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[56]

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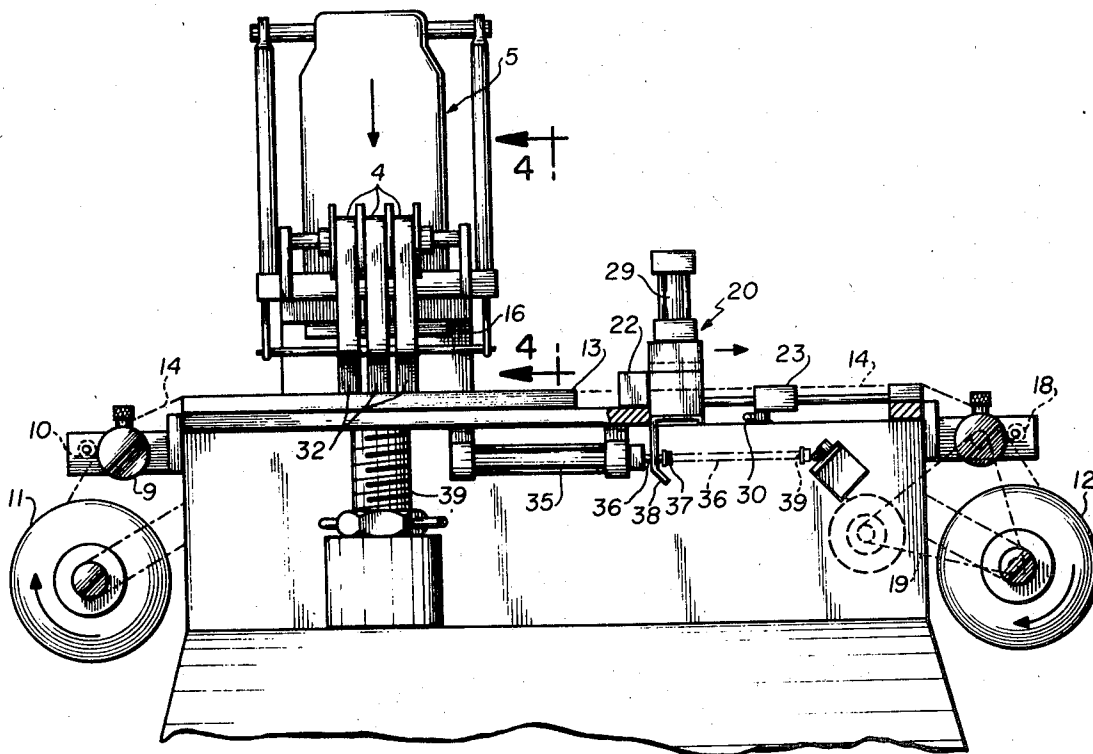
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[54] **REGISTRATION CONTROL FOR SUPERPOSING
 COMPLEMENTARY IMPRINTS**
 6 Claims, 4 Drawing Figs.

[52] U.S. Cl..... **101/198,**
101/288, 101/27; 226/162, 226/141
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B65h 17/36
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292, 288, 27, 196, 197, 198; 226/150, 161, 162,
128, 129, 133, 137, 139, 141

ABSTRACT: An apparatus for hot stamping successive complementary imprints on a length of material and which provides: a clamp that is attachable and detachable to the material to be hot stamped; when the clamp attaches to the material, the material is moved until the clamp engages a stop; this ends the first movement of the material. The clamp then disengages and returns to the original position where the cycle starts again.



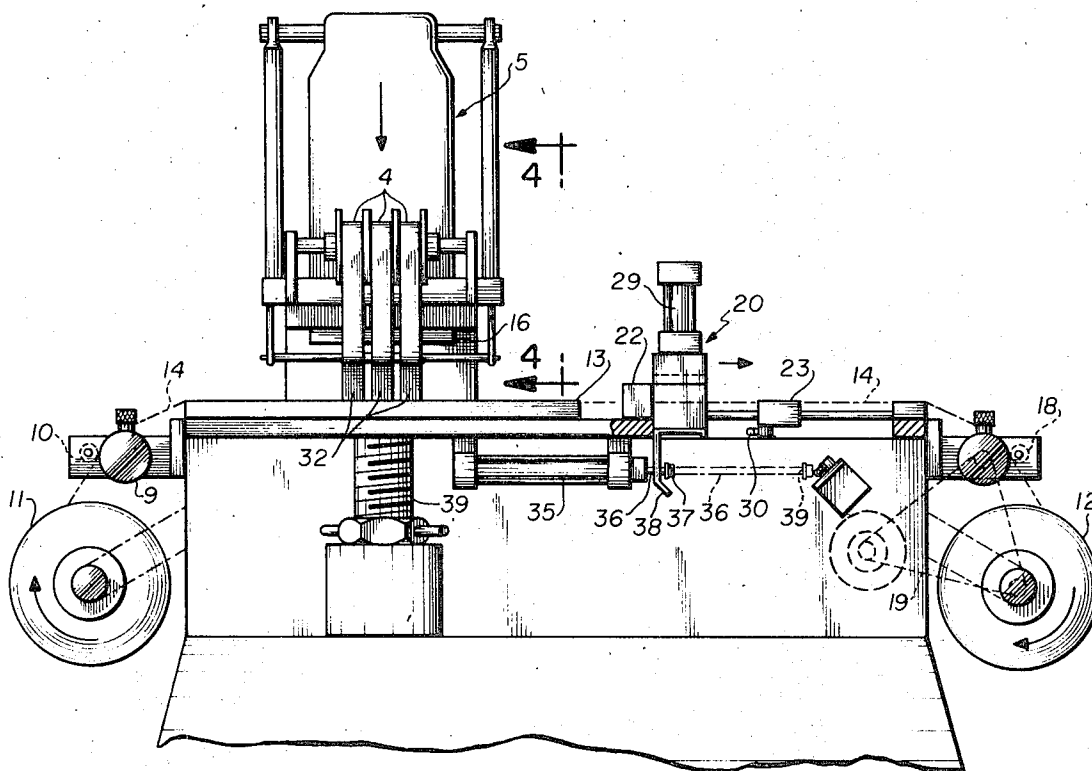


FIG. 1

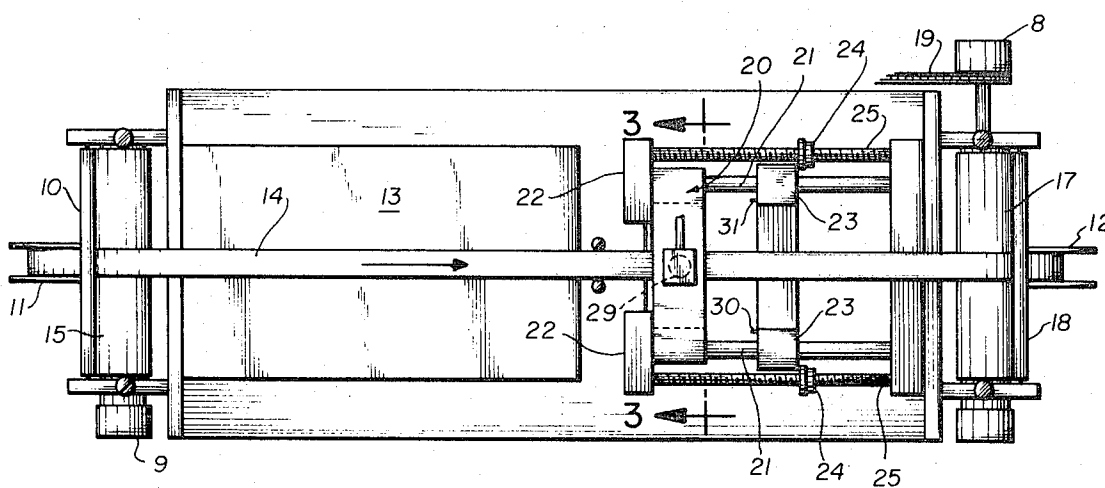
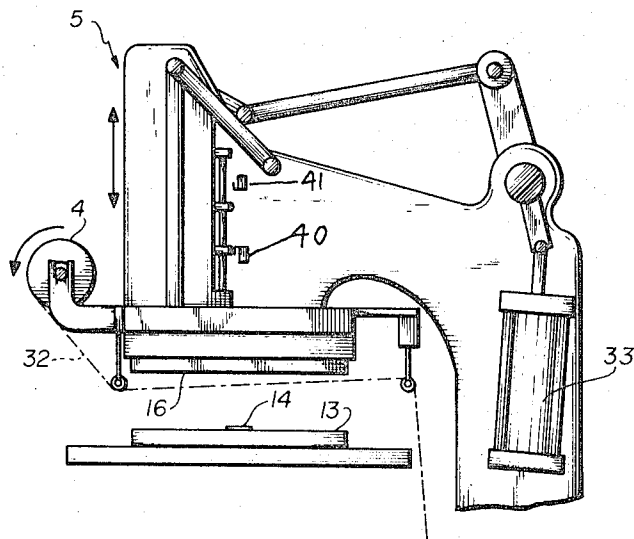
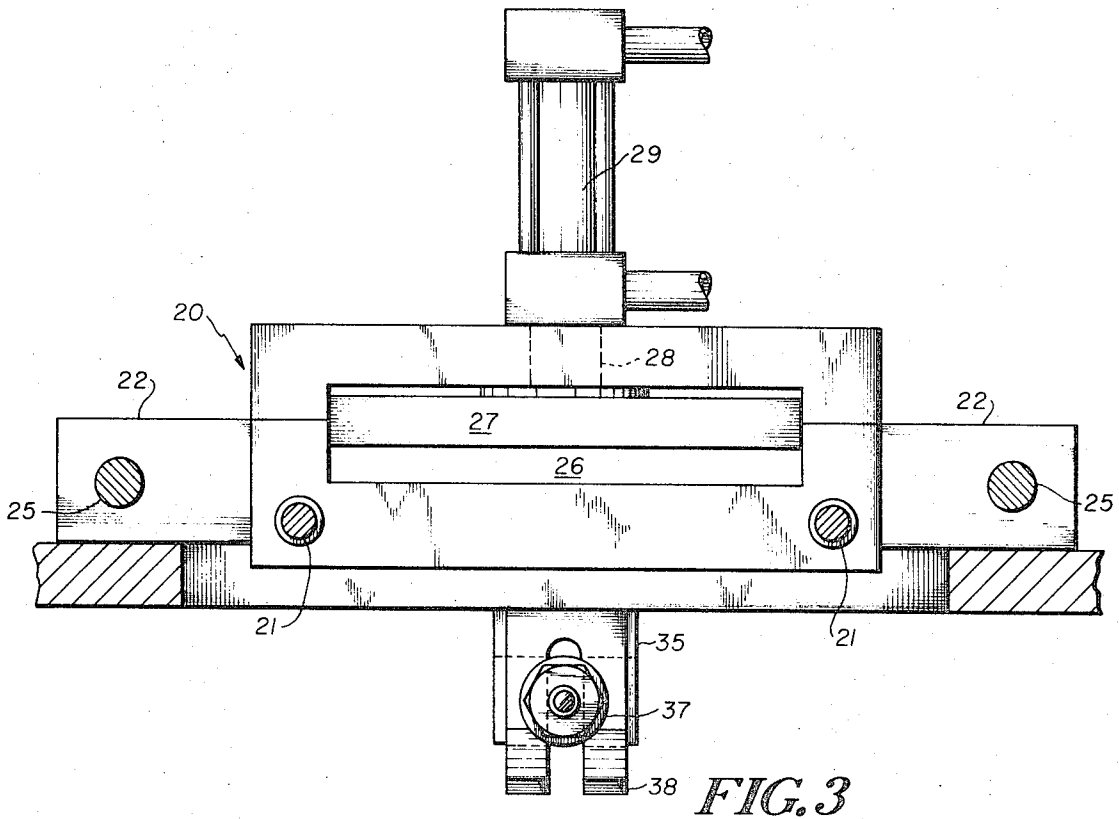


FIG. 2

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REGISTRATION CONTROL FOR SUPERPOSING COMPLEMENTARY IMPRINTS

FIELD OF INVENTION

This invention relates generally to apparatus and methods for hot stamping a plurality of imprints to make one composite imprint, and specifically to precise control of registration of the imprints with each other.

DESCRIPTION OF THE PRIOR ART

Preparation of multicolor labels and other products by conventional methods is very costly, and uneconomical for small runs. The use of the well known hot stamping process is much more economical. Colors are transferred at a first station from strips by the application of heated dies to them, pressing the strips against a label, until the colored coating adheres to the label. The label is then moved to a second imprint station and a second heated die transfers a superposed complementary imprint on the first imprint. The movement of a continuous strip of material to receive successive imprints by the use of rollers is invariably attended by slipping of the material over the pull roller, so that longitudinal registration is lost. Also, the continuous strip of material may wander latitudinally with respect to its direction of movement, so that successive imprints are latitudinally displaced. Slippage may be due in part to differences in thickness of the continuous strip of material constituting the label, or several other causes. In any event, continuous precise registration of successive multicolor superposed imprints is virtually impossible. Very soon, errors in registration of successive imprints occur that make the product commercially unacceptable, and registration must be restored.

SUMMARY OF INVENTION

It has been found that there is a method of controlling the movement of a continuous strip of material from one imprint station to another, and yet others besides, that provides absolutely accurate registration continuously. Such a method is embodied in an apparatus wherein each forward movement of the continuous strip of material to be imprinted is strictly limited by a clamp which can only move a fixed distance between two stops. The clamp seizes the strip, at the first stop, the strip moves carrying the clamp until the clamp encounters the second stop; the encounter of the clamp halts the forward movement of the strip. The clamp returns to the first stop and again seizes the strip, and the cycle is repeated. Each advance of the strip is thus the precise distance between the two stops. Registration for successive superposed imprints is unvaryingly accurate.

DESCRIPTION OF THE DRAWINGS

These objects and advantages are shown by way of illustration in the drawings in which:

FIG. 1 is a side elevational view of an apparatus for hot stamping successive imprints in registration;

FIG. 2 is a top plan view thereof;

FIG. 3 is a front elevational view of the clamp; and

FIG. 4 is a side elevational view of the printing head.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings in detail, the label registration control mechanism assembly provides a mounting for a feed roll 11 and a takeup roll 12. In between the feed and takeup rolls 11, 12, there is an imprint platen 13. Stock or tape 14 to be imprinted is led over a guide roller 15, which is engaged with an idler 10, and then led over the imprint platen 13.

Positioned above the imprint platen 13 is a printing head 5. The printing head 5 is provided with a plurality of dies 16. A separate die is provided for each of the colors to be imprinted upon the stock 14. The dies are heated. The stock 14 to be imprinted is pulled over the imprint platen 13 by being led

between a driven roller 17 and an idler 18, from between which, it is wrapped around the takeup spool 12. The takeup spool 12 is driven by a chain 19 engaged with a sprocket on the takeup spool shaft, and engaged with a motor shaft; the motor also drives roller 17. The movement of the stock 14 is interrupted periodically by a clutch 8 connected to the roller 17, which clutch is operated intermittently as hereafter set forth.

In order to coordinate the takeup of the stock 14 with the advancement of the stock 14, an air driven clamp 20 is mounted on a pair of shafts 21, 21 for reciprocation. The limit of return movement of the clamp 20 is determined by a fixed stop 22. The distance of advancement of the clamp 20 is determined by a movable stop 23. The movable stop 23 is affirmatively positioned by movable threaded detents 24 mounted on threaded shafts 25, 25. By rotating these detents 24, the movable stop 23 may be adjusted to any chosen position to limit the extent of advance of the clamp 20. The clamp 20 is constructed with a central aperture 26 (see FIG. 3) in which there is mounted a gripper or pressure plate 27. The pressure plate 27 is mounted on a shaft 28 operably connected to a reversible cylinder 29, and is normally held raised from the stock to be imprinted which passes through the slot or aperture 26. The pressure plate 27 may be moved downwardly by the cylinder 29 to engage the stock 14 and hold it firmly in the clamp 20. Thus, when the clamp 20 grips the stock 14 at the starting position shown in FIG. 2, it will move with the stock 14 a predetermined distance, dependent upon the position of the movable stop 23. At that point of maximum advance, the clamp 20 is released by reverse operation of the cylinder 29, and the stock 14 is then free, but does not continue to move as will be hereafter set forth.

Mounted upon the movable stop 23, there is a first electroswitch 30 and a second electroswitch 31. The first electroswitch 30 operates the clutch 8 to disengage the puller roller 17, and at the same time, to energize a brake 9 on the guide roller 15. In this manner, the forward movement of the stock to be imprinted is halted. The second electroswitch 31 closes the circuit to a control for a cylinder 33. The cylinder 33 moves the printing head 5 downwardly to engage hot dies 16 and the stock 14 to be imprinted.

The head 5 shows three spools of foil 4 for tricolor imprints. The stock 14 moves each time a precise distance to be under each successive die for successive imprints. While I refer to hot stamping, other transfer processes may be used.

The heated coating on the foil 32 is transferred to the stock 14 to be imprinted. As the imprint stroke is completed, the printing head 5 engages a third electroswitch 40, which activates the cylinder 33 and restores the head 5 to "up" position. A fourth electroswitch 41 at the raised position, operates a latch relay (not shown), which engages the clutch 8 to drive the puller roller 17 and simultaneously releases the brake 9 on the guide roller 15. At the same time, the cylinder 29 on the clamp 20 is actuated so that the stock is seized by the pressure plate 27. The puller roller 17 now being in operation, and the gripper 20 being locked on to the stock 14, the clamp 20 is drawn forward by the stock 14 until it again encounters the microswitches 30, 31 which release the clutch 8 on the puller roller 17, and sets the brake 9 on the feed roller 15.

It will be seen that the gripper has been advanced by the stock 14 pulling it forward. The released gripper 20 is now returned to initial position against the first stop 22 by a reversible cylinder 35 which retracts the piston 36. When the stock 14 is being fed, the cylinder is reversed and it advances the piston 36 to fully extended position as shown by the dotted lines in FIG. 1. The third switch, which is actuated when the head 5 has descended, also actuates the cylinder 35 to pull back the piston 36. The piston has a head 37 which engages a finger 38 on the bottom of the gripper 20, restoring the gripper 20 to the initial position against the first stop 22.

The imprint platen 13 is adjustable as to height by being mounted on a rotatable threaded shaft 39, which may be locked at any desired height to accommodate various

thicknesses of stock 14. The advancement of the gripper 20 from the first fixed stop 22 to contact the second or adjustable stop 23, advances with the stock 14 for each imprint operation, a precise and exact predetermined distance, so that when the second imprint, and subsequently the third imprint, are superimposed on the first imprint, the second and third imprints will be in precise registration with the first imprint and with each other.

It will be seen that the distance of advancement of the imprint strip 14 is, at each step, precisely controlled by the limited movement of the clamp 20. As a result, between imprints, the stock is advanced a precise, predetermined distance for each superposed imprint, and registration is always accurate.

The foregoing description is merely intended to illustrate an embodiment of the invention. The component parts have been shown and described. They each may have substitutes which may perform a substantially similar function; such substitutes may be known as proper substitutes for the said components and may have actually been known or invented before the present invention; these substitutes are contemplated as being within the scope of the appended claims, although they are not specifically cataloged herein.

I claim:

1. A registration control for superposing successive complementary imprints on each other in registration on a continuous length of material comprising:

- a. a clamp for engaging successive predetermined portions of material to be imprinted;
- b. a reciprocation mounting for the clamp;
- c. a pair of stops defining the limits of reciprocation of the clamp;
- d. a gripper on the clamp for affirmatively engaging the clamp to the material to move with the material;
- e. means to engage the gripper with the material when the clamp is at the first stop and to disengage the gripper from the material when the clamp is at the second stop;

f. means to move the material;

g. means to stop the means to move the material when the clamp encounters the second stop;

h. means to return the clamp to the first stop when the gripper disengages the material at the second stop;

i. means to activate the means to move the material when the clamp has returned to the first stop, the gripper has reengaged the material, and an imprint has been made;

j. means to apply to the material successive complementary imprints in timed relation to each full advancement of the material as limited by the clamp.

2. The apparatus according to claim 1 in which one of the stops is specially adjustable with respect to the other stop.

3. The apparatus according to claim 1 in which the clamp is advanced by the pull exerted by the material, when the gripper affirmatively engages the material.

4. The apparatus according to claim 1 in which imprints on the material are accomplished by hot stamping.

5. The apparatus according to claim 1 in which the material is advanced to a succession of imprint stations at which successive imprints are superposed in complementary relation to each other.

6. The method of controlling the superposition of imprints on each other in registration on a continuous length of material comprising:

- a. pulling material past an imprint station;
- b. locking a clamp onto the material whereby the clamp is moved from a first stop to a second stop;
- c. stopping the movement of the material as the clamp reaches the second stop;
- d. imprinting the material while the movement of the material is stopped;
- e. returning the clamp to the first stop;
- f. relocking the clamp onto the material at the first stop;
- g. restarting the movement of the material after the clamp is relocked onto the material.