

April 18, 1933.

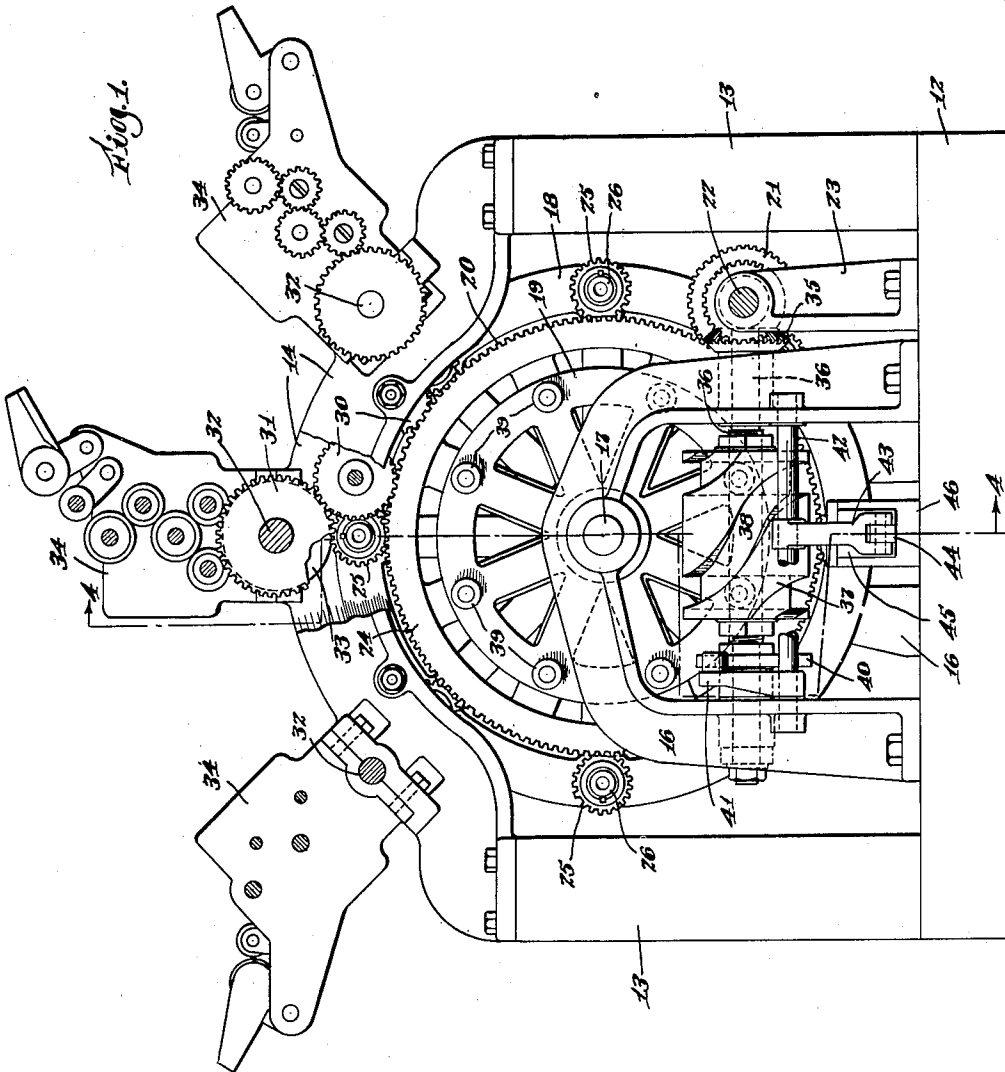
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1,904,332

MACHINE FOR PRINTING ROUND CANS IN MULTIPLE COLORS

Filed July 13, 1931

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

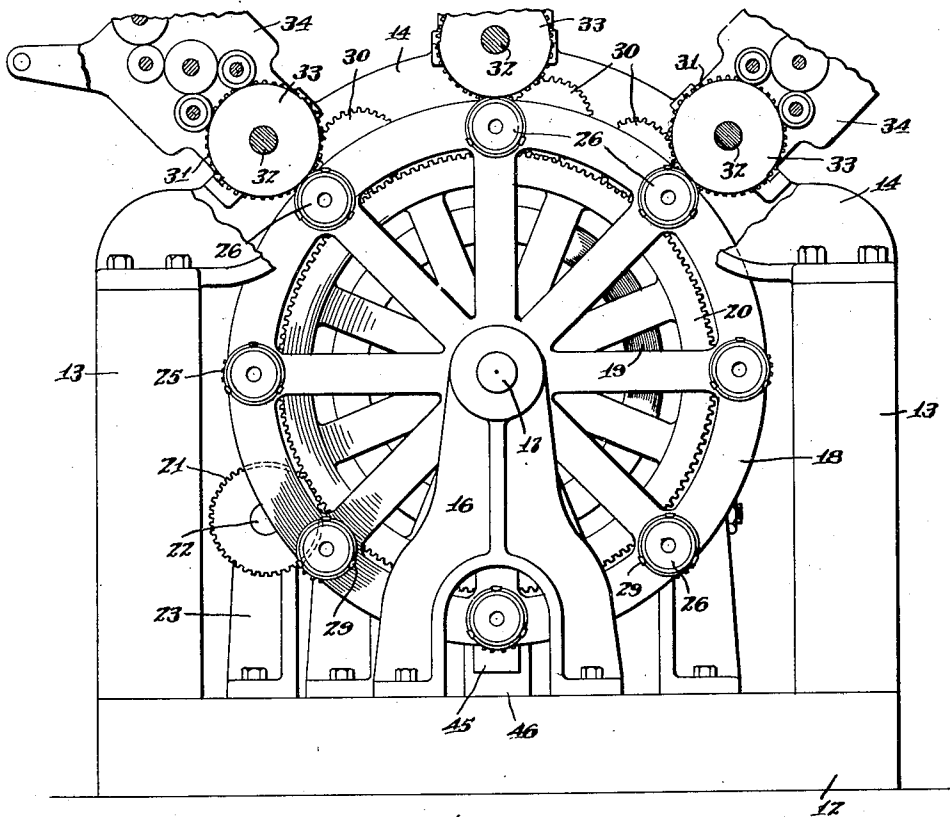


Fig. 2.

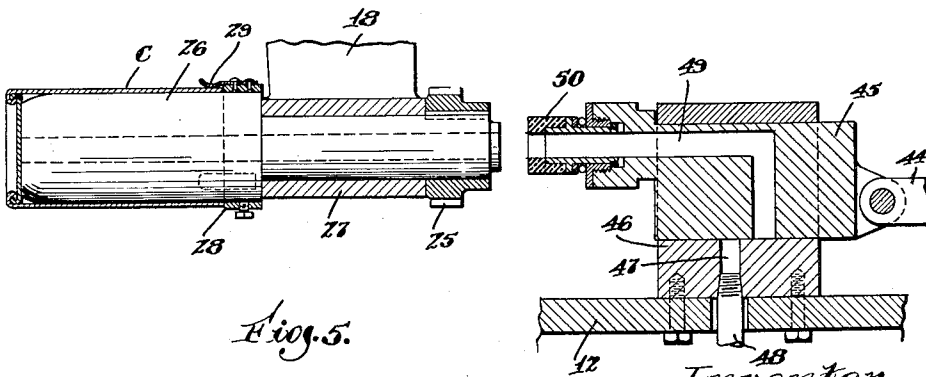


Fig. 5.

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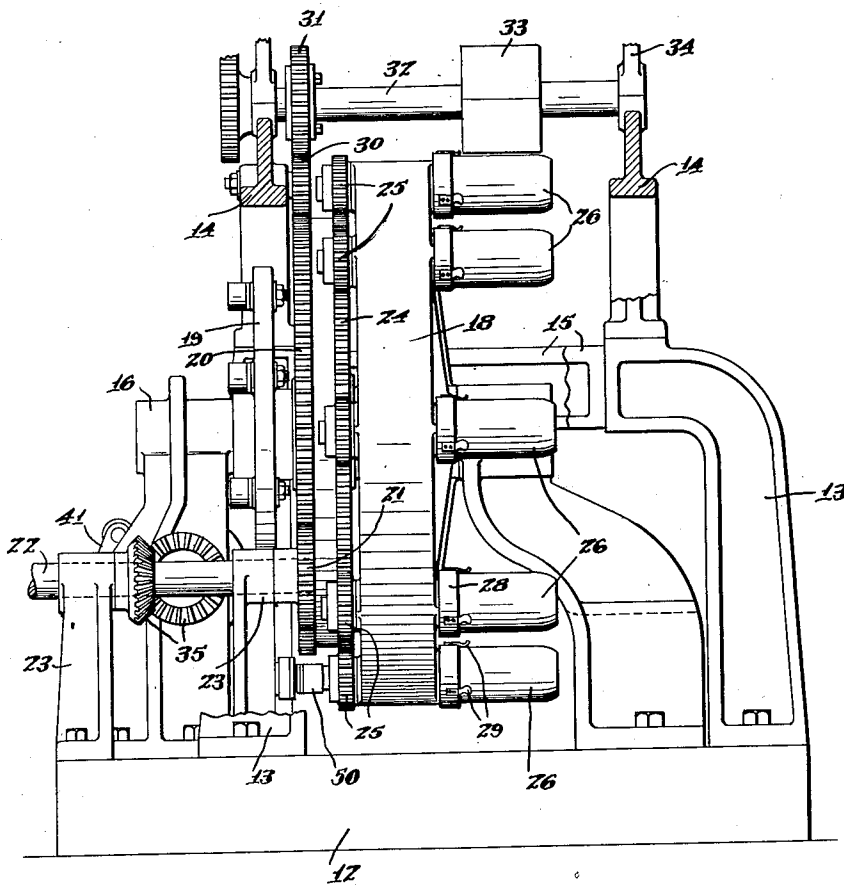
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Fig. 3.



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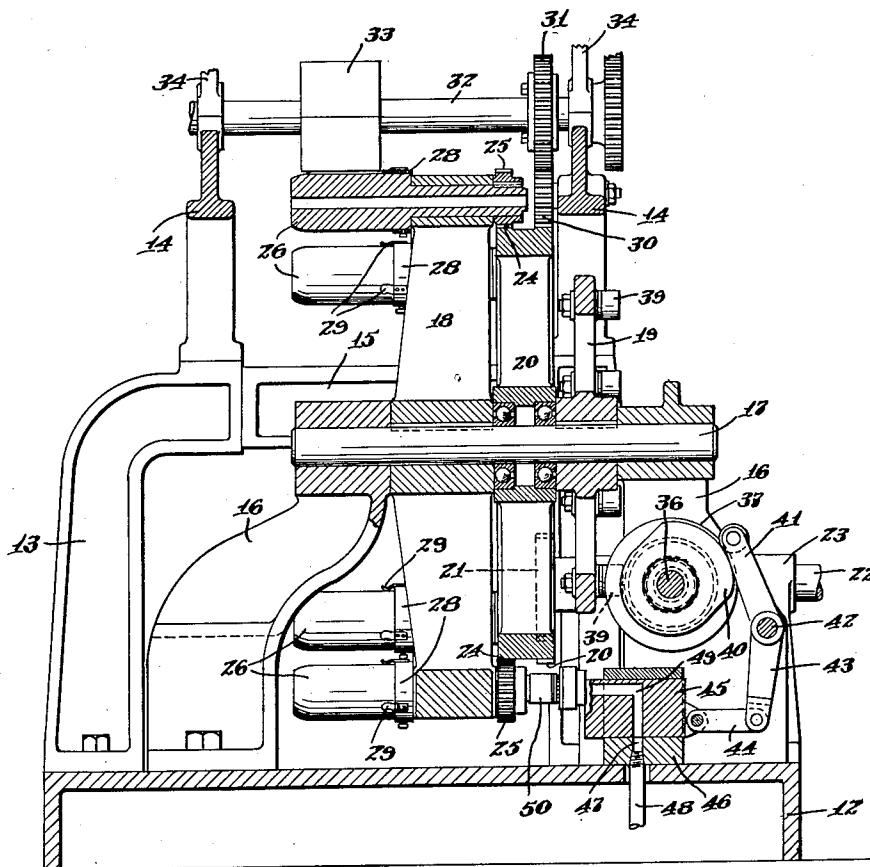
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Fig. 4.



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UNITED STATES PATENT OFFICE

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MACHINE FOR PRINTING ROUND CANS IN MULTIPLE COLORS

Application filed July 13, 1931. Serial No. 550,401.

This invention relates to machines for printing directly on the surface of round articles, such as cylindrical paper cans, and has particular reference to machines which will effect the printing in a manner which will produce fine looking printing and so that various colors applied will register one with another.

At the present time the only machine of which I am aware for printing cylindrical cans in multiple colors has been operated by the dry off-set principle. That is, the printing plates have been in register with a rubber cylinder, and spread the ink on to such rubber cylinder in register with one another and then the ink is transferred from the rubber cylinder to the cans. This is an expensive process and one that requires frequent wash-ups and very careful manipulation of adjustments to produce good results. So far as I am aware, no machine has been devised that will produce multi-color work on round cans excepting such as the off-set process referred to. In other words, no machine known to me has been devised that prints registered colors at different times successively on cylindrical cans.

The object of the invention is to provide a machine for printing round articles having an intermittently rotatable carrier provided with a plurality of rotatable supports for the articles, which machine can be operated to successively print the articles after they pass from one position to another.

With said object in view, and others hereinafter explained, the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:

Figure 1 is a side elevation of the machine, with some of the shafts in section.

Figure 2 is a similar view from the opposite side of the machine, and some parts broken away.

Figure 3 is a view looking from the right of Figure 1.

Figure 4 represents a section on line 4—4 of Figure 1.

Figure 5 is a sectional detail view similar

to a lower portion of Figure 4, on a larger scale.

Similar reference characters designate similar parts or features in all of the views.

In the embodiment of the invention illustrated, the machine has a base 12 provided with uprights 13 which are connected by arches 14. The said uprights and arches are connected by suitable tie bars 15 (Figs. 3 and 4).

Also supported by the base 12 are brackets 16 for supporting the shaft 17. Keyed to said shaft 17 are a turret 18 and a spider 19 and between them, with roller bearings mounted on the shaft 17 is a ring gear 20, said gear having two sets of gear teeth, of which one set is indicated at 21. The other set of gears will be referred to presently.

The main drive shaft 22 (Figs. 1 and 4) is mounted in bearings carried by short uprights 23, said shaft carrying operating and can controlling members described presently.

As best illustrated by Fig. 1, the second ring of gear teeth 24 mesh with epicyclic pinions 25 carried by the stems of the mandrels or forms 26 on which the articles to be printed are mounted for the printing operation. The stems or shafts of the said mandrels or forms 26 are mounted in bearings 27 (Fig. 5) of the turret 18. Each mandrel or form has a band 28 adjustably mounted thereon, said band having clips 29 for engaging the article to be printed such as a paper cylinder, such as indicated at C in Fig. 5. The adjustability of such bands 28 along the mandrels is to provide for operating on articles of different sizes. Each band has one or more screws whereby its position longitudinally of the mandrel can be secured. For a reason presently described, each mandrel is axially hollow, or in other words, is tubular.

In the machine illustrated, three mechanisms are provided for successively printing on the cans as they pass. Referring to Fig. 2 it will be seen that each of the printing portions of the machine includes an idler gear 30 supported by one of the arches 14 and meshing with the gear 31 carried by the shaft 32 of a printing roll 33. Suitable printing heads 34 carrying any usual or preferred

means for supplying ink to the printing rolls are illustrated in Figs. 1 and 2.

Bevel gearing 35 (Fig. 3) connects the main drive shaft 22 with a shaft 36 (Fig. 1) supported in suitable bearings provided in one of the brackets 16. Keyed to said shaft 36 is a roll 37 having a somewhat spiral shape groove in it, said cam members 37-38 being so positioned relatively to pins 39 which project from the spider 19 that each rotation of the cam 37 causes its groove 38 to engage one of the pins 39 and impart a one-step movement to the turret.

Carried by the shaft 36 is another cam 40 which acts upon the arm 41 of a rock-shaft 42 (Fig. 4), said rock shaft having another arm 43 which is connected by a link 44 with a valve 45 slidably mounted in a block 46 mounted on the base 12. Leading to a port 47 in the block 46 is a pipe 48 through which air under pressure is supplied by any suitable mechanism not necessary to illustrate. Said port 47, when the valve 45 is in the position illustrated by Fig. 4, registers with a port 49 in the valve 45, said port 49 being an angular one and leading through a rubber nozzle 50 (Fig. 5).

The timing of operation of the parts of the machine is such that each time that the turret brings a printed article to the position illustrated by Fig. 5, the cam 40 of the main shaft effects the operation of the rock-shaft 42 so that the valve 45 is shifted to the position illustrated in Fig. 4. This brings the rubber nozzle 50 in contact with the end of the tubular mandrel 26 and at the same time brings the two air ports into alinement so that the blast of air immediately supplied will blow the printed article C off from the mandrel into any suitable receptacle, so that the attendant can immediately supply a new article to the mandrel from which the printed article has been blown.

It will now be understood that the machine includes a turret which is provided with eight forms or mandrels on which the cylindrical cans are temporarily clamped. Said turret is intermittently operated step by step by the cylindrical cam, the curved groove 38 of which is of such form as to cause each rotation of the cam carrying shaft to effect a step by step rotation of the mandrel-carrying turret 18 from one position to the next successively. Each article-supporting form 26 is revolved by the large gear 20 which is common to all of them and which is eight times as large as each pinion 25. Therefore, the can-carrying form has two revolutions for each printing impression effected as the forms pass the printing mechanisms. In other words, each can-carrying form has one revolution while it is being printed and the equivalent of one revolution while it is being moved from one position to the next. Each printing cylinder is twice as large as the can-

carrying form and therefore only half of the space of each said cylinder is required for each printing plate, and while the idle or blank part of the printing cylinder is presented inwardly, the spider and the can-carrying forms are shifting from one position to the next.

The inking mechanism is driven continuously by said gearing as illustrated, the master gear of which is the same size as the gear which drives the can-carrying form; that is, eight times the size of the gear of the can-carrying form. Therefore, the surface speeds of the can-carrying forms, the printing cylinders, and inking mechanisms, are the same so as to be comparable with the operation of a plain multi-color press, therefore, resulting in perfect register of the different printing impressions (which may be in different colors) of the three printing mechanisms.

Having now described my invention, I claim:

1. A printing machine having a rotatable plurality of supports for round articles, and means for directly printing registered colors successively on articles carried by said supports.

2. A printing machine having a plurality of rotary supports for round articles, and means for directly printing registered colors successively on articles carried by said supports.

3. A machine for printing round articles, said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, and a plurality of means for successively and directly printing each of the articles after it passes from one position to another, said means being relatively positioned and timed to effect registration of the successive printings.

4. A machine for printing round articles, said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, each of said supports having means for frictionally holding an article thereon, and a plurality of means for successively and directly printing each of the articles after it passes from one position to another, said means being relatively positioned and timed to effect registration of the successive printings.

5. A machine for printing round articles, said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, each of said supports having adjustable means for frictionally holding an article thereon, and a plurality of means for successively and directly printing each of the articles after it passes from one position to another, said means being relatively positioned and timed to effect registration of the successive printings.

6. A machine for printing round articles, said machine comprising an intermittently

rotatable carrier having a plurality of rotatable supports for the articles, said supports having air passages, means for successively printing each of the articles after it passes
5 from one position to another, and means for discharging each completely printed article from its support by means of air pressure transmitted through its air passage.

7. A machine for printing round articles,
10 said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, said supports having air passages, means for successively printing the articles after they pass from one
15 position to another, and automatically-controlled valve mechanism for effecting the discharge of each completely printed article from its support by means of air pressure transmitted through its air passage.

20 8. A machine for printing round articles, said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, a plurality of rotary printing members, and means for im-
25 parting one rotation to each article-support while the article is being printed and another rotation while said support is moving from one printing member to another.

9. A machine for printing round articles,
30 said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, a plurality of rotary printing members, said printing members having twice the circumferential dimen-
35 sions as that of the article-supports, and means for imparting one rotation to each article-support while the article is being printed and another rotation while said support is moving from one printing member to another.

40 10. A machine for printing round articles, said machine comprising an intermittently rotatable carrier having a plurality of rotatable supports for the articles, a plurality of means for successively printing each of the
45 articles after it passes from one position to another, and means for imparting uniform surface speeds of rotation to the article-supports and the printing mechanism to effect registration of the successive printings.

50 In testimony whereof I have affixed my signature.

MELVIN H. SIDEBOTHAM.