loop and in taking the strip from the cylinders over a second looping mechanism which is operated in step with the first but in the reverse sense. Thus while one looping mechanism is operating to pay-out strip the other is operating to take-up strip, and, so far as the looping mechanisms are concerned, the effect is merely to move the length of strip between them first in one direction and then in the other. The arrangement and timing of operation of the looping mechanism in relation to the continuous rotation of the cylinders and their intermittent rolling impression periods is such that the strip is paid out from the feed side to the delivery side of the cylinders throughout the impression period and in the same direction and at the same speed as the rolling impression.

Thus, the die, the foil strip, the book-case or other article to be blocked and the impression cylinder all move in the same direction and at the same speed during the time when they are in impression position and in consequence there is no tendency to snatch or overfeed the strip.

In order now to advance the used section of the strip, and to present a fresh section for impression there is also provided a feed mechanism which operates intermittently to advance the strip through the looping mechanisms and this feed mechanism operates intermittently during the non-impression period of the cylinders at which time the strip is free to be drawn between the cylinders.

The amount of foil fed to and drawn from the system is adjustable to suit the requirements of different dies.

The invention is illustrated in the accompanying drawings in which Figure 1 is a diagrammatic representation of the path about which a foil strip would be trained, Figure 2 is a similar view of a second foil strip in a machine using two such strips, Figure 3 is a diagrammatic end elevation of such a two-strip machine as seen from the left of Figure 2, and showing the arrangement of certain essential elements of the machine, Figure 4 is a side elevation of a mechanism which could be provided to effect control of the foil strips, Figures 5 and 6 are detail views of parts of that mechanism, and Figure 7 is a top view partly broken away, of parts shown in Figure 5.

Referring first to Figures 1 and 2, 1 indicates a die cylinder having mounted on it a die 2, and 3 indicates an impression cylinder with which the die 2 cooperates. The articles to be treated are fed from a feed board 4 to between the cylinders 1 and 3 and the articles are delivered after treatment to a delivery table 5.

A strip S of foil is passed between the cylinders 1, 3 the strip passing from a supply roll 6 and being rewound on a rewind roll 7. In Figures 1 and 2, the foil S in moving towards the cylinders 1, 3 is indicated by full lines and in moving away after impression the strip S is indicated by dotted lines. The cylinders 1 and 3 are constantly rotated and when in the rotation of the cylinder 1 the die 2 rotates into impression register with the cylinder 3, the die impresses the coating of the foil strip on to an article which at that time is passing between the cylinders.

It will be clear that as the die 2 makes impression cooperation with the cylinder 3 for only a part of the rotation of the cylinder, the demand upon the foil strip is intermittent: it would obviously be uneconomic to run the strip S continuously through the cylinders and the purpose of this invention is to provide a mechanism which enables the strip to be paid out intermittently so that the strip can be advanced by and in step with the rolling impression between the die 2 and the cylinder 3 and thus to achieve this result in a way which will avoid snatch being applied to the strip as would be the case if the strip were arranged to be pulled forward from rest by the moving of the die 2 into impression engagement with the web.

In carrying out the invention as shown by the drawing, the strip S passes to the cylinders over rollers 8, 9 of which the roller 8 is fixed in space and the roller 9 is movable in space. The two rollers 8, 9 are so disposed as to form a loop 10 in the strip and by moving the roller 9 the length of that loop can be increased and decreased.

The strip S in passing from the cylinders 1, 3 passes over rollers 11, 12 which are disposed similarly to the rollers 8, 9 so that a loop 13 similar to the loop 10 is formed in the strip S on the delivery side of the cylinders 1, 3. If now the movable rollers 9 and 12 are operated so that one loop is payed out or lengthened as the other loop is shortened the part of the foil strip S passing between the cylinders 1 and 3 is moved forwards and backwards. The forward movement is timed to occur through the period in which the die 2 makes rolling impression with the impression cylinder 3 and the rate of forward movement is the same as the rate of rolling impression. The backward movement occurs while the die 2 is out of impression relation with the impression cylinder.

To achieve the synchronous lengthening and shortening of the loops 10, 13 the rollers 9 and 12 are, in the arrangement shown, carried on rods supported at the

opposite ends of levers **14** which are secured to a rotatably supported shaft **15**, the levers being rocked in phase with the recurring impression periods of the cylinders **1** and **3**.

The looping mechanism clearly does not advance the strip so as to present fresh sections. This is achieved by turning the rewind reel **7** intermittently so that the strip is fed through the looping system. This feed operation of the strip is of course effected during the non-impression period of the cylinders, **1**, **3** and hence the rewind reel **7** is advanced intermittently.

This feed of strip could be accomplished by turning the supply roll **6** and the rewind roll **7** so that one pays out strip and the other draws it in.

However, to avoid difficulty which may arise in effecting the same degree of movement to the two parts of the strip, it is preferred as shown to arrange the run of the strip so that it passes over the same pair of rollers in passing from the supply roll **6** and in passing to the rewind roll **7**. In the drawing the rollers are indicated at **16**, **17**. The strip S passes from the feed roll **6** direct between the rollers **16**, **17** and then around the roller **16**. The strip passing back to the rewind roll **7** passes around the roller **16** and then between the rollers **16**, **17**. Thus the rotation in one direction only of the rollers **16**, **17** draws off the strip S from the supply roll **6** and at the same time pays out the same amount of strip S to enable it to be rewound by the roll **7**.

It is obviously necessary that the feed and withdrawing parts of the strip S shall pass over the single pair of rollers **16**, **17** at different parts lengthwise of them and this can be effected by lateral displacement of the one part of the strip as compared with the other part by the use of for example turner bars, as is shown more clearly in Figure 3 in which turner bars for the strip S are indicated at **18**, **19**, these bars effecting the required lateral displacement.

Obviously more than one such strip feeding mechanism can be employed to suit the requirements of dies different in size and in position on the die cylinder. In the drawings, two such strips are shown, and one is indicated by the reference S in Figures 1 and 3 and the other, which is similar in operation and control, is indicated by the reference S' in Figures 2 and 3. The parts associated with the strip S' that correspond with parts associated with the strip S are identified by the same numerals followed by a prime symbol ('). As the two strips may require different feed, they are each taken to their own rewind roll as is clearly shown in Figures 1 to 3, Figure 1 showing the lead of one strip and Figure 2 the lead of the other strip.

Reference will now be made to Figures 4 to 7 which illustrate a mechanism for effecting the operation of the parts described with reference to the diagrammatic Figures 1–3.

In Figure 4 is shown at **15** a shaft which forms the pivotal mounting for the lever **14** that carries the looping rollers. One end of this lever has pivoted to it at **20** (Figure 6) a link **21** the outer end of which is pivotally connected at **22** to an arm **23** pivoted at **24**. The link is formed with a groove **25** which receives a block **26** pivotally mounted on one of the links of an endless chain **27** passing over chain wheels **28**, **29**. The chain wheel **28** is driven through a chain **30** from a chain wheel **31** on a main driving shaft **32**. The arrangement is such that the chain **27** makes a complete circuit for each operating cycle of the die and impression cylinders and it will be seen that while the block **26** is travelling along one or other straight run of the chain **27** the block will swing the lever **14** in one direction. When the block passes with the chain around one of the chain wheels **28**, **29** the rate of movement of the lever **14** will first decrease to zero and then will increase to a maximum as the block passes into the other straight run of the chain. By this means the lever **14** will first be moved in one direction

at a constant rate, then will decelerate to rest, will then accelerate to a maximum speed in the other direction which will be maintained until a deceleration and reversal again takes place.

As the levers **14** carry the looping rollers **9**, **12** and **9'**, **12'** it follows that the loops **10**, **13**, and **10'**, **13'** will correspondingly be lengthened and shortened in step with the impression and non-impression periods of the cylinders **1**, **3**.

The same shaft **32** (Figure 4) is also employed to cause the foil strips S and S' to be drawn through the looping mechanism to present a fresh portion of the strip.

The shaft **32** carries a gear **33** meshing with a gear **34** which makes one complete revolution per cycle of the machine. This gear has a crank-pin **35** which receives one end of a push-rod **36** the other end of which is pivotally connected at **37** to a frame **38** which can swing about a fixed pivot **39**. To this frame is pivotally connected at **40**, the upper end of a link **41** for rotating the rewind reel **7**. The lower end of the link **41** is pivoted at **42** to an arm **43** fast with a gear quadrant **44** which in turn meshes with a pinion **45** fast with a plate **46** which can oscillate about the centre of a shaft **47** which carries the roller **16**.

The quadrant **44** is caused to oscillate by the oscillation of the frame **38** and this in turn causes the plate **46** to oscillate on the shaft **47**. The plate **46** carries a pawl **48** to engage a ratchet wheel **49**, secured on the shaft **47** and thus, as the pawl **48** operates to drive the ratchet wheel **49** in only one direction of movement of the plate, the ratchet wheel **49** and hence the shaft **47** and the roller **16** will be advanced intermittently in each cycle of operation to take up the foil strip as already described. The same mechanism can also be used to drive the rewind reel **7** by providing a chain wheel **50** on the shaft **47**, this chain wheel transmitting corresponding intermittent drive through a chain **51** to the spindle **52** of the rewind reel **7**.

The amount of foil feed will obviously depend upon the requirements of any particular case. In order therefore to provide for regulation, the pivot **40** connecting the link **41** to the frame **38** is adjustable to vary its distance from the pivotal point **39** of the frame **38**. This is effected by mounting the pivot **40** to slide along the length of the frame **38** and by connecting the pivot to a rod **53** formed at one end with a rack **54** engaged by a pinion **55** on an adjusting hand wheel **56**.

The parts associated with the rewind reel **7'** are similarly operated from the swinging frame **38**, and those parts are given the same reference numerals with a prime symbol (') added.

In the case of the adjusting hand wheel **56'** for the reel **7'**, this is operated not directly on its pinion **55'** but through an intermediate gear **57** which enables the two handwheels **56**, **56'** to be brought out of alignment for ease of manipulation.

It will be clear that the amount of feed of foil for each of the two strips S, S' can be independently regulated since each mechanism from the pivots **40** onwards is independent although both are actuated by the single rocking frame **38**.

Provision can be made to shut-down the feed of foil by the expedient of holding the pawls **48** clear of their ratchet wheels **49** by any of the well-known constructions for such a purpose.

The die cylinder **1** could be heated so as to heat the die or dies on it and the machine could include an inking mechanism indicated at I in Figures 1 and 2 to ink the die when the blocking operation is to be effected in ink instead of or in addition to the foil.

I claim:

1. A blocking machine which comprises a die cylinder, an impression cylinder, means to rotate the cylinders continuously, a die on the die cylinder and moved thereby intermittently into impression relation to the impression

cylinder, foil-strip control means including a positively driven looping device to move the strip forwardly with the die and impression cylinders during their periods of rolling impression cooperation and backward relatively to the cylinders during their non-impression periods, a foil-strip feeding roller positioned to draw strip from a supply roll, a rewind reel driven in timed relation with the feeding roller, a ratchet wheel connected to the feeding roller, a pawl cooperating with the ratchet wheel and oscillated by a continuously moving member of the machine to drive the feed roller intermittently and thereby advance foil-strip through the machine during each non-impression period, thereby to present a fresh section of the strip for each successive impression.

2. A blocking machine which comprises a die cylinder, an impression cylinder, means to rotate the cylinders continuously, a die on the die cylinder and moved thereby intermittently into impression relation to the impression cylinder, foil-strip control means including a positively driven looping device to move the strip forwardly with the die and impression cylinders during their periods of rolling impression cooperation and backward relatively to the cylinders during their non-impression periods, a foil-strip feeding roller having one area located to draw strip from a supply roll, and another area to advance the strip to a rewind reel driven in timed relation with the feeding roller, an overrunning clutch device having a driven member secured to the feeding roller and a driving member oscillated by a reciprocating member of the machine to drive the feed roller intermittently, to advance the foil-strip through the machine and present a fresh section of the strip for each successive impression.

3. A blocking machine which comprises a die cylinder and an impression cylinder rotated continuously, a die on the die cylinder and moved therewith into impression relation to the impression cylinder during each rotation of the cylinders, a foil-strip supply, positively driven looping rollers moved at a speed sufficient to alternately cause forward and backward motion of the strip as it passes between the cylinders, a feed roller and a rewind device, means for driving the feed roller and rewind device intermittently, including an irreversible coupling mechanism having a first member fast on the feed roller and a second member oscillated relatively to the first member by a continuously reciprocating member of the machine.

4. A blocking machine as defined in claim 3 and comprising means for adjusting the stroke of the said reciprocating member, including a pivotally supported frame having a connecting pivot to receive the reciprocating member and means to adjust the connecting pivot radially in the frame and thereby vary the amount of foil-strip fed during each rotation of the cylinders.

5. A blocking machine which comprises a die cylinder, an impression cylinder, means to rotate the cylinders continuously, a die on the die cylinder being moved thereby intermittently into impression relation to the impression cylinder, a foil-strip supply roll, a foil-strip rewind roll, means to train the strip from the one roll to the other between the cylinders, a first looping device to loop the strip passing to the cylinders from the supply roll, a second looping device to loop the strip passing from the cylinders to the rewind roll, positively driven means to operate the looping devices in unison so that one increases its loop as the other decreases its loop and vice versa whereby the strip between the looping devices is first paid out at the same time and speed as the time and speed of the rolling impression and is then moved back, a driven roller over which the strip is taken, first in passing from the supply roll to the cylinder and again in passing to the rewind roll, so that both portions of the strip are moved at the same rate, turner bars positioned to deflect the strip so that the said two portions pass over different parts lengthwise of the roller, and a ratchet device to drive the roller intermittently and during the non-impression periods to advance the strip through the looping devices, the said ratchet having a cooperating pawl connected to a member reciprocated in timed relation to the cylinders.

6. A blocking machine which comprises a die cylinder, an impression cylinder, means to rotate the cylinders continuously, a die on the die cylinder being moved thereby intermittently into impression relation to the impression cylinder, a supply roll for foil-strip, a rewind roll for used foil-strip, means to lead the strip from the supply roll between the cylinders and to the rewind roll, positively driven looping devices to move the section of the strip passing between the cylinders forwardly with the rolling impression and backward relatively to the cylinder during the non-impression period, a driven roll over which the strip passes in running from the supply roll to the cylinders and over which the strip passes in running from the cylinders to the rewind roll, and driving means synchronized with the cylinders to move the driven roll intermittently during non-impression periods to take up used strip and present a fresh section of strip for each impression, the said driving means comprising an irreversible clutch having a first member secured to the feed roller and a second member oscillated by a reciprocating member of the machine during each rotation of the die cylinder.

7. A blocking machine comprising a die cylinder capacitated to carry a plurality of dies disposed lengthwise of the cylinder, an impression cylinder, means to rotate the cylinders continuously, and means to control a foil-strip for each die, the said means each comprising a strip supply roll, a strip rewind roll, means to lead the strip from the supply roll between the cylinders and in the track of its respective die and thence to the rewind roll, positively driven looping means to move the section of strip passing between the cylinders first forwardly with the rolling impression and then backward relatively to the cylinders during their non-impression period in readiness for the next impression, a feed roller for each strip, and driving means for each feed roller including a ratchet clutch, a pawl cooperating with the ratchet, a reciprocating member driven in synchronism with the cylinders to oscillate the pawl, and means manually operable while the machine is running for adjusting the stroke of the reciprocating member and thereby varying the feed of the strip.

References Cited in the file of this patent

UNITED STATES PATENTS

1,939,717	Morse	Dec. 19, 1933
1,978,073	Belcher	Oct. 23, 1934
2,248,419	Auld	July 8, 1941
2,546,372	Pinckert	Mar. 27, 1951