July 15, 1941. K. F. RUSSELL 2,249,047

DISPENSING DEVICE FOR COILED WIRE

Filed Aug. 3, 1940

Fig. 1

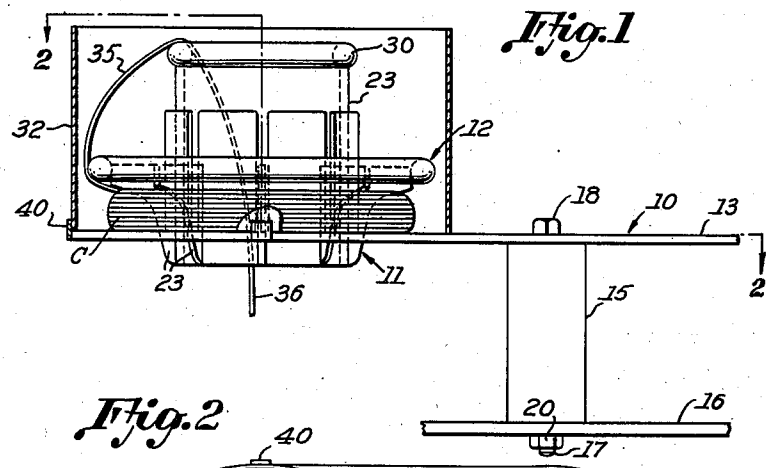



Fig. 2

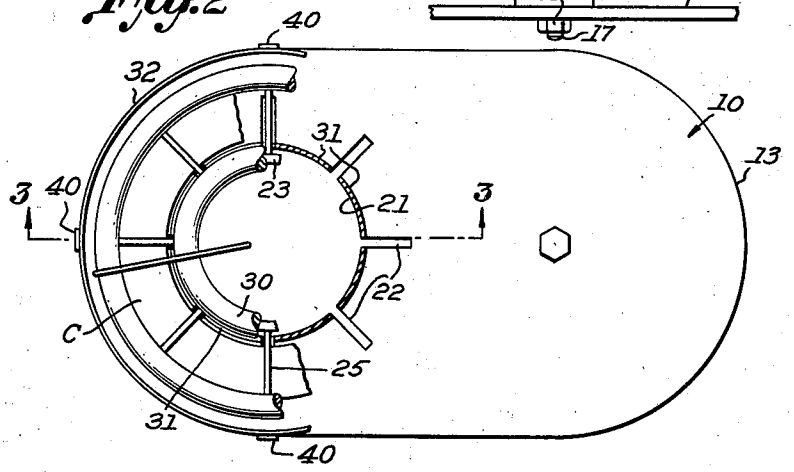



Fig. 4

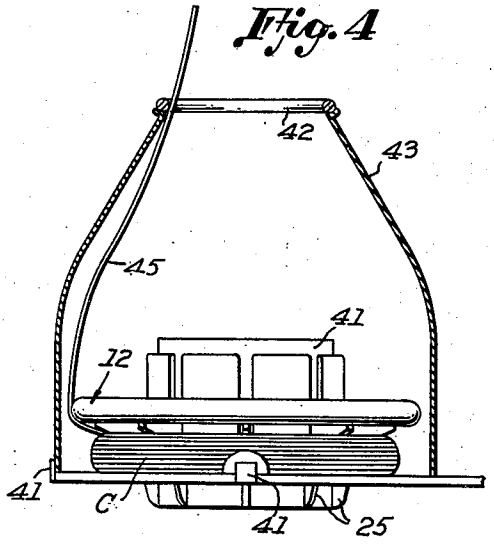
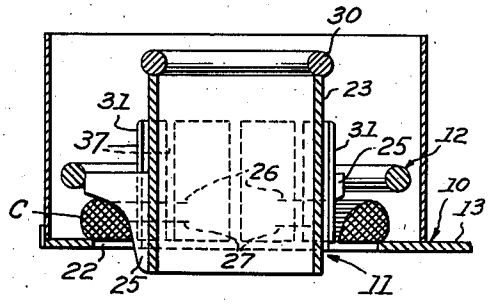



Fig. 3




INVENTOR
KENNETH F. RUSSELL
BY
HARRIS, KIECH, FOSTER & HARRIS
FOR THE FIRM
ATTORNEYS

Patented July 15, 1941

2,249,047

# UNITED STATES PATENT OFFICE

2,249,047

## DISPENSING DEVICE FOR COILED WIRE

Kenneth F. Russell, Claremont, Calif., assignor to Herman H. Garner and Bess A. Garner, both of Claremont, Calif., as joint tenants

Application August 3, 1940, Serial No. 350,461

9 Claims. (Cl. 242—129)

My invention relates to means for dispensing wire and refers especially to devices for unwinding stock coils of wire.

While my invention is applicable widely to devices for feeding wire from stock coils, it has special utility for serving wire-working machinery where either the problem of high speed feed or the problem of intermittent speed is encountered. For the purpose of this disclosure, I shall describe the invention as embodied in a device for feeding light wire to a fabricating machine that operates intermittently as well as at high speed. Such a disclosure will adequately guide those skilled in the art in applying the invention wherever it may be of service.

The usual device for feeding wire from a stock coil to a fabricating machine is a reel or other rotating means having substantial mass, and inevitably the inertia involved complicates the problem of synchronizing the feeding device with the operation of the machine it serves. Relatively slow feeding of the wire caused by failure of the dispensing device to accelerate with the consuming machinery tends to cause constriction of loops in the stock coil leading to subsequent snarling, tends also to strain if not break the wire extending from the feeding device to the machine, and often causes defective fabrication by the machine. On the other hand, overrunning of the feeding device on deceleration of the fabricating machine releases slack wire having a strong tendency to loop and snarl that may be dangerous to personnel as well as costly in production delay. In practice these difficulties often necessitate curtailing the speed of an efficient wire-working machine to comply with the limitations of the coacting wire-feeding device.

The general object of my invention is to provide a dispensing device that will feed wire from a stock coil at exceedingly high speed, that will start and stop feeding the wire as quickly as may be required in the operation of the consuming machine, and that will operate so dependably that one attendant can easily maintain a large number of the dispensing devices in simultaneous service without danger of costly delays in production.

It is another object of my invention to provide such a wire-dispensing device that is non-rotating and that holds a stock coil stationary throughout the dispensing operation so that the inertia involved is only that of the length of wire extending from the coil to the point of consumption. A further object in mind is to achieve a rugged and simple construction for such a wire-dispensing device.

These and other objects of my invention will be apparent in the following detailed description, taken with the accompanying drawing.

In the drawing, which is to be considered as illustrative only:

Fig. 1 is a side elevation partly in section of a preferred form of my invention;

Fig. 2 is a plan view of the device partly broken away;

Fig. 3 is a vertical section taken as indicated by the line 3—3 of Fig. 2; and

Fig. 4 is a side elevation partly in section of a modified form of my invention.

The form of the invention illustrated in Figs. 1–3 is designed to feed wire from above. The particular construction shown is used to feed wire in the wire-working apparatus set forth in my copending application Serial No. 350,462 filed of even date herewith, entitled "Machine for forming wire coils." In such service the device is required to feed relatively fine wire as fast as twelve hundred feet per minute and to start and stop instantly about every two minutes.

The principal parts of the invention include a support means generally designated 10 for a stock coil of wire C, a spreader-weight or centralizing unit generally designated 11, and a guide ring generally designated 12 for the unwinding wire.

The support means 10 which has the function of supporting the coil C in substantially horizontal disposition may comprise a suitably heavy metal plate 13 held at an elevated position by a pedestal 15 rising from a base 16, which base may be a frame member or other part of the fabricating machine served by the invention. In the arrangement shown in Fig. 1 the pedestal 15 is a metal cylinder through which extends a tie rod 17 threaded for engagement by a nut 18 overlying the plate 13 and a nut 20 underlying the base 16.

Among the functions of the spreader-weight or centralizing unit 11 are: to hold the wire coil C firmly down on the support plate 13; to centralize the individual turns or windings of the coil C; and to exert a spreading action on the individual turns as the turns are reached in the diminishing of the coil.

The function of the centralizing unit 11 in holding down the wire coil is desirable to keep the coil compact and to oppose any tendency in the dispensing operation for groups of the individual turns to fly upward from the coil. As for the centralizing function, it is to be noted

that in a stock coil of wire the individual turns are of substantially uniform diameter but lie at random positions within the range of the outer and inner diameters of the assembled coil. For high speed dispensing operation it is highly desirable, if not essential, that the individual turns be made concentric or approach a common axis as they are reached in the diminishing of the coil. The third function of providing a spreading action effective on the turns as they are reached is desirable because maximum diameter favors the unwinding operation and because the tensioning of the wire incidental to the unwinding operation tends to constrict individual turns in the coil. Since this constrictive effect on an individual turn increases in magnitude as the distance decreases between the turn and the instant winding that is being dispensed, it is desirable to have the spreader effect of the centralizing unit accentuated towards the upper layers of the coil.

A feature of my invention is that these various functions desired on the part of a centralizing unit may be provided by a weight means of flared profile dimensioned to extend through the coil from above, to press downward on the coil by its weight, and to overhang and confine the coil. A problem that arises in the design of such a flared weight for cooperation with the support plate **13** arises from the fact that the flared weight must be free to move vertically through the plane of the support plate, and, on the other hand, the support plate must be effective under the supported coil of wire in the downward path of the flared weight. A further feature of my invention is the conception of solving this problem by fabricating the flared weight as a radial assembly of vertical wings and providing complementary radially disposed slots in the support plate to freely permit vertical movement of the wing assembly.

While such a flared weight or wing assembly may take various forms in practice, I prefer to mount the radial wings on a central vertical cylinder and to provide clearance through the support plate not only for the wings, but also for the central cylinder. As best shown in Fig. 2, the support plate **13** may have a circular opening **21** from which radiates a plurality of slots **22**, and the centralizing unit **11** includes a vertical cylinder **23** dimensioned to move freely through the circular opening, the cylinder carrying radially disposed wing members **25** dimensioned to pass freely through the slots **22**.

It will be noted that in profile the wings **25** flare outward to greater effective diameter towards the upper levels of the centralizing unit so that maximum spreading effect is exerted in the upper levels of a coil as pressure is exerted on the coil by the weight of the unit. The flare of the profile may be said to have three zones or levels without definite boundaries: a lower zone in which the primary function of the flaring configuration is to centralize the individual windings of the coil; an intermediate zone in which the flared configuration primarily serves the purpose of tending to increase the diameters of the individual windings as the windings approach their moments of departure from the coil; and an upper zone in which the configuration serves the purpose of holding the coil compactly against the support plate **13** and of preventing individual windings from springing axially upward from the coil.

This aspect of the invention may be better understood by referring to two dotted lines **26** and **27** in Fig. 3 that approximately bound the intermediate zone.

The function of the guide ring **12** is to cause the wire to be pulled outward and upward from the coil C and to provide a smooth annular surface for sliding contact by the wire. Such a guide ring **12** may, as shown in the drawing, be a simple annular member that is circular in cross section and smooth on its peripheral surfaces. I find it convenient to mount the guide ring **12** on the centralizing unit **11**, and in the practice exemplified by the drawing the guide ring **12** is unitary with the outer ends of the blade members **25** and serves to interconnect and brace the blade members.

While the combination of the support means **10**, the centralizing unit **11**, and the guide ring **12** described to this point may be constructed to serve my purpose of dispensing wire in a satisfactory manner so long as the wire is drawn upward over the peripheral surface of the guide ring, I add certain refinements in practice. For example, in the preferred form of my invention I employ a pulling guide **30**, a plurality of inner guards **31**, and an outer guard **32**, any or all of which may be omitted.

The function of the pulling guide **30** is to cause the wire as it leaves the peripheral surface of the guide ring **12** to be drawn not only upward but also inward towards the extended axis of the coil C. In unwinding from the coil the departing wire is continuously displaced in one rotary direction around the periphery of the guide ring **12**. If the wire as it leaves the guide ring **12** is pulled inward as well as upward, the departing wire forms a bow **35** (Fig. 1) that travels in a continuous circular path about the guide ring **12**, the bowing of the wire being the result of centrifugal force. The pulling guide **30** in Figs. 1–3 is a smooth-surfaced ring member unitary with the upper end of the cylinder **23**. It will be noted that the wire strand **36** being dispensed from the coil C passes downward through the cylinder **23** so that the pulling guide **30** not only serves to cause the wire to be directed inward and upward as it leaves the guide ring, but also serves as means for turning the wire downward towards the point of consumption below the device.

The plurality of inner guards **31** may be desirable because the circular opening **21** in the support plate **13** is dimensioned for liberal clearance around the cylinder **23** and individual turns of the wire coil may drop into the clearance space around the cylinder and thereby interfere with the function of the centralizing unit **11**. In the arrangement illustrated by the drawing, the inner guards **31** are metal tongues extending upward from the base plate **13** around the rim of the hole **21** between the various radial slots **22**. The plurality of tongues may take the form of segments of a circular wall, the segments being separated by vertical slots **37** continuous with the radial slots **22** in the support plate **13**.

The outer guard **32** which serves the purpose of limiting the effect of centrifugal action on the bowed portion **35** of the departing wire may consist of an arcuate sheet or metal screen spaced from the periphery of the guide ring **12** and anchored to the support plate **13** by suitable connecting members **40**.

The operation of my invention may be readily understood from the foregoing discussion. The centralizing unit **11** sinks downward as the coil C diminishes in cross-sectional dimension and

serves continuously to affect the coil and the individual windings of the coil in the various respects heretofore mentioned. The dispensing operation proceeds smoothly and uniformly. An attendant supervising a number of the dispensing devices can tell at a glance how soon a stock coil in process must be replaced. To expedite replacement spare coils may be held in reserve on the support plate 13 alongside the outer guard 32.

The modified form of my invention shown in Fig. 4 is designed for installations where the wire is to be fed upward to a wire-working machine above the dispensing device. In this form of the invention most parts of the combination are unchanged as indicated by the use of like numbers to indicate like parts. Instead of the relatively long cylinder 23 of Fig. 1, I use a relatively short cylinder 41 in Fig. 4 because in this form of the invention the cylinder does not support the pulling guide 30. The pulling guide designated 42 in Fig. 4 is mounted on the upper restricted rim of a circular outer guard 43. It will be noted that the internal diameter of the pulling guide 42 is substantially smaller than the diameter of the guide ring 12 so that the departing wire 45 passing upward through the pulling guide is drawn inward towards the extended axis of the coil C.

The preferred form of my invention described in specific detail herein will suggest to those skilled in the art various changes, modifications, and substitutions that do not depart from the spirit of the invention; I reserve the right to all such variations that properly come within the scope of my appended claims.

I claim as my invention:

1. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition; a non-rotating means of flared configuration adapted to rest in and on said coil to tend to spread said coil radially, said means being free to descend as the coil diminishes; and a guide ring above said coil larger in diameter than the individual turns of the coil, said guide ring having a smooth circumferential surface whereby wire may be drawn upward over said smooth circumferential surface and in sliding over said surface in a continuous rotary direction around the guide ring.

2. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition; a non-rotating means of flared configuration adapted to rest in and on said coil to tend to spread said coil radially, said means being free to descend as the coil diminishes; a guide ring above said coil larger in diameter than the individual turns of the coil, said guide ring having a smooth circumferential surface; and means to direct the wire upward and inward relative to said guide ring whereby the wire is drawn from the coil across said circumferential surface and in departing from the surface travels in a continuous rotary direction around the guide ring.

3. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition; a non-rotating means of flared configuration adapted to rest in and on said coil to tend to spread said coil radially, said flared means being free to descend as the coil diminishes; a guide ring above said coil larger in diameter than the individual turns of the coil, said guide ring having a smooth circumferential surface; means to direct the wire upward and inward relative to said guide ring whereby the wire is drawn from the coil across said circumferential surface and in departing from the surface travels in a continuous rotary direction around the guide ring; and a guard surrounding said guide ring in spaced relation to confine said departing portion of the wire.

4. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition; a non-rotating means of flared configuration adapted to rest in and on said coil to tend to spread said coil radially; a guide ring mounted on said flared means above said coil, said guide ring having a smooth circumferential surface and being of substantially larger diameter than the individual turns of said coil; and means to direct the wire across the circumferential surface of said guide ring and both upward from the guide ring and inward towards the axis of the guide ring.

5. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition, said support means having a plurality of slots radially disposed with reference to a center under the coil; a unitary assembly of radial wings corresponding to and extending through said slots, said assembly flaring in profile from a lower diameter less than the inner diameter of the coil to an upper diameter substantially greater than the inner diameter of the coil, said assembly being adapted to rest upon the coil and to descend to follow the diminishing configuration of the coil; and a guide ring positioned above the coil and substantially concentric therewith, said guide ring having a smooth circumferential surface larger in diameter than the individual turns of the coil whereby the wire may be drawn upward to travel in a continuous direction around and across said circumferential surface as the wire unwinds from the coil.

6. A dispensing means as set forth in claim 5 in which a plurality of inner guards for the coil extend upward from said support means within the coil and between said slots.

7. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition, said support means having an opening and a plurality of slots extending outwardly from said opening; means movable vertically through said opening; a plurality of members mounted on said movable means in positions to register with said slots, said plurality of members having a flared configuration in profile and being adapted to rest in and on said coil; and a guide ring larger than the individual turns of the coil connected with said movable body above said plurality of members, said guide ring having a smooth circumferential surface whereby the wire may be drawn upward to travel in a continuous direction around said circumferential surface as it unwinds from the coil.

8. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition, said support means having a circular opening and a plurality of radial slots extending outward from and communicating with said opening; a cylindrical body dimensioned to move vertically through said opening; a plurality of radially disposed vertical wing members unitary with said body dimensioned and disposed to move freely vertically

through said slots; and a guide ring connected with said body to overhang said coil, said guide ring being larger in diameter than the turns of the coil and having a smooth circumferential surface whereby the wire may be drawn upward to travel in a continuous direction around the circumferential surface as its unwinds from the coil.

9. A dispensing device for a coil of wire comprising: means for supporting the coil of wire in substantially horizontal disposition, said support means having a circular opening and a plurality of radial slots extending outward from and communicating with said opening; a cylindrical body dimensioned to move vertically through said opening; a plurality of radially disposed vertical wing members unitary with said body dimensioned and disposed to move freely vertically through said slots; a guide ring connected with said body to overhang said coil, said guide ring having a larger diameter than the turns of the coil and having a smooth circumferential surface; and a second ring of smaller diameter spaced above said guide ring to confine the wire after it leaves the coil whereby the wire in departing from the coil is drawn first over the periphery of said guide ring and then across the surface of said upper ring and travels simultaneously in a circular path between the two rings.

KENNETH F. RUSSELL.