

April 2, 1935.

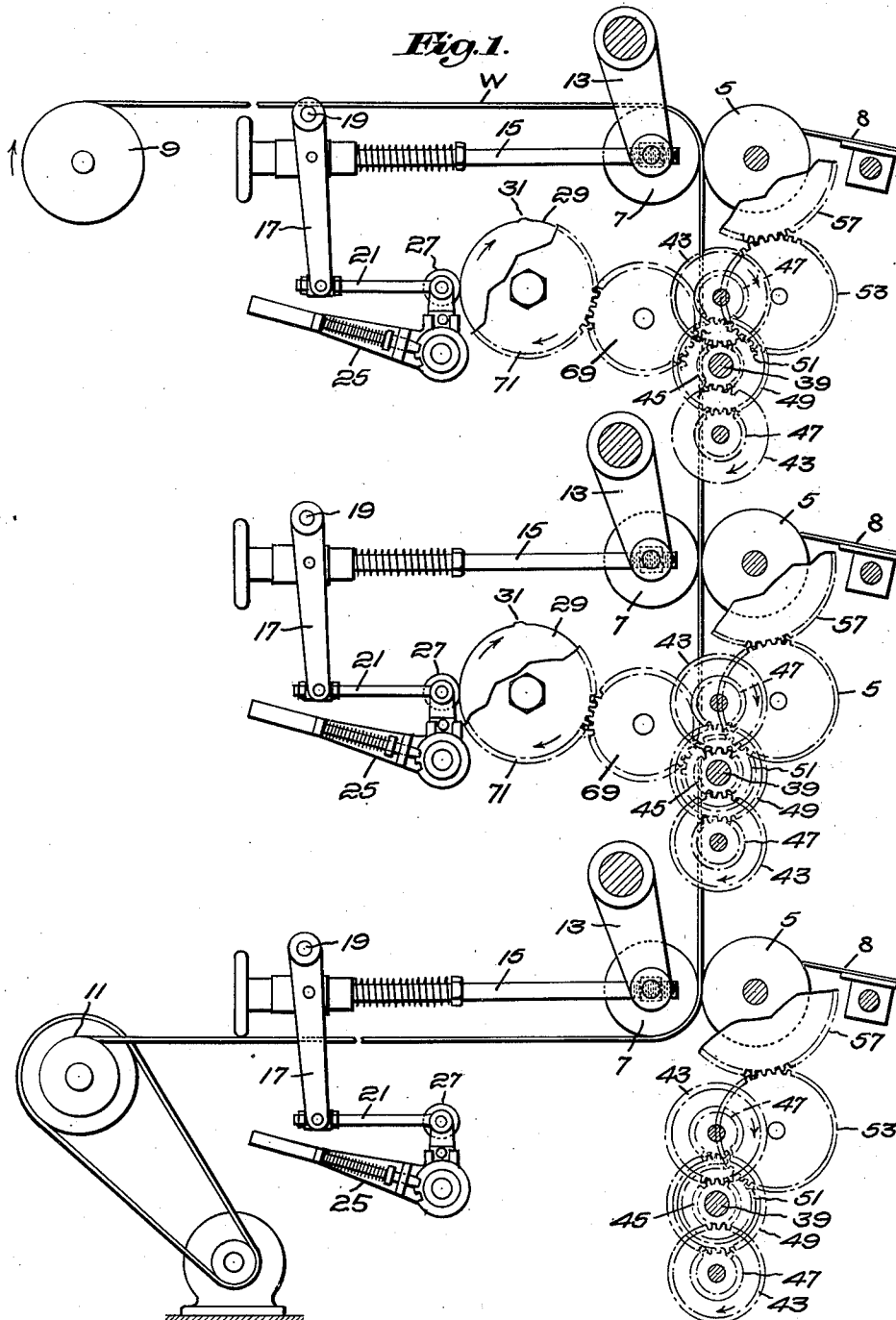
W. E. BRUNNINGS

1,996,639

WEB FEED CONTROL FOR PRESSES AND THE LIKE

Filed Nov. 10, 1932

3 Sheets-Sheet 1



Inventor:
William E. Brunnings
by Emory, Booth, Umney & Townsend
Attys

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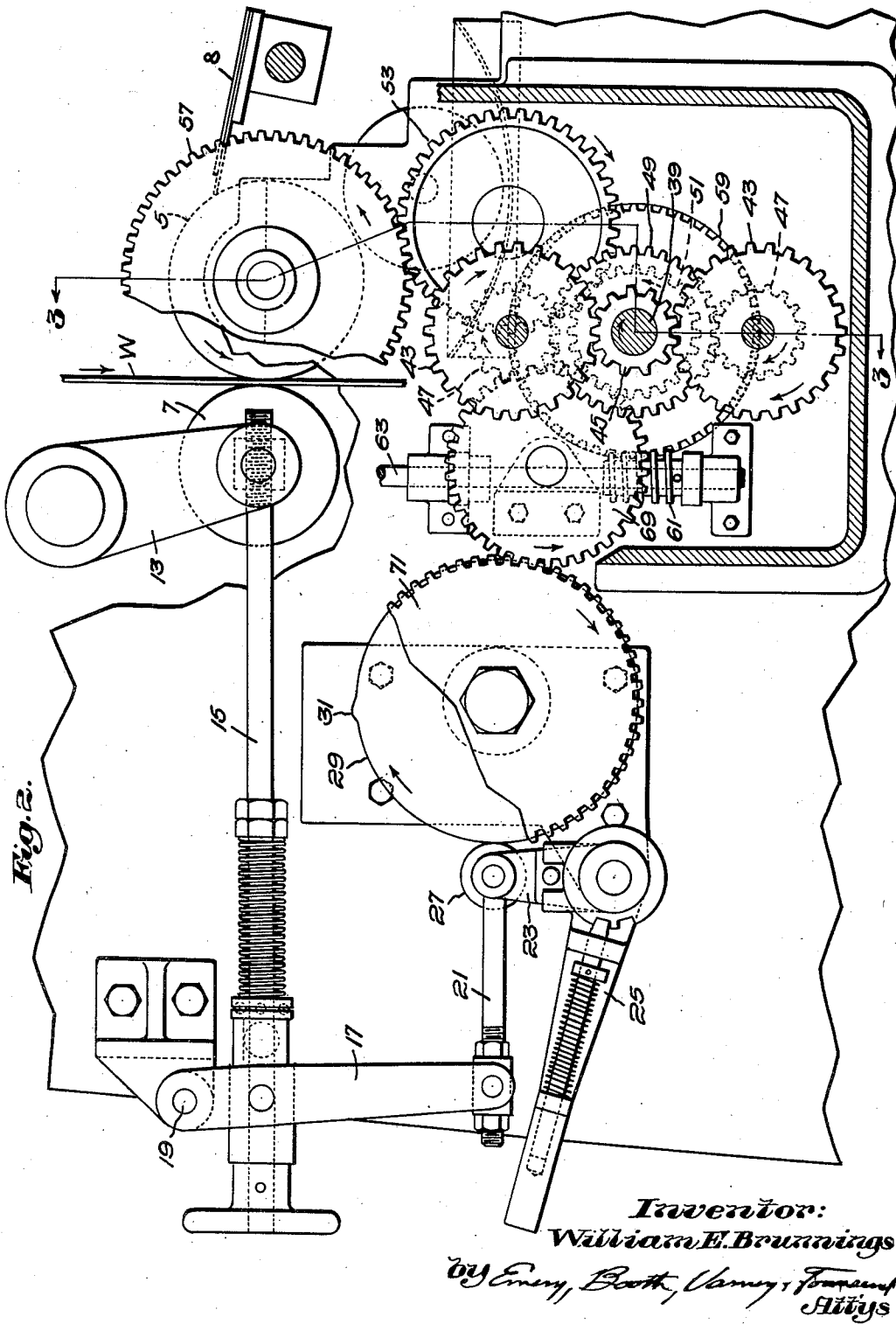
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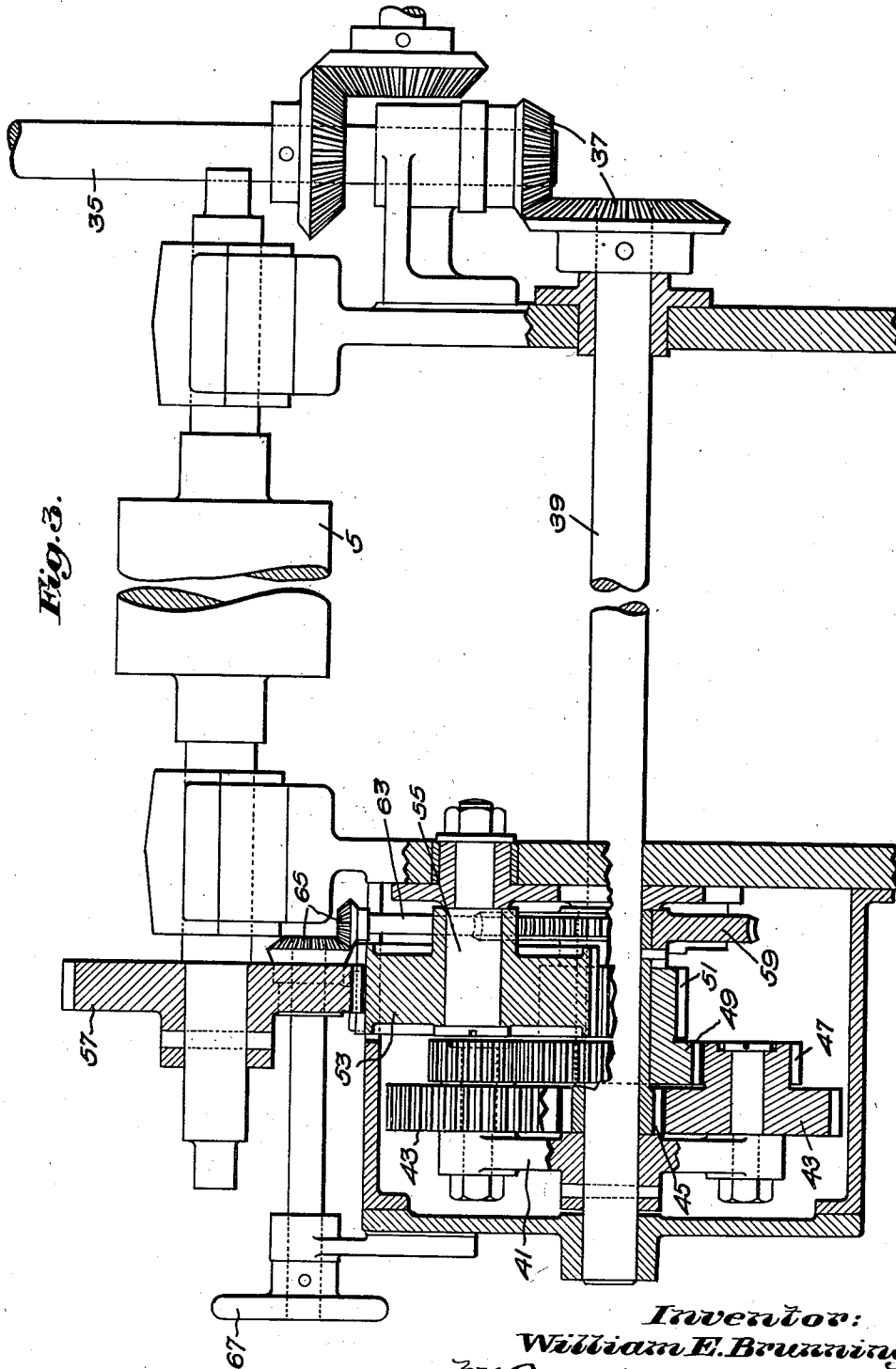
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Fig. 3.



Inventor:
William E. Brunnings
by Emory, Roth, Vance & Townsend
Attys.

UNITED STATES PATENT OFFICE

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WEB FEED CONTROL FOR PRESSES AND
THE LIKEWilliam E. Brunnings, Revere, Mass., assignor to
Forbes Lithograph Manufacturing Company,
Chelsea, Mass., a corporation of Massachusetts

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3 Claims. (Cl. 101—152)

This invention relates to the control of a web of material, such as paper, which passes through a series of pairs of rolls, particularly when certain of the rolls perform in sequence operations on the paper, such as printing impressions thereon, and which it is desired to effect in definite spacial relation. Thus, in multi-color, multi-couple printing presses proper registration of the several colors applied by the couples is essential. Herein by way of example I will describe my invention as embodied in a multi-color web press of the intaglio type in connection with which it is particularly advantageous.

My invention will be well understood by reference to the following description taken in connection with the accompanying drawings, wherein:—

Fig. 1 is a diagrammatic view of such portions of the press as are necessary to an understanding of the invention, chiefly in side elevation;

Fig. 2 is a fragmentary side elevation, partly broken away, showing a single couple; and

Fig. 3 is a broken section, with parts omitted, on the line 3—3 of Fig. 2.

The press herein illustrated as an example of my invention embodies a series of printing couples, herein three, each of which comprises the engraved intaglio cylinder 5 with which co-operates the soft-surface impression roll 7. The showing of doctor blade 8 diagrammatically characterizes cylinder 5 as an intaglio cylinder. The web *w* of paper comes from a suitable supply at 9, passes through the successive couples and is rewound at 11. Preferably the couples are arranged as shown, one above the other, so that the web passes through them in an approximately vertical line, as indicated in Fig. 1, for purposes which will appear as the description proceeds.

It will be understood that the several printing couples are driven and thus tend to feed the paper. Nominally they move at the same surface speed. If this were actually true and if the web *w* were of unvarying length and moved in a perfectly straight line without deviation, no difficulties of register would arise. However, this is not true in fact. Particularly in the case of an intaglio press in which the printing is done by an engraved copper cylinder, there are minute differences in the circumferences of the several cylinders 5 and consequently a variation in the surface speeds of the several couples when they move at the same speed of revolution. Hence the several couples tend to feed the webs at different linear speeds and there is an accu-

mulative error which will destroy the register of the impressions and otherwise cause difficulty.

In one aspect of my invention it might be said that I utilize one of the couples as a control couple while at frequent intervals, preferably on each revolution, the driving relation of the other couples to the web is broken to permit readjustment of such other couples with respect to the web to conform to the action thereon of the control couple whereby accumulative error is avoided. I also preferably provide means for effecting a manual correction which may also be utilized in securing initial registration of the matter on the several couples.

The impression cylinders 7 are herein shown mounted on the swinging arms 13 and are held in contact with the intaglio cylinders 5 by means of the spring-pressed rods 15. To swing the impression cylinders 7 away from rolls 5, in other words to trip the couple, the rods 15 may be drawn towards the left in the figures against the force of the springs by means of the levers 17 pivoted at 19 to the frame of the machine. Such tripping may be manually effected to maintain the rolls and the couples separated for an indefinite period of time by means of a suitable handle, and herein the lever 17 carries the adjustable rod 21, the outer end of which is supported by the radius link 23 which may be turned and positioned by a control handle 25 of conventional type and which does not need detailed description. The link 23, however, is arranged to have a lost motion with the handle 25 for a purpose which will appear. In other words, the handle 25, when in the off position rocked counterclockwise from the position of the figures, does not lock the rod 21 against movement.

Herein the bottom couple, viewing Fig. 1, is the control couple referred to above and I provide means for automatically periodically tripping the other couples. Herein each of the rods 21 which control these couples carries a cam roll 27 co-operating with cam 29 rotating in synchronism with the cylinder 5 and having the rise 31 which in a brief moment during the revolution of the cylinder moves roll 27 to the left in Fig. 2, momentarily tripping the couple. The tripping action of the couples is arranged to take place at intervals between successive impressions corresponding to unprinted intervals on the web, and while the rolls of the upper couples are thus separated, the web is solely under the control of the lower couple and the relation between the printing surfaces of the upper couples and the web is automatically readjusted to permit a fresh

start and thus to prevent harmful accumulation of error due, for example, to unequal circumferences of the intaglio rolls 5 which would be negligible in a single revolution. The preferred vertical arrangement of the couples obviates such sagging of the web between them in catenary form as would preclude such rearrangement.

The couples are preferably driven by means permitting a temporary alteration of their speed without stopping the drive thereof. Such means may also provide for the initial correlation of the positions of the intaglio cylinders 5. It also provides means whereby the control couple, such as the lower couple, may be adjusted while the others are tripped, thereby to move the web, or on the other hand, it makes possible the adjustment of a tripped couple while the control couple is moving the web. For this drive I preferably provide an epicyclic train, as best seen in Fig. 3. The several couples of the press take motion from the vertical shaft 35 driving through the bevel gears 37 cross shafts 39 parallel to the shafts of the intaglio cylinders 5. On the other end of shaft 39 is arranged the arm 41 carrying the planet gears 43 which roll around the normally stationary sun gear 45 loose on the shaft. Pinions 47 integral with the planet gears cooperate with one wheel 49 of a spool gear journalled on the hub of sun gear 45, the other wheel 51 of which spool gear drives idler 53 journalled on the stud 55 which projects from the frame of the machine, and gear 57 on the shaft of cylinder 5 takes its motion from this idler. On the extended hub of the sun gear 45 is secured a worm wheel 59 with which meshes (see Fig. 2) the worm 61, the shaft 63 of which is mounted on the frame of the machine and which may be turned through the bevel pinions 65 by means of the hand wheel 67 accessible at the side of the press. It will be apparent that the worm locks the worm gear 59 and normally holds sun gear 45 stationary. If, however, the hand wheel 67 is turned, which may be done even although shaft 39 is being rotated, a slow motion is imparted to the sun gear. By this means not only is an adjustment of the angular position of the intaglio roll possible when the shaft 39 is stationary, but the speed of motion of the roll may be delicately varied either to increase or decrease such speed while the shaft 39 is turning under power. Gear 51, the terminal driven member of the epicyclic train, may also drive idler 69 meshing with gear 71 to turn the cam 29.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. A multi-color printing press of the intaglio type comprising successive couples each consisting of an intaglio cylinder and a cooperating presser cylinder, the web passing directly from the bite of one couple to the succeeding to be forwarded by the rotation of the couples moving at substantially equal surface speed, one such couple being a master couple adapted to maintain control of the web speed, and means periodically tripping the other couples to provide automatic readjustment of their printing surfaces to the web as positioned by the master couple.
2. A multi-color printing press of the intaglio type comprising successive couples each consisting of an intaglio cylinder and a cooperating presser cylinder, the web passing in a substantially vertical path directly from the bite of one couple to the succeeding to be forwarded by the rotation of the couples moving at substantially equal surface speed, one such couple being a master couple adapted to maintain control of the web speed, and means periodically tripping the other couples to provide automatic readjustment of their printing surfaces to the web as positioned by the master couple as it extends without substantial catenary sag in said vertical path.
3. A multi-color printing press of the intaglio type comprising successive couples each consisting of an intaglio cylinder and a cooperating presser cylinder, the web passing directly from the bite of one couple to the succeeding to be forwarded by the rotation of the couples moving at substantially equal surface speed, one such couple being a master couple adapted to maintain control of the web speed, and means periodically tripping the other couples to provide automatic readjustment of their printing surfaces to the web as positioned by the master couple, the driving means for said master couple providing for manually temporarily altering the speed thereof.

WILLIAM E. BRUNNINGS.