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WINDING REEL

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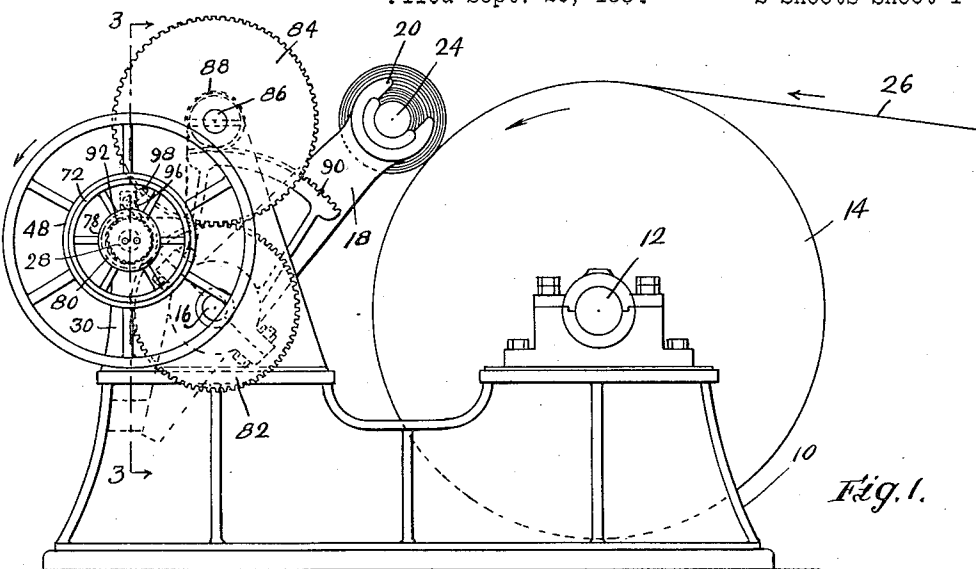


Fig. 1.

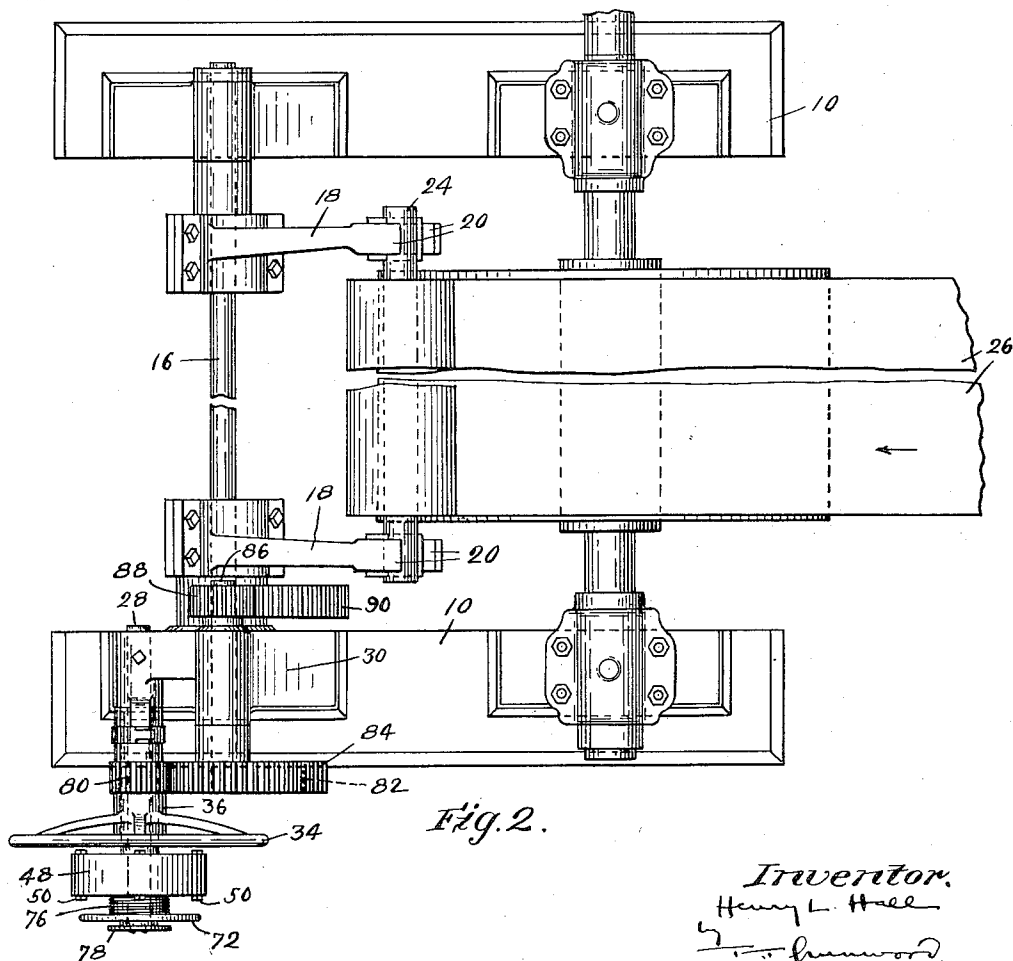


Fig. 2.

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UNITED STATES PATENT OFFICE

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WINDING REEL

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7 Claims. (Cl. 242—65)

This invention relates to winding reels for winding the web of paper produced by a paper making machine and is intended as an improvement on the winding reel illustrated in the Charles E. Pope Patent No. 1,248,542, dated December 4, 1917.

In the reel of the Pope patent the web of paper that is delivered from the driers, calenders or other part of the paper making machine is wound upon a winding roll that is journaled loosely and removably in the upper ends of a pair of arms that are capable of swinging toward and away from the winding drum over which the web passes and with which drum the peripheral portion of the paper on the winding roll is in contact, the roll being held in engagement with the drum during the winding process by its weight and by the weight of the inclined arms, and the arms being capable of swinging around a pivot to maintain the roll in the aforesaid relation during the growth of paper on the roll.

While the Pope winding reel is in general highly satisfactory in operation, for some purposes, and for some kinds of paper, it is desirable to have the machine operate to wind the paper more tightly on the winding roll than it will do ordinarily when constructed as described in the aforesaid Pope patent. The winding roll, by having its periphery in contact with the reel drum is always driven about at the speed of the paper and hence the paper is laid onto the winding roll without any great amount of tension. For some purposes it is desirable to wind the paper quite tightly or under substantial tension on the winding roll and hence an object of the present invention is the provision of a winding reel having mechanism to accomplish this process.

A further object is the provision of a winding reel wherein the winding roll is caused to be pressed against the periphery of the reel drum by the growth of paper on the winding roll.

A yet further object is the provision of a winding reel wherein the movement of the axis of the winding roll away from the reel drum is under restraint so that the winding roll is caused to press forcibly upon the winding drum to insure a tight winding.

An additional object is the provision of means wherein the degree of restraint of movement of the winding roll is controllable at will.

A yet further object is generally to improve the construction and operation of winding reels for paper webs.

Fig. 1 is a front elevation of a winding reel embodying the present invention.

Fig. 2 is a plan view of the reel of Fig. 1.

Fig. 3 is a section taken along line 3—3 of Fig. 1 and illustrating more particularly the construction of the clutch mechanism.

Fig. 4 is a section taken along line 4—4 of Fig. 3.

Fig. 5 is a section taken along line 5—5 of Fig. 3.

The winding reel embodying the present invention comprises a bed 10, in which a shaft 12 is journaled that carries the winding drum 14, the shaft being driven in any suitable manner so that the periphery of the drum has about the linear speed of the paper delivered to it. In front of the reel drum the bed 10 provides support for a shaft 16 to which a pair of roll supporting arms 18 are clamped or otherwise secured. The arms are extended upwardly in front of the drum and have bifurcated upper ends 20 which support open bearing boxes in which a winding roll 24 is removably journaled, one roll being removed from the boxes when full and replaced by an empty roll.

In the Pope patent means are provided to automatically position a winding roll in the boxes but such means has no bearing on the present invention and hence is not herein illustrated.

The paper web 26 that comes from the paper making machine passes over the top of the reel drum 14 and is in engagement with the periphery thereof and thence passes about the winding roll. The winding paper on the roll is held in engagement with the periphery of the drum 14 by the weights of the inclined arms 18 and the roll. As the diameter of the roll grows due to the accumulated mass of paper thereon the arms 18 move away from the drum 14 toward a vertical position.

It is evident therefore that the weight of the arms 18, and winding roll 24, and accumulated paper tend to keep the roll 24 and paper wound on it in rotating engagement with the winding drum 14. The relative speed of the periphery of the winding drum and the delivery of paper from the calenders determines the tightness of the roll except that if the drum speed is too high the winding roll must slip or the paper will break and if the drum is slower than the paper the roll cannot take up the paper. This relative speed is determined by suitable means. It has been found, however, that if a tight roll is desired the roll 24 may, particularly at the start, slip on the drum and cause the formation of a roll as tight as desired. The resistance to slippage provided by the arms 18 and winding roll 24 and accumulated paper is variable within small limits due to the change in weight of the accumulated

paper on the roll, the change in angular position of the arms 18 and the change in length of the chord of the paper roll in contact with the drum 14 due to the compression of the roll on the drum. This gives an undesirable variation of tension at least with certain papers.

In accordance with the present invention the winding reel is so constructed and arranged that the paper web may be wound more tightly upon the winding roll than has been the case heretofore, if desired and with more uniform tension. To this end restraining or braking mechanism is provided that opposes the movement of the roll supporting arms away from the reel drum so as to cause the paper on the roll due to the growth of paper thereon to bear forcibly against the drum and hence to become more tightly wound upon the roll, said mechanism providing a frictional and slipping engagement between the roll supporting arms and a fixed part of the reel.

The restraining or braking mechanism, more clearly illustrated in Fig. 3, includes a shaft 28 which is fixed against rotation in a pedestal 30 secured to the bed 10, which pedestal forms one of the bearing supports for the arm supporting shaft 16. Said shaft 28 extends laterally of the pedestal and has a sleeve 32 journaled thereon. A hand wheel 34 is concentric with said shaft and sleeve and has an axially elongated hub 36 that has a driving connection with said sleeve by means of a key 38. A clutch plate 40 is fixed to the outer end of said hub 36 by suitable means as screws 42 and also is keyed to said sleeve by the aforesaid key 38 so that said clutch plate, hand wheel and sleeve are connected for conjoint rotation. A clutch casing comprising inner and outer casing end plates 44 and 46, respectively and an enclosing drum 48, enclose said clutch plate.

The casing end plates 44 and 46 are capable of adjustment toward and away from each other to compensate for clutch plate wear and are connected together through bolts 50 which pass through said end plates beyond the periphery of said clutch plate 40. The casing drum 48 encloses and is fixed to the periphery of the inner end plate 44 by suitable means as screws 52 but is free from positive connection with the outer plate 46 so that said end plates are free for movement toward and away from each other. The inner end plate 44 is loosely supported upon the hub 36 of the hand wheel. The outer end plate 46, and hence the clutch casing, is constrained against rotation as will presently appear. The stationary shaft 28 projects outwardly beyond the clutch casing and its outer end has a hub 54 fixed thereto by suitable means as the key 56. A clutch plate 58 loosely surrounds and is supported by the inner portion of the hub 54 and is keyed thereto by keys 60, the arrangement being such that the clutch plate 58 is free for movement axially of the shaft 28 but is restrained against rotation. Pins 62 are fixed in said clutch plate 58 near its outer periphery and extend outwardly therefrom and loosely through holes 64 in the outer end plate 46 of the clutch casing, thereby connecting the clutch casing to the clutch plate so that the casing is held against rotation while permitting axial movement of the casing. Loose clutch plates 68 and 70 are interposed respectively between the inner casing plate 44 and the driving clutch plate 40 and between the driving clutch plate and the stationary clutch plate 58.

The clutch is operated by a hand wheel 72 having a hub 74 that is rotatably supported on

the stationary hub 54. The hub 74 projects into the clutch casing in position to bear against the clutch plate 58 and move it axially toward the driving clutch plate and has external screw threads 76 which are screw-threaded into the outer casing plate 46 to obtain such axial movement. The hub 74 is held in position by a restraining plate 78 which is fixed to the end of the stationary shaft 28 and overlies the outer end of the hub 74. To set the clutch the hand wheel 72 is rotated in a clockwise direction, Fig. 1, to force the clutch plate 58 against the loose clutch plate 70 and the latter against the driving plate 40 and at the same time to move the clutch casing outwardly to draw the inner end plate 44 of the casing against the loose clutch plate 68 and the latter against the inner face of the driving plate 40. The plate 40 is thus clutched on opposite sides between clutch plates which are fixed against rotation so that the rotation of the clutch plate 40 is restricted. The degree of resistance can be adjusted by varying the amount of clamping pressure on the clutch plates by the setting of the hand wheel 72.

The hub 36 and the clutch plate 40 are connected to and are movable with the winding roll supporting arms 18 through suitable gearing which includes a pinion gear 80 which is keyed to the sleeve 32 and hence is rotatable with the hand wheel 34 and clutch plate 40. The pinion gear 80 meshes with a larger gear 82 which is loosely journaled on the arm supporting shaft 16. The gear 82 meshes with a larger gear 84 which is fixed to a stub shaft 86 journaled in the upper part of the pedestal 30. A pinion gear 88 is fixed to said shaft and meshes with a gear sector 90 that is fixed to the arm supporting shaft 16. Hence rotation of the pinion gear 80 causes the rotation of the shaft 16 and conversely rotation of the shaft 16 causes the rotation of the driving clutch plate 40.

When the clutching mechanism is unset the shaft 16 can turn freely and hence the roll supporting arms 18 can move freely away from the reel drum 14 as the diameter of the winding roll grows. When, however, the clutch mechanism is set frictional resistance is offered to the movement of the arms 18 away from the reel drum and hence the paper on the winding roll due to its growth is caused to press forcibly against the periphery of the reel drum. The winding roll is thus held firmly against any tendency to chatter or vibrate which may result in a loosely wound web. The amount of restraint to the movement of the winding roll away from the drum, and the pressure between the roll and the drum, can be adjusted by the setting of the clutch mechanism.

The roll supporting arms can be moved toward and away from the reel drum by rotation of the hand wheel 34 in the proper direction when the clutch mechanism is disengaged. A ratchet wheel 92 is fixed to the sleeve 32 and hence to the gear 80 and hand wheel 34 and cooperates with a pawl 96 pivoted to the pedestal 30 to hold the roll supporting arms 18 in a substantially vertical position against movement towards the reel drum when desired. The pawl is provided with a handle 98 so that the pawl can be disengaged manually from the teeth of the ratchet wheel 92 and moved into an inoperative position to permit movement of the roll supporting arms 18 toward the reel drum.

I claim:

1. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum

and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, a fixed shaft, a hand wheel rotatable on said fixed shaft having a reducing gearing connection with said arm carrying shaft, and brake mechanism connected between said wheel and fixed shaft arranged to impose a yielding restraint to the aforesaid movement of said arms.

2. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, a hand wheel for rotating said shaft, gearing connecting said wheel and shaft, clutch mechanism co-axial with said hand wheel for imposing a yielding restraint to the aforesaid movement of said arms, and means including a hand wheel co-axial with said first hand wheel for operating said clutch.

3. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, a hand wheel for rotating said shaft to swing said arms in opposite directions, clutch mechanism for imposing a yielding restraint to the aforesaid movement of said arms, said means including a clutch casing, means for holding said casing against rotation, clutch elements within said casing some of which are connected with said hand wheel, and a clutch operating member carried by said casing and movable axially thereof to cause the engagement and disengagement of said clutch elements.

4. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, a stationary shaft, a hand wheel journaled thereon, gearing connecting said hand wheel with said arm shaft for rotating said shaft manually in opposite directions, and clutch mechanism for imposing a yielding restraint to the movement of said arms, said clutch mechanism comprising a casing supported by said stationary shaft against rotation, cooperating friction elements within

said casing connected to said fixed shaft and hand wheel respectively, and a second hand wheel on said stationary shaft for operating said clutch mechanism.

5. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, and clutch mechanism for imposing a yielding restraint to the aforesaid movement of said arms comprising a stationary shaft, a hand wheel rotatable thereon, gearing connecting said hand wheel with said arm shaft for rotating said shaft manually in opposite directions, said clutch mechanism having cooperating friction elements connected with said stationary shaft and hand wheel respectively, and means for operating said clutch mechanism comprising a second hand wheel rotatable on said stationary shaft having means for effecting engagement and disengagement of said friction elements.

6. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, and clutch mechanism for imposing a yielding restraint to the aforesaid movement of said arms comprising a stationary shaft, a hand wheel thereon, gearing connecting said hand wheel with said arm shaft for rotating said shaft manually in opposite directions, said clutch mechanism having cooperating friction elements fixed to said stationary shaft and hand wheel respectively against rotation independently thereof, and means co-axial with said stationary shaft for operating said clutch mechanism, a ratchet wheel rotatable with said hand wheel, a fixed support and a pawl pivoted on said support engageable with said ratchet wheel and holding it releasably against rotation in one direction.

7. In a winding reel for a paper web comprising a reel drum, a shaft parallel with the drum and disposed below the axis thereof, a pair of arms fixed to said shaft and extended upwardly in front of said drum, said arms having boxes at their upper ends adapted removably to support a winding roll against the periphery of said drum and to be moved away from said drum with the winding roll by the growth of the web on the roll, clutch mechanism for imposing a yielding restraint to the aforesaid movement of said arms, means including a hand wheel for operating said clutch, and means including a second hand wheel co-axial with said first wheel for swinging said arms manually in opposite directions.

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