Nov. 25, 1952 C. MENGE 2,619,248

TAPE APPLYING TOOL

Filed Dec. 16, 1950

FIG. 1.

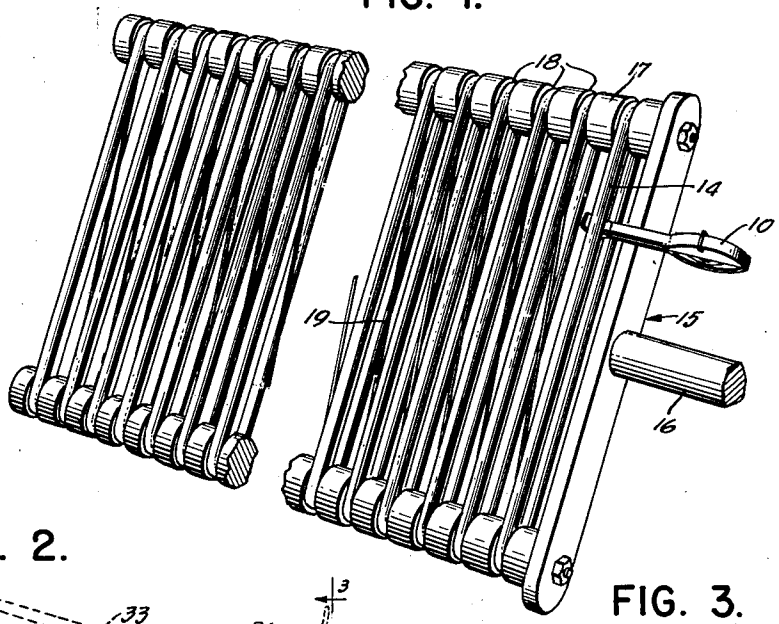


FIG. 2.

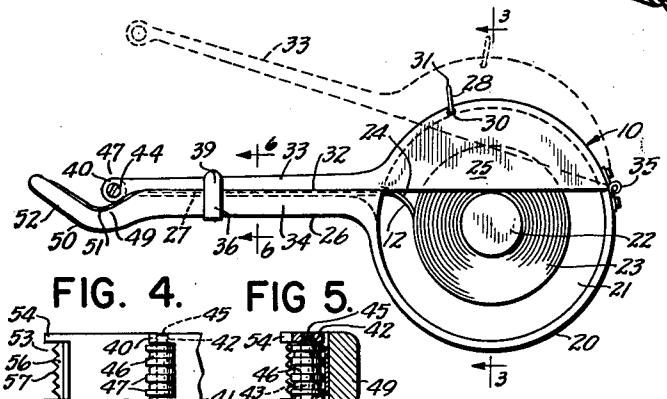


FIG. 3.

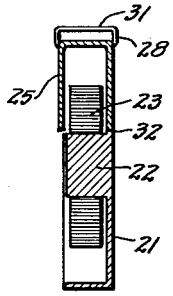


FIG. 4.

FIG 5.

FIG. 8.

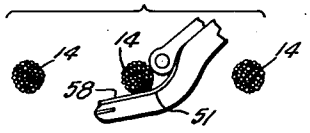


FIG. 9.

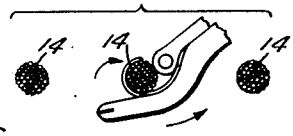


FIG. 6.

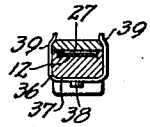


FIG. 10.

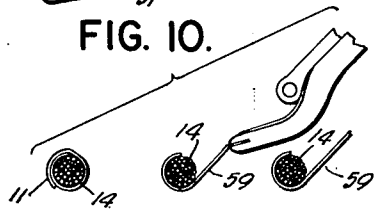
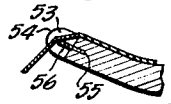


FIG. 7.



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Patented Nov. 25, 1952

2,619,248

UNITED STATES PATENT OFFICE

2,619,248

TAPE APPLYING TOOL

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Application December 16, 1950, Serial No. 201,136

18 Claims. (Cl. 216—33)

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This invention relates to tape applying devices and more particularly to devices or tools for applying pressure sensitive adhesive tape though it is noted that in most of the claims the invention is not limited to any specific tape.

Objects of the invention are to provide an improved tape applying device of this kind which greatly facilitates applying tape around small bundles of wires or formed coils of wire and is particularly suitable for applying bands of tape around stator or rotor coils of electric motors or generators.

Other objects of the invention are to provide an improved conveniently supported and handled tool of this kind for applying tape around such coils while the coils are disposed on the winding reels or coilers or other supports, and to provide a tool in which the tape to be applied may be easily placed in the magazine of the tool and threaded to the applying part of the tool.

Additional objects of the invention are to effect simplicity and efficiency in such tools and to provide an extremely simple rugged tool of this kind which is convenient, efficient and reliable in operation, and economical to manufacture.

Still other objects of the invention will appear as the description proceeds; and while herein details of the invention are described in the specification and some of the claims, the invention as described in the broader claims is not limited to these, and many and various changes may be made without departing from the scope of the invention as claimed in the broader claims.

The inventive features for the accomplishment of these and other objects are shown herein in connection with a tape applying tool which briefly stated, includes upper and lower hinged sections forming a magazine adapted to receive a roll of adhesive tape and an arm joining the magazine and having therethrough a passage adapted to receive tape with the adhesive side up. A transverse roller mounted on the arm extends slightly below the upper wall of the passage at the free end thereof, and said arm has a part downwardly concaved just under and outwardly beyond the roller to form an end hook having a continuous pressing face of transversely continuous straight cross section and a part upwardly forwardly inclined a distance approximately equal to the circumference of the cross section of the coil to be bound, and provided at the free end with a pair of guide ears and a serrated blade therebetween.

Tape drawn from the roll through the passage and under the roller may be guided to the teeth

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to be cut off thereby leaving the free end portion of the tape over said pressing face, whereby said free end may be pressed under the coil to be taped and allow the free end to be pressed and held partly around the coil, whereupon the tool may be pulled from the held coil to pull out enough tape to complete the band around the coil whereupon the teeth may sever the tape to allow the band around the coil to be completed by hand.

In the accompanying drawing showing, by way of example, one of many possible embodiments of the invention,

Fig. 1 is a fragmental perspective view showing the tool used for binding coils on a reel or coiler;

Fig. 2 is a side elevation showing the tool with tape therein;

Fig. 3 shows a section on the line 3—3 of Fig. 2;

Fig. 4 is a fragmental plan showing the end hook;

Fig. 5 shows a transverse section of the hook;

Fig. 6 shows a section taken on the line 6—6 of Fig. 2;

Fig. 7 is a longitudinal vertical section through the end of the hook; and

Figs. 8, 9 and 10 are fragmental side elevations showing the steps in the method of binding a coil shown in section.

My improved tape applying tool 10 is particularly efficient for putting bands 11 (Fig. 10) of pressure sensitive adhesive tape 12 around electric power machine coils 14, said tool being especially efficient and convenient for applying said bands 11 to elongated coils 14 while still disposed on the winding reel or coiler 15 (Fig. 1) which in winding operation revolves on a shaft 16 and is provided with parallel rounds 17 provided with grooves 18 which hold the coils 14 as they are wound.

While the coils are still close together on the reel and not yet cut apart as shown by the connecting wire 19, it is difficult to bind them by hand, as heretofore and my improved tape applying tool obviates this difficulty.

As shown in the drawing, my improved tape applying tool comprising a hollow disk-shaped magazine 20 (Figs. 2 and 3) having one complete flat wall 21 having thereon a central cylindrical post 22 to receive a roll 23 of tape 12 adhesive on the inner face 24. A segmental opposite wall 25 at the upper part of the magazine loosely engages and holds the tape on the post 22.

A hollow substantially radial arm 26 open at its free end and at the inner end joining and communicating with the magazine 20 has a lon-

gitudinal passage 27 therethrough receiving tape 12 drawn from the roll 23. A small wire loop 28 having inturned ends pivotally received in alined apertures 30 in the upper part of the magazine substantially parallel to the axis of the magazine, has an elongated upper part 31 parallel to said axis for holding the tool suspended by a strap on the operator's neck at the proper position and angle for use.

The upper and lower part of said tool is divided by a plane 32 parting parallel to the axis of the magazine and extending along the upper part of the passage of the arm, and just below the segmental wall 25 and just above the upper side of the post 22, to form upper and lower sections 33, 34 of the arm, magazine and tool. A hinge 35 at said plane on the peripheral wall of the magazine most remote from arm has its hinge members secured to said upper and lower sections respectively for hinging said upper and lower sections, for movement apart, to expose said passage 27 for threading the tape therein, and for moving said segmental wall far enough away from the post 22 to allow a new roll 23 of tape to be placed on the post. A substantially U-shaped clip 36 (Figs. 2 and 6) having its yoke-part 37 secured by a screw 38 to the lower face of the lower section of the arm near the free end thereof has upper spring arms 39 having intermediate upper cam parts inwardly curved toward each other to form cams engaging the upper arm section 33 to hold it in closed position and to allow it to yieldably move to and from said position as shown by the dotted lines of Fig. 2.

The free end of the upper arm section 33 is provided with a pair of axially transversely alined apertured spaced ears 40 (Figs. 2 and 4) extending slightly below the plane of parting and spaced apart a distance greater than the width of the tape, one ear having the outer part of its aperture countersunk as at 41, the other aperture being threaded as at 42. A screw spindle 43 (Fig. 5) in said aperture has a head 44 in the countersink and a threaded portion engaged with the threads of the other aperture.

An elongated roller 46 on said spindle 43 loosely engaging said ears is provided with a series of annular grooves disposed around the roller forming therebetween raised annular ridges 47 to engage the adhesive upper face of the tape 12 and guide the tape without much adhesion of the roller to the tape.

The lower arm section is downwardly concaved as at 49 (Fig. 2) just under and outwardly beyond the roller 47 to form an end hook 50 having a continuous pressing face 51 of transversely continuous straight cross section having a part at and near the roller extending lower than the roller, and an upwardly inclined part 52 extending a distance approximately equal to the circumference of the cross section of the coil 14 to be bound, to a position above the plane 32 of parting, extended, and provided at the free end with a transversely elongated shallow end notch 53 (Fig. 4) a little longer than the tape is wide and forming a pair of guide ears 54 at the ends of the notch.

The guide ears 54 and the free end portion of the hook are provided with a thin deep slit 55 (Fig. 7) extending from side to side between and substantially parallel to their upper and lower faces and receiving a serrated blade 56 crimped in said slit and having sharp teeth 57 between the guide ears projecting less far than the ears, whereby tape 12 drawn from under the roller 46 may be disposed between said guide ears 54 and thereby guided to the sharp teeth and pulled against the teeth 57 to be cut off, thereby leaving the free end portion 58 (Fig. 8) of the tape disposed over and against said pressing face 51, whereby the tool may be, by hand, positioned with said portion 58 of the tape on the pressing face 51 transversely under the coil 14 to be taped with the coil adjacent to the roller and said portion 58 pressed up by said pressing face 51 to the coil, to adhere the tape to the coil, and allow the free end of the tape to be pressed and held by the operator's fingers partly around the coil as in Fig. 9, whereupon while said free end of the tape is thus held, the tool may be pulled from the held coil to pull out enough tape, as at 59 (Fig. 10) beyond the teeth 57, to complete a band 11 of tape around the coil, whereupon the teeth 57 may be pushed upwardly against the tape, as in Fig. 7 to sever the tape, as at the right of Fig. 10, to allow the band around the coil to be completed by hand as at the left of Fig. 10, leaving the tool with the tape positioned in the hook, as in Figs. 2 and 8, ready for another operation.

The passage 27 receives the tape from the roll with the adhesive up, whereby the unadhesive face of the tape may engage the inner end of the lower wall of the passage. The ridges 47 of the roller extend below the plane of upper wall of the passage 27 at the free end thereof, whereby the adhesive face of the tape is guided out of contact with said upper wall.

The coil 14 to be bound may be placed across the face 51 and positioned against the roller 46 at a point remote from the end of the hook and the serrated blade 56 in position to cut off the amount of tape 58, Fig. 8 for starting the next operation.

I claim as my invention:

1. A tape applying tool comprising a magazine adapted to receive a roll of adhesive tape; an arm joining the magazine and having therethrough a passage adapted to receive tape with the adhesive side up; a transverse roller mounted on the free end of the arm and extending slightly below the plane of the upper wall of the passage at the free end thereof; said arm having a thin concaved part having a shallow downwardly concaved face just under and outwardly beyond the roller to form an end hook having a continuous pressing face of transversely continuous straight cross section extending to the side faces of the hook and a part upwardly forwardly inclined from the concaved part a distance approximately equal to the circumference of the cross section of a coil to be bound, and provided at the free end with a pair of transversely spaced guide ears; and a transverse serrated blade secured between said ears remote from said roller.

2. A tape applying tool comprising a member having therethrough a tape-receiving passage to deliver adhesive tape; a roller on the member axially just above the free end of the passage and extending below the plane of the upper wall of the passage; said member having a pressing face under the roller.

3. A tape applying tool comprising a member having therethrough a tape-receiving passage to deliver adhesive tape; said member having a thin end hook having a thin free end having a pressing face under the free end of the passage and extending to the side faces of the hook.

4. A tape applying tool comprising a disk-shaped magazine having a flat side wall having a post to receive a roll of adhesive tape and a

segmental opposite wall at the upper part of the magazine; a substantially radial arm joining the magazine and having a longitudinal passage therethrough; said tool being divided by a plane of parting extending along the upper part of said passage below the segmental wall and above the post; a hinge at said plane on the peripheral wall of the magazine remote from the arm, and connecting said upper and lower sections; means to yieldably hold said sections closed on each other; the free end of the upper arm section being provided with an elongated transverse roller extending slightly below the plane of parting and provided with raised annular ridges therearound; the lower arm section having an end hook having a pressing face under the roller, and at the free end a pair of spaced ears and a transverse blade, the side edges of said hook and face being as low as the intramarginal part of the face.

5. A tape applying tool comprising a tape magazine; an arm joining the magazine and having therethrough a passage to receive and deliver the tape; an axially transverse roller on the arm just above the free end of the passage; the lower part of the arm being extended and downwardly concaved just under and outwardly beyond the roller to form an end hook having a continuous pressing face of transversely continuous straight cross section having a part at and near the roller extending lower than the roller, and an upwardly inclined part extending a distance approximately equal to the circumference of the cross section of a coil to be bound, to a position above the extended plane of the top wall of the passage and provided at the free end with a transversely elongated shallow end notch forming a pair of guide ears at the ends of the notch; and a serrated blade crimped in said notch remote from said roller.

6. A tape applying tool comprising a tape magazine for a roll of tape; an arm joining the magazine and having therethrough a passage to receive and deliver the tape from the roll with the adhesive up; an axially transverse roller on the arm just above the free end of the passage; the lower part of said arm having under and extending beyond the roller an end hook having a pressing face all side marginal parts of which are the same height as the intramarginal parts; said hook having at the free end a pair of spaced ears and a transverse toothed blade therebetween; whereby tape drawn from the roll through the passage and under the roller may be guided between the ears to the teeth to be cut off thereby leaving a free end portion of the tape over said face; whereby said free end portion may be pressed under a coil to be taped and allow the free end to be pressed and held partly around the coil; whereupon the tool may be pulled from the held tape on the coil to pull out enough tape to complete the band around the coil; whereupon the teeth may be forced to sever the tape to allow the band around the coil to be completed.

7. A tape applying tool for putting bands of pressure-adhesive tape around electric power machine coils, said tool comprising a hollow disk-shaped magazine having one complete flat wall having a central cylindrical post thereon to receive a roll of tape adhesive on the inner face, and a segmental opposite wall at the upper part of the magazine for loosely engaging and holding the tape on the post; a hollow substantially radial arm open at its free end and

at the inner end joining and communicating with the magazine and having a longitudinal passage therethrough receiving tape drawn from the coil; a small wire loop having inturned ends pivotally received in alined apertures in the upper part of the magazine substantially parallel to the axis of the magazine and having an elongated upper part parallel to said axis for holding the tool suspended by a strap on the operator's neck at the proper position and angle for use; a roller on the arm just above the free end of the passage; said arm having an end hook having a pressing face extending entirely from side to side of the hook under the roller, and at the free end of the hook a transverse blade.

8. A tape applying tool comprising a disk-shaped tape magazine having one flat side wall with an axial post thereon in the magazine, and an opposite segmental wall at the upper part of the magazine; an arm joining the magazine and having therethrough a passage to receive and deliver the tape; the upper and lower parts of said tool being divided by a plane of parting parallel to the axis of the magazine and extending along the upper part of the passage of the arm, and just below the segmental wall and just above the upper side of the post, to form upper and lower one piece sections of the arm, magazine and tool; a hinge at said plane on the peripheral wall of the magazine most remote from arm, and having its hinge members secured to said upper and lower sections respectively, for hinging said upper and lower sections for movement apart to expose said passage for threading the tape therein, and for moving said segmental wall far enough away from the post to allow a new roll of tape to be placed on the post; a U-shaped clip having its yoke-part secured to the lower face of the lower section of the arm near the free end, and upper spring arms having intermediate upper cam parts inwardly curved toward each other to form cams engaging the upper arm section to hold it in closed position and to allow it to yieldably move to and from said position; a roller on the arm with its axis just above the free end of the passage; the lower part of the roller extending below the plane of the upper face of the passage; said arm having an end hook having a pressing face under and at the free end a tranverse blade at the free end of the hook.

9. A tape applying tool comprising a tape magazine; an arm joining the magazine and having therethrough a passage to receive and deliver the tape; the upper part of the free end of the arm being provided with a pair of axially transversely alined apertured spaced ears extending slightly below the plane of parting and spaced apart a distance greater than the width of the tape; one ear having the outer part of its aperture countersunk, the other aperture being threaded; a screw spindle in said aperture having a head in the countersink and a threaded portion engaged with the threads of the other aperture; an elongated roller on said spindle loosely engaging said ears and extending below the plane of the upper wall of the passage provided with a series of annular grooves disposed around the roller forming therebetween raised annular ridges to engage the adhesive upper face of the tape and guide the tape out of contact with said upper wall without much adhesion to the tape; said arm having an

end hook having a pressing face under the roller and at the free end of the hook a transverse blade.

10. A tape applying tool comprising a tape magazine for holding a roll of tape; an arm joining the magazine and having therethrough a passage to receive tape from the roll with the adhesive side up; a roller on the arm just above the free end of the passage against the under side of which the tape may engage; said arm having under and beyond the roller an end hook having a pressing face extending from side face to side face of the hook; the hook having at the free end of the hook a pair of spaced guide ears and a transverse toothed blade therebetween; whereby tape drawn from under the roller may be disposed between said guide ears and thereby guided to the teeth and pulled against the teeth to be cut off; thereby leaving the free end portion of the tape disposed over and against said pressing face; whereby the tool may be, by hand, positioned with said portion of the tape on the pressing face transversely under a coil to be taped with the coil adjacent to the roller and said portion pressed up by said pressing face to the coil, to adhere the tape to the coil, and allow the free end portion of the tape to be pressed and held by the operator's fingers partly around the coil whereupon while said free end portion of the tape is thus held, the tool may be pulled from the held coil to pull out enough tape beyond the teeth to complete the band of tape around the coil; whereupon the teeth may be pushed upwardly against the tape to sever the tape to allow the band around the coil to be completed by hand; leaving the tool with the tape positioned in the hook ready for another operation.

11. A tape applying tool for taping a band around a cross-section of a coil of wire, said tool comprising a magazine for adhesive tape; a long narrow thin arm, free of lateral projections, joining the magazine and having substantially therethrough a passage just wide and thick enough to receive the tape with the adhesive up; a transverse roller mounted on the arm and extending slightly below the level of the upper wall of the passage at the free end thereof; said arm having an extension downwardly slightly concaved just under the roller and extended outwardly beyond the roller almost alined with the arm to form a shallow end hook having a continuous slightly concaved almost longitudinally straight pressing face of transversely continuous straight cross section from side face to side face of the hook, said face being about as wide as the tape and forwardly slightly upwardly inclined a distance approximately equal to the circumference of the cross section of a coil to be bound, and provided at the free end with a pair of guide ears; and a transverse serrated blade secured between said ears.

12. A method of applying tape bands around closely adjacent bundles of wires of closely adjacent coils on a rack, with a tool comprising a long narrow arm adapted to pass between coils and having therethrough a shallow passage and a downwardly concaved pressing face under the outer end of the passage and a transverse toothed blade at the free end of the said face; said method camprising drawing tape with the adhesive side up through the passage and over said face to the teeth and pulling against the teeth to cut off the tape, thereby leaving the free end portion of the tape disposed over and against said pressing face; positioning said portion of the tape transversely under the coil to be taped; pressing said portion upwardly by said pressing face to the coil, thereby adhering the tape to the coil; pressing the unadhered free end portion of the tape partly around the coil and there holding it and the coil; pulling the tool from the held coil thereby pulling out enough tape beyond the teeth to complete the band of tape around the coil; pushing the teeth upwardly against the tape to sever the tape; and completing and pressing the band around the coil.

13. A tape applying tool comprising a magazine having an axial post for the reception of a roll of adhesive tape having adhesive only on the inner face; a long narrow thin arm, free of lateral projections, joining the magazine and having therethrough, approximately radial to the post, a straight passage just wide and thick enough to receive the tape from the roll with the adhesive face up, whereby the unadhesive face of the tape may engage the inner end of the lower wall of the passage; a transverse roller having raised annular ridges therearound mounted transversely on the arm and extending below the plane of the upper face of the passage at the free end thereof, whereby the adhesive of the tape is guided without adhesion out of contact with said upper face; said arm having a part downwardly slightly concaved just under and extended outwardly beyond the roller almost alined with the arm to form a shallow end hook having a continuous slightly concaved almost longitudinally straight pressing face of transversely continuous straight cross section, extending from side face to side face of the hook, about as wide as the tape and forwardly slightly upwardly inclined, whereby the coil to be bound may be placed across said face and positioned against the roller at a point remote from the end of the hook; a pair of guide ears at the free end of said hook; and a serrated blade secured between said ears remote from the roller.

14. A tape applying tool for applying bands of pressure sensitive adhesive tape around closely adjacent electric power machine coils, said tool comprising a magazine having an axial post for reception of a roll of adhesive tape having adhesive only on the inner face; a straight long narrow thin arm, free of projections, joining the magazine and having therethrough, approximately radial to the post, a straight passage just wide and thick enough to receive the tape from the roll with the adhesive face up, whereby the unadhesive face of the tape may engage the inner end of the lower wall of the passage; a transverse roller mounted transversely on the arm axially above the plane of the passage and extending below the plane of the passage at the free end thereof, whereby the adhesive of the tape is guided with little friction against the lower face of the passage entirely out of contact with the upper face of the passage; said arm having a narrow part thin at its free end and throughout for passage between closely adjacent coils to be bound and having its upper face downwardly slightly concaved just under and almost contacting the roller and extended outwardly beyond the roller to said free end and almost alined with the arm to form a shallow end hook having a continuous slightly concaved almost longitudinally straight pressing face of transversely continuous straight cross section, extending from the side face to side face of the hook, about as wide as the tape and forwardly slightly

upwardly inclined and provided at the free end with a transverse serrated blade.

15. A tape applying tool for applying bands of pressure sensitive adhesive tape around closely adjacent electric power machine coils, said tool comprising a magazine for a roll of adhesive tape; a long narrow thin arm joining the magazine and having therethrough, a thin narrow passage to receive the tape from the roll with the adhesive face up; a transverse roller mounted transversely on the arm and extending below the plane of the passage; said arm having a narrow part, thin at its free end and throughout, for passage between closely adjacent coils to be bound and having its upper face downwardly slightly concaved just under and almost contacting the roller and almost alined with the arm to form a shallow end hook having a continuous slightly concaved almost longitudinally straight pressing face of transversely continous straight cross section, extending from the side face to side face of the hook; and a serrated blade secured at said free end; whereby the tape may be drawn out and cut off by the blade and leave substantially flat on said face a proper amount of tape to bind the coil, against which the coil to be bound may be transversely placed and positioned against the roller and pressed against the tape substantially along a single line and there partly bound by hand without slackness in the tape; whereupon the tool may be pulled from the partly bound coil to pull out and cut off enough tape to complete the binding and leave the proper amount of tape on the pressing face for the next binding.

16. A tape applying tool comprising a disk-shaped magazine having a flat side wall having a post to receive a roll of adhesive tape and a segmental opposite wall at the upper part of the magazine to hold the roll in place on the post; a substantially radial arm joining the magazine and having a longitudinal passage therethrough; said tool being divided by a plane of parting extending along the upper part of said passage below the segmental wall and above the post and forming a lower section and a one-piece upper section; a single hinge at said plane on the peripheral wall of the magazine remote from arm, and connecting said upper and lower sections; whereby said single hinge serves to hinge the upper wall of said passage and said segmental wall; whereby when the part of the upper section is raised the whole of the section is raised causing said segmental wall to be raised to permit insertion of a new roll and causing the upper wall of the passage to be raised for threading the tape, and whereby when the upper section is lowered, said passage will be closed and said segmental wall will be automatically lowered; a single means to yieldably hold said sections closed on each other; the free end of the upper arm section being provided with an elongated transverse roller extending slightly below the plane of parting; the lower arm section having an end hook having a pressing face near the roller, and at the free end a transverse blade.

17. A tape applying tool comprising a disk-shaped magazine having a flat side wall having a post to receive a roll of adhesive tape and a segmental opposite wall at the upper part of the magazine to hold the roll in place on the post; a substantially radial arm joining the magazine and having a longitudinal passage therethrough; said tool being divided by a plane of parting extending along the upper part of said passage below the segmental wall and above the post and forming a lower section and a one-piece upper section; a single hinge at said plane on the peripheral wall of the magazine remote from arm, and connecting said upper and lower sections; whereby said single hinge serves to hinge the upper wall of said passage and said segmental wall; whereby when any part of the upper section is raised and lowered the whole of the section including the segmental wall is raised and lowered to permit insertion of a new roll and threading of the tape, automatically causing reclosure of the passage and said segmental wall by one operation; the free end of the upper arm section being provided with an elongated transverse roller extending slightly below the plane of parting and provided with raised annular ridges therearound; the lower arm section having an end hook having a pressing face near the roller, and at the free end a transverse blade.

18. A method of applying bands of tape around closely adjacent bundles of wires of coils with a tool comprising a long narrow thin arm having therethrough a shallow passage to receive and deliver adhesive tape from its free end, said arm having an axially transverse roller on the arm just above the free end of the passage and a narrow thin part having upwardly exposed pressing face below said roller and a thin free end and transverse blade at said free end; said method comprising drawing tape by hand through the passage under the roller with the adhesive side up and over said blade and by hand pulling against the blade to cut off the tape; thereby leaving the free end portion of the tape disposed over and against said pressing face; by hand inserting said narrow part between adjacent bundles and by hand positioning said portion of the tape on the pressing face transversely under a bundle, with the bundle against the roller and said portion pressed up by forcing the tool upwardly by hand, thereby pressing the face against the bundle, thereby adhering the tape to the bundle; passing the free end portion of the tape by the fingers partly around the bundle and there holding the bundle and said portion by the fingers; pulling the tool by hand from the bundle while held by hand, thereby pulling the tape partly around the bundle and pulling out enough tape beyond the blade to complete the band of tape around the bundle; pushing the blade upwardly by hand against the tape to sever the tape; and by hand completing and pressing the band around the bundle; leaving the tool with the tape positioned on the pressing face ready for another operation.

CHARLES MENGE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,981,946	Collins	Nov. 27, 1934
2,239,932	Richards	Apr. 29, 1941
2,334,458	Van Tuyl	Nov. 16, 1943
2,486,832	Ferguson	Nov. 1, 1949
2,511,857	Fritzinger	June 20, 1950
2,527,588	Sorenson	Oct. 31, 1950

FOREIGN PATENTS

Number	Country	Date
806,796	France	Oct. 5, 1936