Dec. 13, 1932. E. A. WALLER 1,890,922

MULTICOLOR PRINTING PRESS

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Fig. 1.

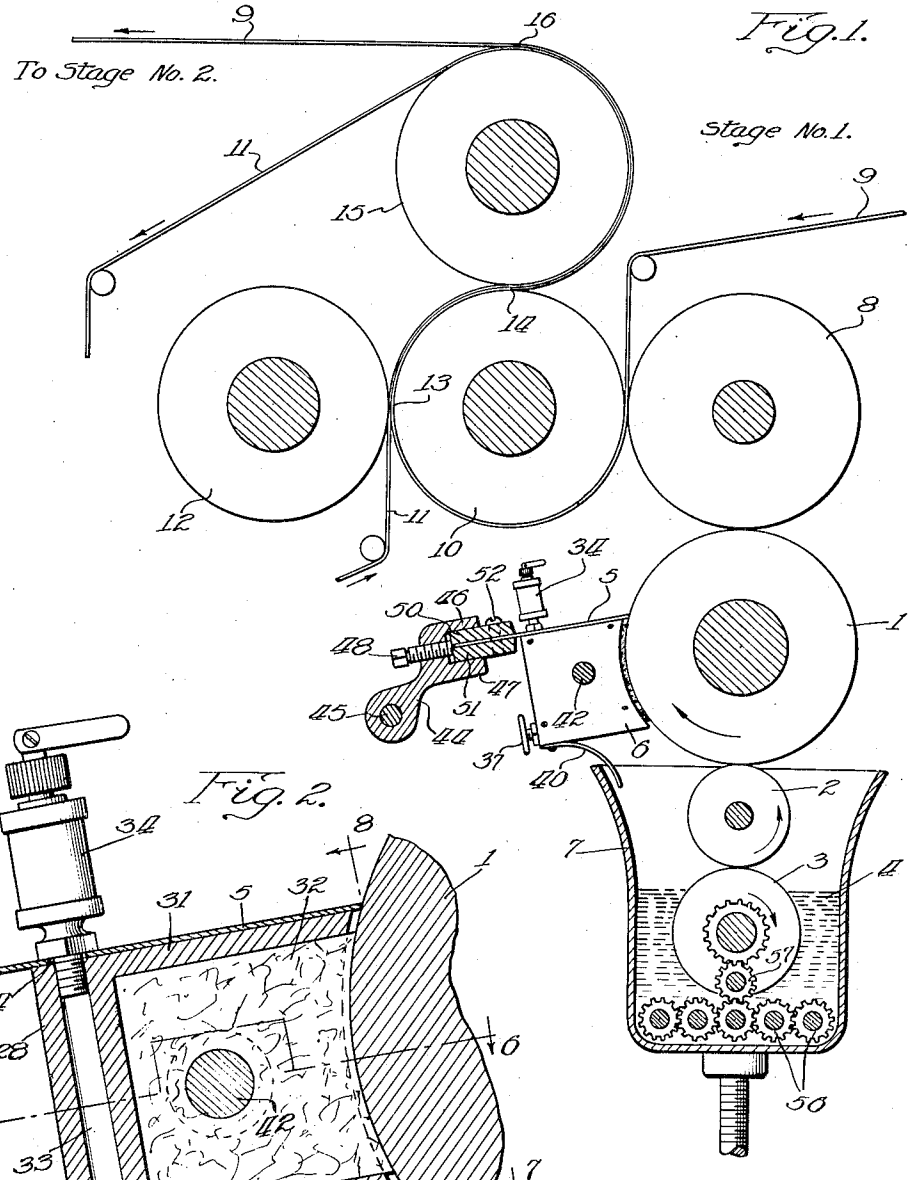


Fig. 2.

Witnesses
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Fig. 3.

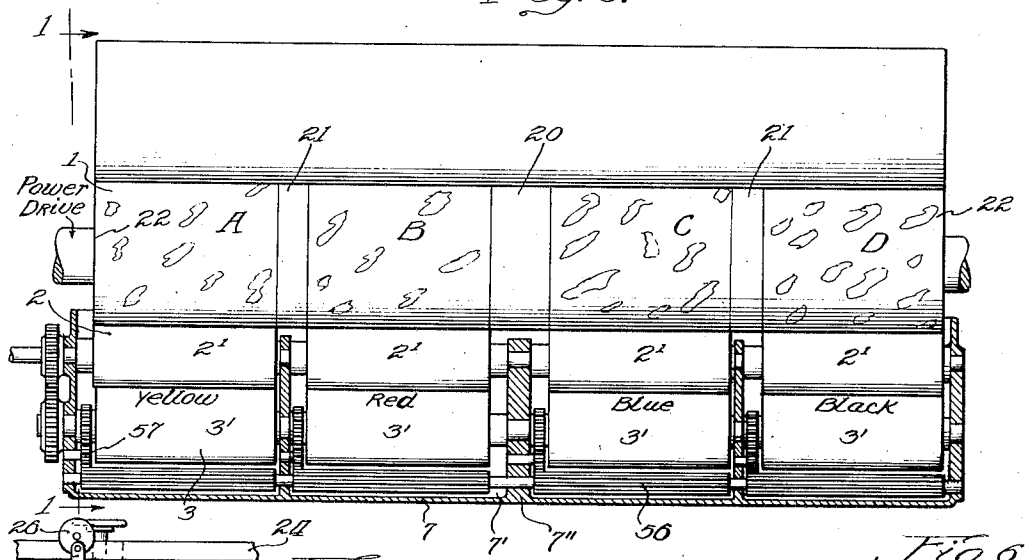


Fig. 4.

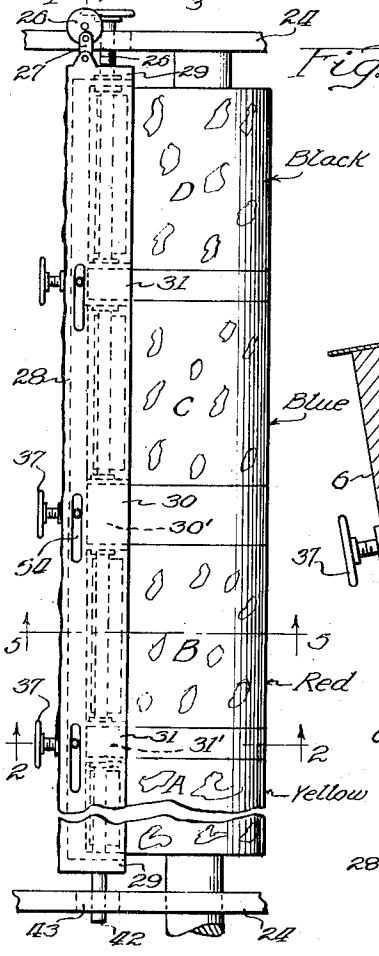


Fig. 5.

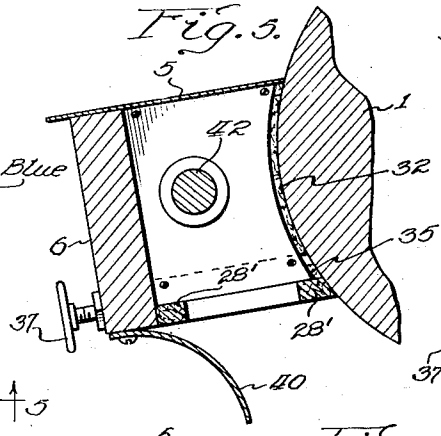


Fig. 6

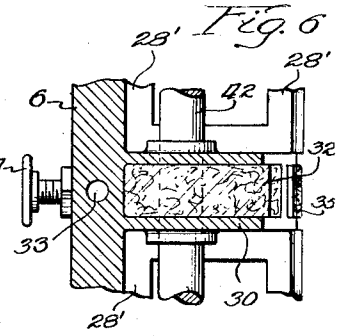


Fig. 7.

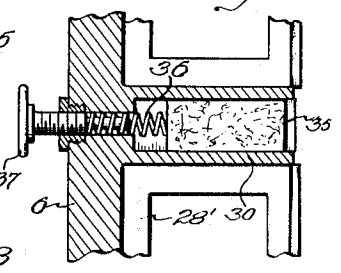
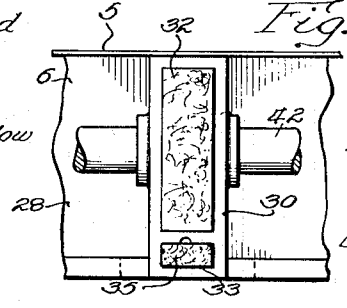


Fig. 8



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Fig. 10

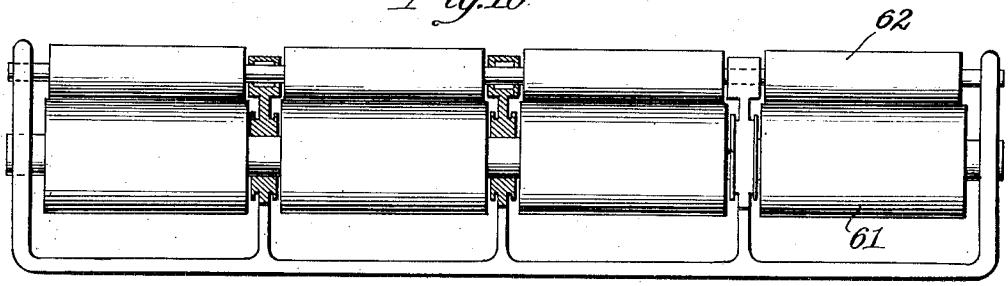


Fig. 11.

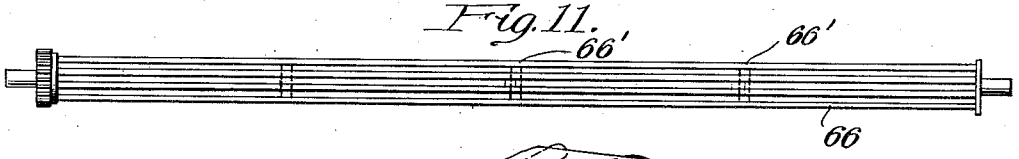
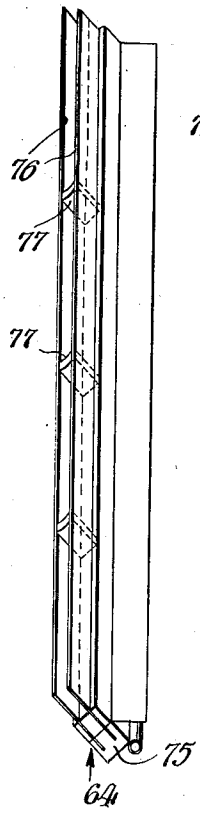


Fig. 12.



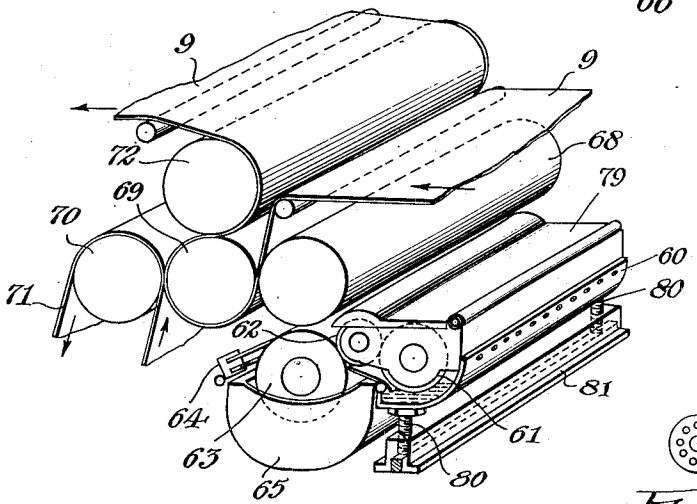


Fig. 9.



Fig. 11a

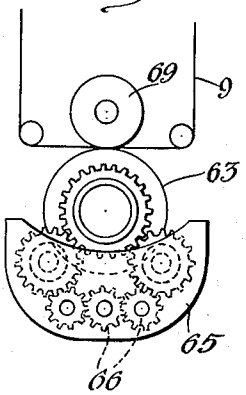


Fig. 13.

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UNITED STATES PATENT OFFICE

EDWARD A. WALLER, OF CHICAGO, ILLINOIS

MULTICOLOR PRINTING PRESS

Application filed April 13, 1929. Serial No. 354,930.

This invention relates to that kind of intaglio printing methods and means commonly known as rotary gravure; to a printing method of the kind known as the web process; and especially to multicolor printing by means of single and multiple web presses, in which is involved, as hereinafter more fully pointed out, the problem which I have solved for concurrently printing a plurality of colors from corresponding longitudinally successive parts of a common unitary cylinder of the intaglio etched variety and having a continuous uniform face extending from end to end.

Heretofore the etched cylinder equipment, for each of the successively arranged stages, of a press adapted for printing simultaneously a plurality of parallel web sections each in multicolor, comprised substantially a series of cylindrical sections spaced apart on a common drive shaft, for dipping directly into their corresponding ink founts. This is illustrated in my Patents Nos. 1,574,379 and 1,774,119.

The main objects of the invention are to provide for using, in a press of the character referred to, a single unitary, continuous and unbroken etched cylinder; to provide for four independent color schemes all being printed at the same time in a press having a continuous faced intaglio cylinder for each successive stage; to provide a doctor blade of such construction and operation as to accommodate the use of such a cylinder and adapted to assure against any mixture of the variously colored inks; to provide an improved form of doctor blade support or frame; to provide such a device adapted for self-lubrication, and for effective wiping of the cylinder margins; to provide for properly deflecting and guiding the ink removed by the doctor blade in such manner as to prevent cross discharge or fling of the ink, and in such manner as to insure its proper return to its own fount; to provide such a device adapted to accommodate reciprocation of the doctor blade in use; and to provide for effective agitation of the ink and its pigment material within the founts.

By means of the present invention, a non-etched steel drum having four sections first picks up the ink from four corresponding independent ink fountains and transfers it to an intermediate position roll which in turn applies the ink to the continuous, unitary etched cylinder. This latter cylinder is provided with a special form of doctor blade equipment which removes all ink except that in the etching grooves and restores it to its proper fount. Although in my previous patent applications I have shown presses using sixteen colors arranged in four sets, they did not accommodate use of a continuous, unbroken-faced etched cylinder, such as this invention provides for.

For the purpose of illustrating this invention, reference is now had to the accompanying drawings in which:

Fig. 1 is a diagrammatic vertical sectional view of one of the several (four) component printing units, substantially on the line 1—1 of Fig. 3.

Fig. 2 is a greatly enlarged vertical section through the doctor blade unit, or blade and frame, on the line 2—2 of Fig. 4.

Fig. 3 is mainly a side elevation of the roller system of one unit as viewed from the right of Fig. 1, the associated ink fountain being shown in central vertical section.

Fig. 4 is a plan of the etched printing roll and coacting doctor blade shown in Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a section on line 6—6 of Fig. 2.

Fig. 7 is a section on line 7—7 of Fig. 2.

Fig. 8 is a face view of the doctor blade, guard frame and margin wiper as viewed on line 8—8 of Fig. 2.

Fig. 9 is a perspective view of a lateral offset modification of a printing stage embodying this invention.

Fig. 10 is a plan of the ink pickup and idler supply rolls of Fig. 9.

Fig. 11 is a side view of one of the agitators such as shown in Figs. 1 and 13.

Fig. 12 is a perspective view of a modified form of doctor blade.

Fig. 13 is a conventional diagram of an endwise view of an ink collector trough, etched roll, agitators and other rolls, mainly as shown in Fig. 9.

Referring more in detail to the drawings, and especially to Figure 1, each of the several stages or printing units comprises mainly an assemblage of rolls in combination with an ink fountain and a doctor blade equipment substantially as indicated in said Figure 1. Here the etched roll 1 receives its charge of ink from an intermediate soft-faced idler roll 2 which co-acts with a metallic pickup roll 3 which is partly immersed in ink, indicated at 4. The roll 2, as indicated on Fig. 3, comprises sections 2′ fixed on a common shaft; and roll 3 comprises corresponding sections 3′ on a parallel common shaft. The sections 3′ dip in different colors of ink.

Cooperating with roll 1 is a combined doctor blade 5 and wiper frame 6 which removes all surplus ink and restores the same to the fountain 7, the latter having compartments 7′ separated by partitions 7″, so that multiple colors of inks may be used on the same roll 1.

The ink remaining in the etched grooves of roll 1 is impressed upon a soft-faced roll 8 which transfers the subject matter directly to the print receiving web 9 which is fed into the unit between the printing roll 8 and a platen roll 10.

A blotter web or smut sheet 11 is introduced between roll 10 and a co-acting roll 12. The print web and the smut sheet then travel together close against roll 10 for a short distance, as from point 13 to point 14, at which latter point they pass together between roll 10 and co-acting roll 15. Thence they continue together for about 180 degrees on the roll 15 and then separate at point 16, as indicated at the top of Fig. 1. The print web 9 next advances to the next color stage, and so on through the press.

It is to be understood that the main rolls 1, 8, 10, 12 and 15 are power driven, substantially as in my said Patent No. 1,754,379, reference being had particularly to the upper half of Fig. 2 of that patent. Hence it does not seem advisable to complicate the present drawings with the main driving gear mechanism.

Turning next to the side and plan views, Figs. 3 and 4 respectively, the compact structure of the printing roll 1 is apparent. Its face is continuous and uniform throughout its length, except that for printing purposes the etching is arranged in circumferential zones A, B, C and D, corresponding with the pages to be printed, and these zones are separated by plain margins 20 and 21 corresponding with the page margins. There are also end margins 22. The middle margin 20 is of double width to accommodate a margin for each half of the web when split.

Referring now to the doctor blade 5 and to the margin wiper and ink return device 6, the latter serves also to support said doctor blade 5. The frame 6 is adjustable lengthwise by means of screw 24 coacting with the press frame 25 and the blade 5 rests slidably on top where it is reciprocated continuously by the crank wheel 26 and rod 27 at one end, as in Fig. 4.

The device 6 is of substantially flat bar construction with forward arms and a base rim thereon. It comprises mainly a back and open rimmed bottom 28—28′ with a pair of end walls 29, a thick central partition 30, and a pair of thin medial partitions 31 disposed between the middle and end walls. These walls and partitions register with the zone margins on the roll 1.

The intermediate partitions 30 and 31 are of hollow construction and have chambers 30′ and 31′ which contain absorbent wiper material 32 disposed for alinement in registry with the zone margins on the printing roll.

In the lower edge of each partition 30 and 31 is a tubular conduit 33 for the admission of lubricant to the face of roll 1 on the corresponding margins to prevent heating of the wipers. This conduit extends upward through the back 28 to receive oil from a cup 34 mounted thereon. Mounted in the horizontal part of the conduit for bearing against the printing roll is a wick wiper 35 of fibrous nature such for instance as leather, wool, etc. adapted to permit seepage of oil and assure distribution on the roll margins. Moderate pressure of this wiper against the printing roll is assured by means of a spring helix 36 and an adjusting screw 37 therefor, as shown by Figure 2. The bottom rim 28′ stiffens the device and also serves to restrict the splash and throw of the ink as it is scraped off roll 1 by the doctor blade. The front edges of the frame are spaced somewhat from roll 1 as shown by Figs. 2 and 5, but the wipers 32 and 35 are held in effective contact with roll 1 thereby.

An apron 40 is secured to the lower edge of the back 28 for conducting surplus ink down into the fountain 4.

The device 6 is mounted centrally on a shaft 42, the arms 29, 30 and 31 being journaled directly thereon. The ends of shaft 42 are mounted adjustably in horizontal frame slots 43, as in Fig. 4, so as to accommodate retraction of member 6 away from roll 1 for access to its wipers 32 and 35. Frame 6 when retracted may be tilted to further facilitate access to the chambers 30′, 31′ and 33.

The doctor blade 5 is held against the roll 1 by means of a series of arms 44 which are tiltable backward on the supporting rod 45. Each arm 44 has a pair of jaws 46 and 47, as on Fig. 1, and an adjusting screw 48 pointing forward between said jaws against the back edge of the doctor blade, the latter having a two-piece clamp 50—51 secured thereto by screws 52.

The doctor blade 5 is perforated to receive

these screws. It is also slotted at 54 to accommodate the screw stemmed oil cups 34 which are detachable relative to part 6 so as to permit back swinging of the blade. This permits ready removal and renewal of the doctor blade which has to be ground occasionally for keeping its roll engaging edge sharp.

Referring to the ink agitators 56, shown in Figures 1 and 3, these are all geared together as in Fig. 1 and as at the left end of Figure 3, the middle agitator roll being geared to an idler 57 which in turn is geared to the steel pickup roll 3. Said roll 3 is geared to roll 2 and thence to roll 1, as will be understood, or frictional drive may suffice as between rolls 1, 2 and 3.

When the press is running, the several successive stages all operate in substantially the same way. The four different kinds of ink in each sectional fountain 7 are fed by the sectional rolls 3 and 2 to the etched roll 1. Here the doctor blade 5 removes surplus ink which is restored to its proper source or fount section. Impressions are transferred by roll 8 from roll 1 directly to the print web, each page receiving its proper color for this stage, under the specific color scheme in use. The complementary colors are applied at the other stages. Hence, as will be seen, four independent color combinations or schemes are printed simultaneously on the corresponding page zones of the web. This is apparent from the following cartographic diagram:

Tabulation of illustrative color scheme for a sixteen color, four stage press

Stage No.	Allocation of colors Each web section one page wide			
	Section No. 1 Zone A	Section No. 2 Zone B	Section No. 3 Zone C	Section No. 4 Zone D
1	yellow	red	blue	black
2	green	purple	straw	indigo
3	violet	slate	pink	orange
4	brown	tan	grey	maroon

Some of the main advantages derived from the novel construction and operation described are great increase in the possible artistic range of a multicolor press, in that a variety of subjects characterized by distinctive color complexes may be accommodated, requiring widely variant color treatments; and also structural and operative unity, compactness and simplicity of design.

As will be apparent, the fount sections for each stage respectively may all have the same colored ink in case a single color scheme is sufficient for the needs of all four pages; or part of the sections in one stage may have one color and the others different colors.

If, or whenever, a single color is desired for each stage respectively, the sectional fountains may be replaced by single, common, chamber fountains, not shown. In such an event the ink agitators, instead of being sectional, would consistently each be continuous from end to end of the ink chamber.

Referring to the "offset" form of stage shown by Fig. 9, the fountain 60 may be either sectional for four colors or unitary for a single color. Dipping therein is a steel pickup roll 61, beside which is a soft idler roll 62 which transmits ink to the offset etched roll 63. The double doctor blade 64 removes surplus ink which drops into a trough 65 having agitators 66 as illustrated in Fig. 13.

Roll 63 is similar to roll 1 of Figs. 1, 3 and 4, but rolls 61 and 62 may be sectional or continuous according to plural or single color use. The agitators 66 are either sectional or continuous under these same considerations. The marginal breaks are indicated by the dotted lines at 66′ on Fig. 11 in case the agitators are to be sectional.

A transfer roll 68 coacts with roll 63 and prints directly on the web 9. Incident to this, the web passes between rolls 68 and 69, thence between rolls 69 and 70 where a smut sheet 71 on roll 70 is interposed, thence between rolls 69 and 72, and on to the next stage.

The doctor blade 64 comprises mainly a holder 75 for the two blades proper 76 and roll margin wiper and guard members 77. The fountain 60 has a lid 79 and a pair of elevation screws 80 held by the base 81.

It will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims:

I claim:

1. A printing press comprising an etched roll having longitudinally distinct zones each bearing subject matter of its own, in combination with a common doctor blade and a support for said blade, said support having spaced roll-wiping parts formed and adapted to maintain non-inked margins between the etched sections.

2. In a printing press, a printing roll etched in longitudinally distinct zones, a doctor blade therefor, a frame to support said blade, means to adjust the position of said frame lengthwise of said roll and automatic means to reciprocate said blade as the press operates, said frame having wipers to bear on the divisional margins separating said zones.

3. A multicolor printing roll for corresponding multiple page printing, in combination with longitudinally adjustable means having margin wipers to prevent crossing of ink on the roll, and an automatically reciprocable doctor blade mounted on said means.

4. A page-zoned multicolor printing roll, in combination with a zone margin wiper comprising a longitudinal back with transverse hollow arms disposed forwardly to face the roll margins, absorbent material in the main body of said arms to wipe against the

margins and the lowermost part of each arm having an oil feed conduit with a wick therein to lubricate the margins and adjustable means to urge said wicks forward against the roll.

Signed at Chicago this tenth day of April, 1929.

EDWARD A. WALLER.