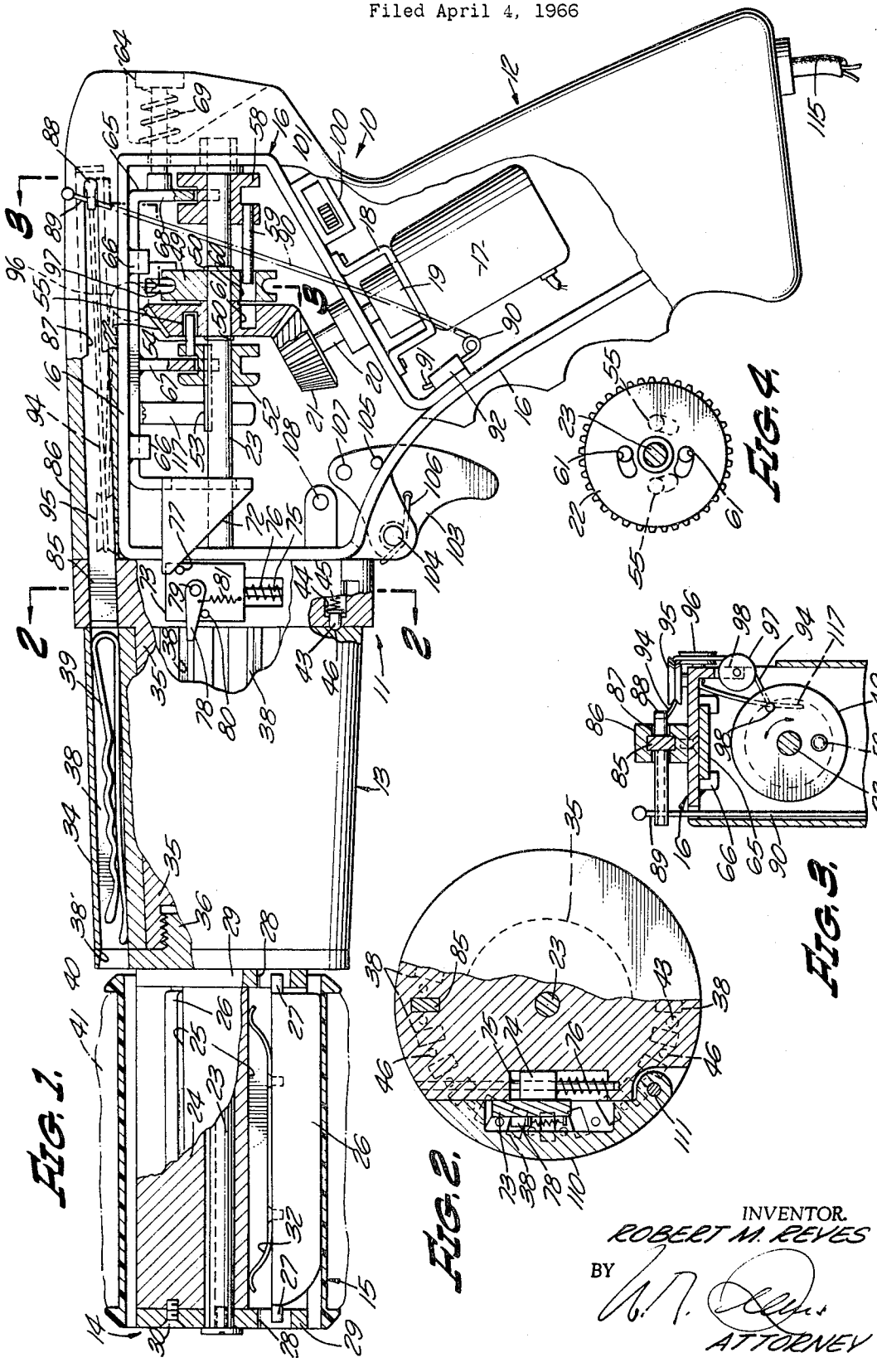
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POWER-DRIVEN SEMI-AUTOMATIC HAIR CURLER

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POWER-DRIVEN SEMI-AUTOMATIC HAIR CURLER

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This invention relates to hair curling devices and more particularly to an improved self-contained power driven hair curler of lightweight construction adapted to be easily manipulated in the hand of the user and effective to curl strands of hair on a cylindrical roller and thereafter to lock the hair in place thereon with a power-set hairpin.

The task of curling strands of hair tightly on roller devices and holding it in place while the hair takes a set is a time consuming and laborious one. In recognition of this and of the tiring effort involved, designers have made proposals for a variety of mechanical devices intended to minimize the effort and time involved. However, prior devices provided for this purpose are subject to many disadvantages and leave much to be desired.

For example, these are not self-contained and require power units supported outside the curler proper and connected thereto through flexible power transmission means. Another shortcoming has been the lack of a power-driven curler adapted to support conventional type curler rolls and capable of being driven in either direction at the user's option.

Another failing has been the lack of provision for storing and setting hairpins while the curling roller is still mounted on the curling appliance to maintain the hair stored firmly on the roller.

It is, therefore, a primary objective of the present invention to provide a compact, lightweight, fully self-contained powered hair curler avoiding the foregoing and other shortcomings of prior curling devices.

The invention curler has a main frame provided with a pistol grip at one end featuring an ON-OFF control, a reversing control and a third control for activating the hairpin setter using the power of the device under controlled conditions to set the pin. The curling roller itself is frictionally retained on a power-driven chucking device at the forward end of a main body with the curler rim positioned in alignment with the next hairpin presented by the hairpin magazine. A single pin is discharged from the magazine and astride the rim of the roller and the hair stored thereon by first shifting a selectable clutch mechanism of the device and then activating the motor to eject the pin at a desired rate. The pin ejecting plunger is returned to its retracted position as spring-pressed indexing mechanism rotates the magazine to its next pin-setting position. As the operator relaxes her hold on clutch shifting mechanism, a spring restores the clutch to its normal setting in readiness to rotate the next roller in a direction controlled by a reversing switch for the motor. The three controls for the device are mounted in a convenient position to be operated by the user's index finger and thumb while maintaining a grasp of the hair curler handgrip.

It is therefore a principal object of the invention to provide a self-contained unitary hand-held power-driven hair curler having a two-phase operating cycle in the first of which the motor is utilized to store hair on a roller and in the second of which the motor is used to set a hairpin thereby securing the hair in stored position on the roller.

Another object of the invention is the provision of a lightweight hand-held hair curler having a hairpin magazine and power means for setting hairpins in succession

astride the rim of a roller after a strand of hair has been stored thereon.

Another object of the invention is the provision of a power-drive hand-held hair curler having a pair of sequentially operating clutch devices in one position of which the motor is operable to drive a hair roller and in the second position of which the motor is operable to set a hairpin to secure the hair wrapped about the roller.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a side elevational view of a preferred embodiment of the invention hair curler with portions of the device cut away along broken lines to show constructional details;

FIGURE 2 is a fragmentary cross-sectional view taken generally along line 2—2 on FIGURE 1;

FIGURE 3 is a fragmentary cross-sectional view taken along broken line 3—3 and

FIGURE 4 is an elevational view looking at the right-hand end face of the driven spur gear.

Referring to FIGURE 1, there is shown a preferred embodiment of the invention hair curler, designated generally **10**, having a main body **11** provided with a pistol type handgrip **12**, a hairpin magazine **13** and a collet-type chucking device **14** at its forward end frictionally supporting a curling roller **15**. Suitably secured within the rearward end of the main body and downwardly into handle **12** is a main frame **16** formed of strip metal and to which the reversible electric motor **17** is mounted by means of a bracket **18**. This motor preferably includes a slip clutch device **19** driving a shaft **20** to which a spur gear **21** is secured. This gear meshes with the teeth of a driven gear **22** having a loose fit with main shaft **23** of the curler. This shaft is carried in bearings mounted along the length of the main body with its forward end keyed to hub **24** of chucking device **14**.

Chucking device **14** is sized to readily receive the thin-walled cylindrical rollers **15**. Hub **24** is provided with a plurality of slots **25** about its periphery each loosely seating a chucking vane **26** provided at its opposite ends with trunnions **27** having a loose sliding fit in slots **28**. These slots are formed in end discs **29** held assembled to the hubs, as by screws **30**. The inner edges of the vanes **26** are provided with a flat leaf spring **32** having curved ends bearing against the bottom of slots **25**. These springs urge the vanes outwardly into firm frictional gripping contact with the interior surface of rollers **15**. The vanes may be formed of resilient material to provide an even firmer gripping contact with the rollers. Also the leading ends of the vanes are contoured, as in FIGURE 1, to facilitate piloting the roller onto the chucking device and in depressing the gripping vanes during the assembly operation.

Hairpin magazine **13** comprises a generally ring shaped main body **34** held loosely and rotatably assembled on a stationary hub **35** forming a part of the curler's main body. Magazine ring **34** is held in assembled position on the hub, as by a bushing ring **36** having threads mating with a threaded well in the forward end of hub **35** and is provided with a series of rectangular passages or storage cells **38** each loosely accommodating a single hairpin **39**. It will be understood that bushing **36** is provided with a single opening **38'** in alignment with that cell **38** of the magazine always aligned with the pin setting plunger **85** to be described more fully presently. As is made clear by FIGURE 1, the discharge port **38'** for the pin storage

cells is so positioned as to guide the inner longer leg of the hairpin along the interior surface of curler roller **15** and the shorter leg outwardly over the camming rim edge **40** of the roller, thereby spreading the pin legs while guiding them over the hair **41** curled on the roller.

Magazine **34** is held in a proper pin setting position by a flanged ball detent **43** slidably supported in a shouldered well **44** and urged toward its extended position by a spring **45** so that its forward rounded end seats in one of a ring of depressions **46** (FIGURE 2) formed between storage cells **38**. The means for indexing the magazine ring into its successive pin setting positions will be described below.

Referring now to the right-hand end of FIGURE 1, it will be understood that the driven spur gear **22** mounted loosely on shaft **23** is arranged to be selectively clutched either to shaft **23** or to a cable storing reel **49** mounted loosely on shaft **23**. Spur gear **22** and reel **49** are held against movement along the shaft in any suitable way as by the split ring keepers **50**, **50** seated in grooves formed in the shaft. A first clutching device comprises a grooved collar **52** slidable along the shaft and along a key **53** fixed to the shaft. Clutch collar **52** has at least one pin **54**, and preferably a pair of diametrically-spaced pins, extending axially therefrom and loosely into wells **55** in the adjacent face of spur gear **22**. For simplicity of illustration, only one pin is shown in FIGURE 1 but it will be understood that a pair of pins is preferably present and spaced 180 degrees apart as best indicated in FIGURE 4. The inlets to wells **55** are preferably provided with sloping arcuate camming depressions serving to guide the ends of pins **54** into the wells.

A second clutching collar **58** is loosely supported on shaft **23** to the right of cable reel **49** and is provided with at least one pin and preferably a pair of pins **59**. This pin is substantially longer than pin **54** and its forward end is continuously and loosely seated in a bore **60** through reel **49**. Bore **60** is arranged to align with a well **61** opening through the right-hand face of driven spur gear **22** when pin **55** is aligned with its seating well in this same gear. When clutch pin **59** is seated in well **61**, the motor is effective to rotate cable reel **49**.

A common control for operating clutch collars **52** and **58** in out-of-phase relation comprises a plunger button **64** secured to a slider **65** held reciprocably supported against the underside of main frame member **16** by guide tabs **66** (FIGURE 3) formed from main frame **16**. Slider **65** includes a pair of downturned tangs **67**, **68** having bifurcated lower ends respectively seated loosely in the grooved clutch collars **52**, **58**. A compression spring **69** surrounding the shank of plunger **64** holds this plunger normally in its extended position shown in FIGURE 1 wherein the first clutch **52** is engaged with driven gear **22** and clutch **58** is disengaged therefrom. However, when the operator depresses plunger **64** clutch **52**, **54** is disengaged from gear **22** as the second clutch **58**, **59** shifts to its alternate position clutching cable reel **49** to gear **22**. The two clutches are so arranged that it is not possible for both to be engaged at the same time.

The plunger-operated slider **65** includes a cam member **72** at its forward end position for indexing the hairpin magazine **34** one cell following each complete pin setting operation. This indexing means is best shown in FIGURES 1 and 2 and includes a slide member **73** having an integral boss **74** freely slidable along a pin **75** and urged toward its upper limit by a compression spring **76**. This spring also maintains a pin **77** fixed in the front face of slider **73** in contact with cam **72**. An indexing dog **78** pivotally supported on a pin **79** is urged counterclockwise against a stop pin **80** by a tension spring **81**. The free end of this dog extends into a hairpin storage cell **38** as the slider moves upwardly under the action of spring **76** during the extension movement of plunger **64** at the end of a hairpin setting operation. In this way the next hairpin is indexed into setting position relative to magazine outlet port **38'** as the operator relaxes the pressure on plunger **64** at the end of a pin setting operation.

The pin setting means comprises a plunger **85** loosely supported in a hollow housing **86** secured to the top of frame **16**. This housing is provided with a slot **87** extending along substantially the full length of its opposite sides to accommodate a cross-pin **88**. The left-hand end of cross-pin **88** as viewed in FIGURE 3 is notched to seat the upper end **89** of a torsion spring **90**. The other end **91** of this spring is anchored to the main frame, as by clip **92** (FIGURE 2) the torsion spring being effective at all times to urge plunger **85** to its retracted position shown in FIGURE 1.

The right-hand end of cross-pin **88** as viewed in FIGURE 3 is connected to one end of a strong flexible cable **94** extending along the top side of frame **16**, around pulley **95**, then over pulleys **96** and **97** to a pin **98** anchored across the bottom of cable reel **49**. Pulley **95** is mounted on a pivot pin carried by main frame **16** whereas pulleys **96** and **97** are supported on a bracket **98** along the side of frame **16** as best shown in FIGURE 1. It will be understood that cable **94** is maintained under tension at all times by torsion spring **90** and that each of the pulleys is sufficiently deeply grooved to prevent the cable from becoming displaced therefrom.

Additional features of the curler device include a motor reversing switch **100** secured to the main frame **16** and having a two position control button **101** projecting through the side wall of handle **12** in a convenient position to be manipulated by the user's thumb while grasping the handle. The main motor switch comprises a trigger **103** pivotally supported on a pin **104** and urged clockwise against stop pin **105** by a torsion spring **106**. When trigger **103** is pivoted clockwise, contact **107** closes against stationary contact **108** to close the power circuit the motor then operating in a direction determined by the position of reversing switch button **101**.

It should also be pointed out that the magazine indexing slider **73** is preferably normally concealed by a cover **110** (FIGURE 2) pivoted to the side of the main frame on a pin **111**. As shown in FIGURE 2, this cover is closed across the ends of certain of the hairpin storage cells **38**. When the cover is swung to its open position, the rear ends of these cells are exposed for reloading, the magazine drum being rotated from position to position as the cells are filled. Although not so shown, it will be understood that the right-hand side of the main frame may be provided with a similar cover providing access to a larger number of cells **38** for convenience in loading.

The operation of the described hair curler will be quite apparent from the foregoing detailed description of its construction and the functional relationship of the parts to one another. Assuming that the magazine has been charged with pins in the manner described immediately above and that a curler roller **15** is in place on chucking device **14**, the device is in readiness for use. The operator connects the electric service cord **115** for the motor to any suitable power supply and then grasps handle **12** in the right hand with the index finger embracing trigger **103**. The free end of a strand of hair is then held pressed against the side of the roller in the usual manner following which trigger **103** is depressed to energize motor **17**. The motor then drives spur gears **21**, **22** through slip clutch **19**. Clutch collar **52** then being engaged with driven gear **22**, shaft **23**, chucking device **14** and roller **15** are slowly rotated to wind hair **41** on roller **15** as the operator manipulates the curler in a manner to maintain the hair strand under light tension. When the hair has been fully stored on the roller, trigger **103** is released following which the pin setting control plunger **64** is depressed. This declutches clutch collar **52** from gear **22** and simultaneously shifts clutch collar **58** to the left to clutch cable reel **49** to gear **22**. The operator now depresses trigger **103** to energize the motor and wind one end of cable **94** upon reel **49**. As this occurs, the cable extends pin set-

ting plunger **85** to the left, as viewed in FIGURE 1 and into the aligned cell **38** to displace hairpin **39** through port **38'** and to drive it astride the cammed rim edge **40** of roller **15**. During this operation, the operator may open and close trigger **103** as often and as necessary to avoid risk of injury to herself or too rapid setting of the hairpin over the roller. When properly fully set, the rounded head of the pin closely embraces rim **42** of the roller so as to be held firmly in set position thereon.

During the depression of plunger **64** to set the hairpin, cam **72** on the foremost end of member **65** acts through pin **77** to index slider **73** downwardly. During this operation, indexing pawl **73** pivots clockwise about pin **79** and becomes disengaged from one hairpin cell and comes to rest within the end of the next lower cell. Accordingly, upon release of plunger **64** and return of this plunger to its normal position, spring **76** projects indexing slider **73** upwardly as dog **78** indexes hairpin magazine **34** by one cell. As the magazine finally reaches its new position, ball detent **43** seats in recess **46** and secures the magazine firmly in place.

It is also pointed out that rotation of chucking device **14** during the pin setting operation is safeguarded against in any suitable manner. For example, a brake for shaft **23** may comprise a spring **117** secured to the underside of main frame **16** with its free end positioned to bear against the rim edges of clutch collar **52** when the latter is shifted to its disengaged position. For greater holding power, spring **117** may be corrugated crosswise of its free end and the rim of clutch collar **52** may be complementally corrugated to seat these corrugations.

As soon as the hair has been clamped in place on the roller by a hairpin, the operator replaces the roller with another and the curler is again used in the same manner described above to wrap another strand of hair thereon. If the operator should wish to wrap the hair in the reverse direction, this is easily done by shifting motor reversing button **101** to its alternate position. The motor then operates to drive the roller in the opposite direction but the reverse rotation of the motor does not interfere in any way with the operation of the pin setting mechanism since the cable reel is operable in either direction through the described pulley arrangement to store the cable for reasons made apparent by FIGURE 3.

While the particular power-driven semi-automatic hair curler herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A self-contained power-driven hair curler having an elongated main body with an electric motor carried in the handle end thereof, a hairpin magazine, a rotary roller chucking device projecting axially forwardly of said magazine, a hollow roller adapted to be telescopically mounted over said chucking device, power-driven means for transferring a hairpin from said magazine lengthwise of said hollow roller and so that the hairpin embraces the adjacent rim edge of the hollow roller, means operatively connecting said electric motor to said chucking device and operator-controlled means for selectively driving said chucking device and said hairpin transfer means from said motor at the operator's selection.

2. A hair curler as defined in claim **1** characterized in that said motor is reversible and operable to rotate said roller in opposite directions, and said means for transferring hairpins being operable to set hairpins in the same direction over the adjacent rim edge of a roller irrespective of the direction of rotation of said motor.

3. A hair curler as defined in claim **2** characterized in the provision of manual control means carried on said handle end for controlling the direction of rotation of said reversible electric motor.

4. A hair curler as defined in claim **2** characterized in that said operator-controlled means includes spring means operable to hold the last-mentioned means in one of two normal operating positions wherein said motor is effective to drive said roller chucking device.

5. A hair curler as defined in claim **1** characterized in the provision of means operatively associated with said hairpin magazine and effective to position successive ones of a supply of hairpins stored therein in position for one only thereof to be transferred over the edge of a hair roller during a given hairpin transfer operating cycle of said hair curler.

6. A hair curler as defined in claim **1** characterized in that said handle end includes a pistol-type handgrip projecting at an angle from the main axis of said hair curler and enclosing said electric motor.

7. A hair curler as delned in claim **1** characterized in that said hairpin magazine is arranged for rotation about an axis extending lengthwise of said main housing, and indexing means operably connected to operator-controlled means and effective to index another hairpin into transfer position during each operating cycle thereof.

8. A hair curler as defined in claim **1** characterized in that said selectively operable means for driving said chucking device and said hairpin transfer means includes first and second clutch means, and common coordinating means for disengaging either clutch as the other clutch is engaged while shifting said selectively operable means between the two normal positions thereof.

9. A hair curler as defined in claim **8** characterized in that said operator-controlled means includes plunger means having an exposed end exteriorly of said main body and positioned to be shifted by a component of the operator's hand while grasping said handle end to change the operating conditions of said first and second clutch means.

10. A hair curler as defined in claim **8** characterized in the provision of a finger-operated control switch for said motor and arranged to be opened and closed while the operator maintains a firm grasp of said handle end, and said curler device being further characterized in that said operator-controlled means is positioned to be manipulated by the hand while grasping said handle end.

11. A hair curler as defined in claim **8** characterized in the provision of brake means engageable by that one of said clutch means operable to drive said chucking device when disengaged thereby to prevent rotation of the chucking device and the roller thereon while said electric motor is in use to drive said hairpin transfer means.

12. A hair curler as defined in claim **1** characterized in that said hair curler includes a roller having a flanged rim at either end thereof, each of said flanged rims being bevelled to cooperate with the forward pronged end of a hairpin in spreading the prongs apart as the hairpin is advanced axially of said roller and astride one of said flanged rims.

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