March 8, 1938. F. W. YEAGER 2,110,565

PROCESS AND APPARATUS FOR APPLYING SHIELDS TO PIPES

Filed Dec. 18, 1933

Fig. 1.

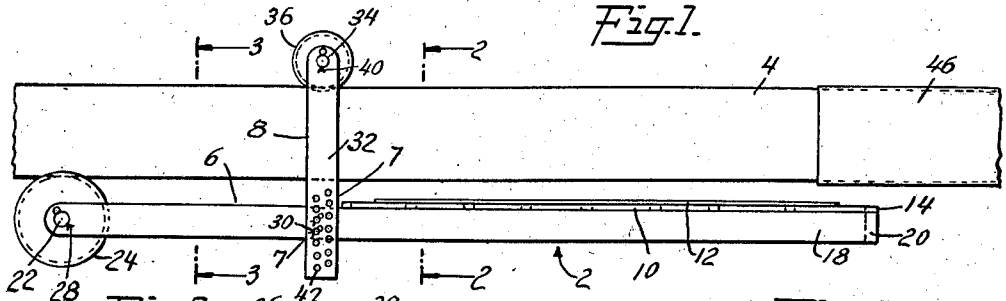


Fig. 2.

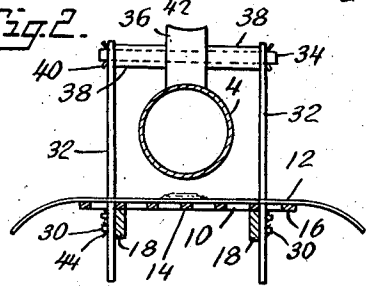


Fig. 3.

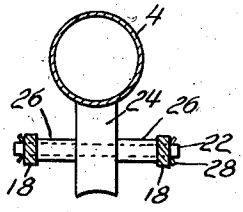


Fig. 7.

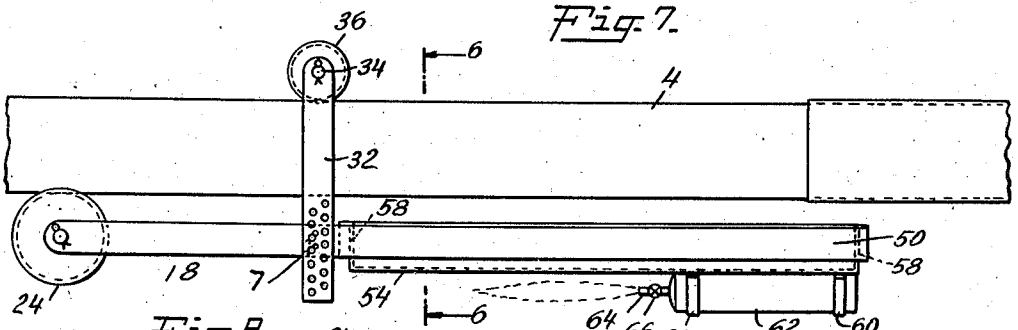


Fig. 8.

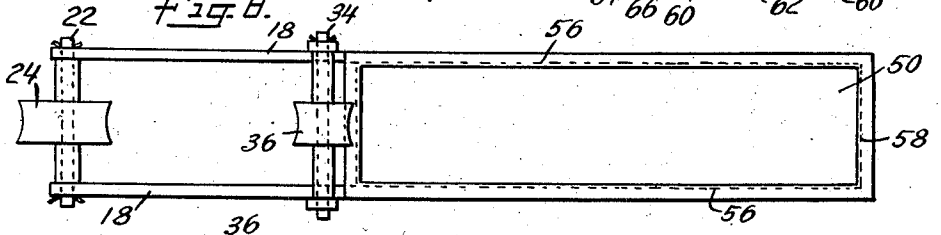


Fig. 9.

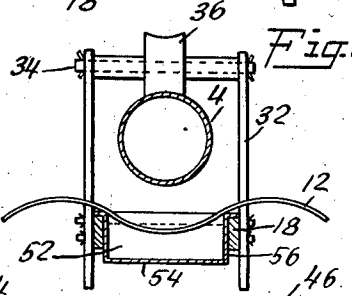


Fig. 4.

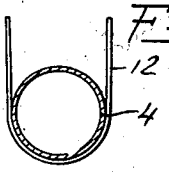


Fig. 5.

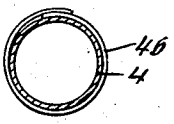
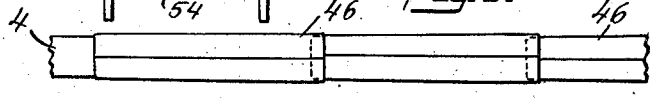


Fig. 6.



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PROCESS AND APPARATUS FOR APPLYING SHIELDS TO PIPES

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Application December 18, 1933, Serial No. 702,955

16 Claims. (Cl. 154—1)

This invention relates to the application of protective coverings to pipes or other tubular articles hereinafter referred to as pipes, and especially relates to an apparatus for aiding in the field application of shields, such as bitumen- or resin-saturated felt or paper or other types of saturated or unsaturated flexible shields, around a pipe.

One object of this invention is to provide an improved process for cementing lengths of felts or flexible shields to pipe lines and an apparatus therefor.

Another object of the invention is to provide an apparatus adapted to be moved longitudinally along a pipe and which provides a support underneath the pipe on which a pipe shield may be placed during the application of cementing material thereto and thereafter folded about the pipe.

Another object of the invention is to provide an apparatus adapted to be moved longitudinally along a pipe and providing a trough underneath the pipe for holding fluid cementing material in which sheets of pipe wrapping material may be dipped and thus coated with the cementing material.

Other objects and advantages will appear from the following detailed description of this invention.

Owing to the corrosive action of various substances present in the atmosphere or in the soil, pipe lines, especially those of iron or steel, are subject to rapid deterioration. The life of unprotected pipes varies, depending upon the particular conditions to which they are subjected. Numerous factors may take part in the corrosive or erosive action and the rate of deterioration may be the resultant of a number of these factors acting together. Thus, with underground pipe lines the effect of alkaline or acid substances in the water which reaches the pipe by seepage, and the effect of electrolysis and ground currents or other agencies may be such that a pipe will have a relatively short useful life. If the pipes are coated with protective coatings such as bituminous enamel or the like, the effect of soil stresses and erosive movements frequently is such as to remove or damage the enamel at one or more points and expose the pipe to the destructive actions mentioned. If the pipe is exposed to the atmosphere, the composition of the gases, water, etc., contacting with it may be such that the pipe rapidly deteriorates and must be replaced long before replacement would ordinarily be necessary.

Pipes (whether of iron, steel, other metal, concrete, wood, or other material) which are to be used under such unfavorable conditions are frequently provided with a protective film of bituminous enamel, paint, or varnish, but such films are more or less readily removed by the abrasive or other action of materials with which the pipe comes in contact. Even a small abrasion in the protective film will permit the ingress of injurious substances to the metal or other walls of the pipe with consequent deterioration thereof. In order to prevent such localized corrosion, it is essential that the continuity of the protective film or coating be preserved. With buried pipes this is especially difficult since, although the pipes may be laid with the greatest possible care, subsequent soil stresses and movements may deform and abrade the protective coating with resultant exposure of portions of the metal pipe. By soil stresses, I means those agencies of motion in a soil which exert mechanical forces, almost entirely of a disadvantageous nature, against anything placed or buried in the soil. In such a category would be classed—

1. Destructive effects of back fill striking against material being buried;
2. Settling of soil;
3. Expansion and shrinkage effect produced in soil by
   - *a*. Wetting and drying
   - *b*. Freezing and thawing;
4. Earth vibrations and slides;
5. Motion of heavy substances, as rock, etc., thrown on soil;
6. The suction of quicksands, colloidal clays, mud, e. g., "gumbo mud".

In order to prevent the rapid deterioration of pipe lines, such lines have been coated with bituminous enamel or other protective coating and the coated pipe wrapped by winding a strip of saturated porous material, such as tar- or asphalt-saturated rag or asbestos felt spirally around the pipe. Such spiral wrappings, while providing a considerable degree of protection, have not proven to be entirely satisfactory for protecting the coating because of insufficient resistance to the shifting of the soil, and other destructive agencies.

It has been proposed to protect pipe lines by folding individual pipe shields about the pipe. The individual shield may be about 6 feet long and preferably should have a width somewhat greater than the circumference of the pipe being shielded so that the marginal portions of the

sheet are lapped, for example, about 2 to 4 inches. Such shielding material may comprise a sheet of fibrous material, such as paper, felt, woven or knitted cloth, wood veneer or the like, impregrated with a bituminous material such as coal tar pitch or asphalt, or a resin such, for example, as a condensation product of formaldehyde and a phenol, such as phenol, cresols, xylenols, or mixtures thereof. Any resin imparting to the base sheet imperviousness, hardness, and resistance to tearing or puncture while yielding a sheet suitable for folding around a pipe may be employed as the impregnating agent.

If desired, the shields may be built up of a number of laminations of impregnated materials, either similar or dissimilar materials being used for different laminations, but the thickness of the shield should not be increased to such an extent that its flexibility will be materially impaired. The shields may also be provided with a reinforcing element which serves to give additional strength and other desirable qualities to the shield.

This invention is particularly directed to processes and apparatus for applying such shields to pipes. My apparatus comprises a support adapted to be placed around and moved longitudinally along the pipe which is maintained a short distance above the ground by any suitable means. This apparatus carries a flat frame extending underneath the pipe suitable for supporting a length of shield material prior to its being wrapped around the pipe. It is especially advantageous for supporting the wrapping material during the application of cementing material thereto. The coated shield is raised from the frame and slipped into contact with and firmly cemented to the pipe. The overlapping portions of the shield may then be cemented to the pipe by enamel applied by mops in the customary fashion. If the shields are not cemented to the pipe, they may be secured in wrapped position by other well known means, such as straps, bands, wire staples, or the like.

In one modification of the apparatus, instead of having a flat frame on which the lengths of shield may be placed and coated with enamel, the apparatus is equipped with a trough adapted to contain a supply of heated fluid enamel. A burner or other suitable source of heat may be mounted adjacent the trough to keep the enamel molten. The shield is held by the corners and slipped into the enamel in the trough and nearly entirely coated by a suitable movement of the sheet in the trough. It is then raised from the trough and placed in contact with the pipe, whereupon the enamel quickly hardens and cements the sheet in position. The marginal portions which form the lap are cemented by the application of enamel with mops.

In both types of apparatus the support is maintained in operating position on the pipe by wheels connected to only one end of the support. These wheels engage only the unshielded portion of the pipe thereby avoiding possible damage to the freshly applied shields.

For a better understanding of the invention, reference should be made to the accompanying drawing, wherein is shown by way of illustration a preferred embodiment of the invention.

In the drawing:

Fig. 1 is a side elevation of the apparatus embodying the invention, showing it placed in operating position on a section of pipe;

Fig. 2 is a sectional elevation taken along the line 2—2 of Fig. 1, showing the construction of the frame and the upper carrying wheel contacting with the top of the pipe;

Fig. 3 is a sectional elevation taken along the line 3—3 of Fig. 1 showing the lower carrying wheel contacting with the bottom of the pipe;

Fig. 4 is an end view of a section of pipe with a sheet of coated wrapping material being applied thereto;

Fig. 5 is an end view of a section of shielded pipe;

Fig. 6 is a small scale plan view of a section of shielded pipe;

Fig. 7 is a side elevation of a modified apparatus placed in operating position on a section of pipe;

Fig. 8 shows a plan view of the apparatus of Fig. 7; and

Fig. 9 is a sectional elevation taken along the line 6—6 of Fig. 7 showing a sheet of protective material dipping in the enamel in the trough.

Referring to the drawing, with particular reference to Figs. 1 to 3, numeral 2 indicates in general the apparatus of this invention placed in operating position on a section of pipe 4. This apparatus comprises a base or support 6 from which extends upwardly as at 7, an inverted U-shaped upper portion 8 which may be removable therefrom and adjustably connected thereto as hereinafter more fully described.

At the rear end of the base 6, there is a flat frame 10 adapted to support a shield or sheet 12 of pipe wrapping material in a substantially horizontal position. The frame may be formed of a series of spaced parallel bars or rods 14, which may be of steel and welded or otherwise secured to cross bars 16. As shown in Figs. 1 and 2, the frame is preferably of sufficient size to support the shield 12 throughout its length and for the middle third of its width. This means that for usual practice the frame should be somewhat more than six feet in length and should have a width slightly greater than the diameter of the largest pipe on which the device is to be employed. Frame 10 is rigidly supported on the rear-ends of spaced parallel side pieces 18 of the base 6 extending longitudinally of the pipe 4 and on brace 20 connecting the rear ends of the side pieces 18 and holding them in fixed spaced relation. Side pieces 18 are spaced apart a distance somewhat greater than the diameter of the largest pipe which is to be wrapped.

A shaft 22 passes through a hole near the forward end of each side piece 18 and supports a rotatable carrying wheel 24, the top of which bears against the bottom of pipe 4. The periphery of the carrying wheel may be made somewhat concave in shape to conform with the curvature of the pipe and permit it to be more readily held against the pipe and moved longitudinally thereabout. Cylindrical collars 26 fit over the shaft 22 on either side of the carrying wheel and keep the wheel in the desired position on the shaft. Side pieces 18 may be prevented from slipping off the shaft by cotter pins 28 passing through holes near the ends of the shaft.

Two projections or pins 30 extend outward from the outer side of each side piece 18 at a point a short distance from the forward edge of frame 10. These pins are used to connect the base 6 of the device with the U-shaped upper portion 8 in a manner more fully pointed out below.

The U-shaped upper portion of the device comprises two vertical arms 32 having holes near their upper ends through which shaft 34 passes.

This shaft rotatably supports an upper carrying wheel 36 adapted to contact with and move along the top of the pipe. As shown in Fig. 2 the periphery of wheel 36 is preferably made somewhat concave to conform with the curvature of the pipe. Collars 38 on shaft 34 keep the wheel properly spaced on the shaft. Suitable means such as cotter pins 40 are provided for holding the shaft in place and preventing it from slipping through the holes in the vertical arms.

The lower end of each vertical arm 32 is provided with a vertical series of holes 42 through any adjacent pair of which the projections 30 on side pieces 18 may be slipped. Cotter pins 44 passing through the ends of the projections hold the vertical arms securely in place against the side arms and prevent them from slipping off the ends of the projections 30. If desired the projections may be threaded and nuts provided for holding the vertical arms in place against the side pieces.

Projections 30 on the side pieces and holes 42 in the vertical arms permit the apparatus to be readily adjusted and frame 10 maintained in a horizontal position suitably spaced from the pipe when used on different sizes of pipe.

The movable support is used to assist in the shield applying operation as follows: The device is first placed in operating position on the pipe which is held a sufficient distance above the ground or trench in any desired manner so that the base of the apparatus may readily travel thereunder. This may be done either by slipping the apparatus over the end of the pipe or in the case of fixed lines, i. e., lines already in place in the field, by removing cotter pins 44 and spreading the lower ends of the vertical arms slightly so that the U-shaped upper portion 8 slips off pins 30 and separates from the base 6. The upper portion is then placed over the pipe as a yoke and the base reconnected thereto, placing the device in operating position on the pipe.

One or more shields 12 of suitable length are then placed in a substantially horizontal position on frame 10 with the central portion of the sheet extending longitudinally under the pipe. These shields should be of sufficient width to encircle the pipe and provide a small amount of overlap. While in this position hot fluid enamel, such as molten coal tar pitch, asphalt, or other cementing material is poured or mopped onto the central longiutdinal portion of the upper surface of the top shield. Workmen standing on opposite sides of the support then grasp the coated shield by the corners and raise it vertically into contact with the pipe extending thereabove. This operation can be done conveniently by one man on each side of the machine. Contact of the hot enamel with the relatively cold pipe quickly cools and hardens the enamel thereby causing the coated central portion of the shield to become firmly cemented to the lower half of the pipe, as shown in Fig. 4.

Hot enamel is then applied to the remaining inner surface of the shield or to the uncovered top portion of the pipe. The side or marginal edges of the shield are then bent around the top of the pipe and cemented thereto forming a finished shield 46. As shown in Fig. 5, the side edges of the shield overlap longitudinally along the top of the pipe to form a strong, durable joint.

The travelling support is then pushed longitudinally along the pipe until, as shown in Fig. 1, the frame is again directly under the unshielded portion of the pipe adjacent the last shielded portion. Enamel is then applied to another shield, and the shield wrapped around the pipe as described above. Fig. 6 illustrates a section of pipe 4 having several shields 46 successively applied thereto. As shown in this figure, the ends of adjacent shields are arranged in overlapping relation. In the case where a plurality of sheets of wrapping material are placed on the frame or support at one time, cementing material is applied to the top sheet and the coated sheet wrapped around the pipe. The support with the remaining sheets thereon is then moved into wrapping position under a contiguous unwrapped portion of the pipe and the procedure repeated until the pipe is completely shielded or wrapped.

After the entire length of the pipe has been shielded in this manner the support may be either slipped off the end of the pipe or taken from the pipe by removing cotter pins 44 and separating the base 6 from the upper portion 8 as described above. The apparatus may then be fitted around another pipe and the wrapping operation continued.

Figs. 7 to 9 illustrate a modified type of travelling support. This apparatus is similar to that shown in Fig. 1 with the exception that the horizontal frame or flat support for holding the sheet of wrapping material or shield is replaced by a trough-shaped support 50 carrying a bath 52 of the fluid enamel. This trough may comprise a bottom 54, sides 56, and ends 58 of sheet steel welded or otherwise secured to form a liquid-tight container. The trough is preferably somewhat longer than a sheet of the wrapping material and has a width approximately equal to the distance between side pieces 18 of the base so that it may be securely attached thereto.

Metal bands or straps 60 attached to the base 54 of the trough near the rear end thereof pass around and support a cylindrical tank or container 62 holding under pressure a supply of combustible fluid, such as gasoline or manufactured gas. The forward end of the container is equipped with an outlet pipe 64 and control valve 66. The combustible fluid may be discharged through pipe 64 and burned under the trough, thereby maintaining the cementing material in the trough at the proper temperature and in a fluid condition.

In operation the modified travelling support is placed on the pipe to be shielded, moved along, and taken off in the same manner as the apparatus shown in Fig. 1. In accordance with the preferred procedure, a shield or sheet of wrapping material 12 is held by the corners and slipped into the enamel in the trough (Fig. 9). The shield is then moved back and forth in the bath 52 in such a manner that a central portion of the sheet is coated on both sides, the marginal portions remaining uncoated. The shield is then raised from the trough in such a manner as to allow excess enamel to drain back into the trough, and placed around the pipe. The pipe cools the enamel and causes the shield to become cemented to the pipe. The uncoated marginal portions of the shield constituting the lap may be cemented to the top of the pipe by the application of enamel with mops.

My invention provides a dependable, economical and readily used method and apparatus for the field application of protective sheets or shields to pipe lines. My apparatus and method make

possible a quicker and better cementing of the shields to the pipe at greatly reduced labor costs.

Furthermore, the carrying wheels which support the device on the pipe contact only with the unshielded portion of the pipe, thus avoiding possible damage to the freshly applied shields.

Since certain changes in the construction of my apparatus and in the process set forth may be made without departing from the scope of this invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus for applying shields to stationary pipes, the combination comprising a support adapted to be moved along the pipe, means for mounting said support on the pipe, and a frame on said support extending horizontally underneath the pipe for supporting a shield prior to its application to the pipe.

2. In apparatus for applying shields to pipes, the combination comprising a support for holding a shield and means at only one end of said support for maintaining said support on the pipe.

3. In apparatus for successively applying shields to pipes, the combination comprising a support for holding a shield in position to be placed about the pipe and means for maintaining said support in operative position with respect to said pipe, said means being constructed and arranged to engage only the unshielded portion of the pipe as said support is moved longitudinally along said pipe.

4. In apparatus for successively applying shields to pipes, the combination comprising a support for holding a shield in position to be placed about the pipe with one end of the shield arranged to overlap one end of a shield previously applied to said pipe and means for maintaining said support in operative position with respect to said pipe, said means being constructed and arranged to engage only the unshielded portion of the pipe as said support is moved longitudinally along said pipe.

5. In apparatus for successively applying shields to pipes, the combination comprising a support for holding a shield in position to be placed about the pipe, means passing about the pipe at the end of the support remote from the shield previously applied, and means extending horizontally from the said end of the support arranged to contact with the bottom of said pipe to maintain the support in substantially horizontal position beneath the pipe.

6. In apparatus for applying shields to pipes, the combination comprising a base, means on said base for supporting a shield during the application of cementing material thereto, an upper portion connected to the base adapted to fit around the pipe, and wheels connected to the base and upper portion for supporting the apparatus on the pipe.

7. In apparatus for applying shields to pipes, the combination comprising a horizontal base, a support on the base for holding a sheet of wrapping material during the application of cementing material thereto, an upper portion connected to the base and adapted to fit around the pipe, and rotatable wheels mounted in the base and the upper portion for movably supporting the apparatus on the pipe.

8. In apparatus for applying flexible sheets to stationary pipes, the combination comprising a horizontal base, a flat frame at one end thereof on which the flexible sheets may be placed during the application of hot bituminous material thereto, a wheel mounted on a shaft near the other end of said base adapted to bear against the bottom of the pipe, a U-shaped upper portion connected to the base and adapted to fit around the pipe, and a rotatable wheel carried by said upper portion and adapted to bear against the top of the pipe.

9. In apparatus for applying shields to pipes, the combination comprising side pieces extending longitudinally of the pipe on either side thereof, a flat frame supported underneath the pipe by said side pieces, said frame being adapted to support the shields during the application of cementing material thereto, a rotatable wheel mounted on a shaft passing through the forward ends of the side pieces, said wheel being adapted to bear against the bottom of the pipe, vertical arms connected to the side pieces, and a rotatable wheel mounted on a shaft passing through the tops of the vertical arms, said wheel being adapted to bear against the top of the pipe.

10. In apparatus for applying shields to pipes, the combination comprising a support adapted to be moved along the pipe, rollers carried by said support engaging both the upper and lower surfaces of said pipe for movably mounting the support upon the pipe and a trough carried by said support extending horizontally underneath the pipe, said trough being adapted to contain a bath of fluid cementing material through which the shields may be moved.

11. In apparatus for applying shields to stationary pipes, the combination comprising a support adapted to be moved longitudinally along the pipe, a trough on said support extending horizontally underneath the pipe, said trough being adapted to contain a supply of fluid cementing material into which the shields may be placed, and a source of heat adjacent said trough for maintaining the cementing material in a heated and fluid condition.

12. In apparatus for applying shields to pipes, the combination comprising a base, a trough at one end of the base adapted to hold a supply of fluid cementing material, an upper portion connected to the base adapted to fit around the pipe, and wheels connected to the upper portion and the base adapted to bear against the upper and lower surfaces respectively of the pipe for supporting the apparatus on the pipe.

13. The process of applying wrapping material around a pipe which comprises placing at least one sheet of wrapping material on a support underneath and pendant from the pipe, coating the central longitudinal portion of a sheet of said wrapping material with fluid cementing material, moving the coated sheet upward into wrapping position and wrapping it around the pipe whereby the cementing material secures the sheet to the pipe, applying additional cementing material to the marginal portions of the sheet to secure it in wrapped position around the pipe, and moving the support into position for wrapping another sheet of said wrapping material around the pipe.

14. In apparatus for applying shields to pipes, the combination comprising a member adapted to be moved along the pipe, means on said member for engaging said pipe to support said member on said pipe and a frame on said member extending in the general longitudinal direction of and adjacent to said pipe for holding a shield during the application of cementing material thereto.

15. The process of applying a shield of wrapping material around a pipe which comprises placing the shield into contact with a body of fluid cementing material extending underneath the pipe, moving the sheet back and forth in said body of fluid cementing material to coat the surface thereof with the material, lifting the coated sheet from the body of cementing material, and wrapping the coated sheet around the pipe so that the longitudinal edges of the sheet overlap and form a seam extending longitudinally of the pipe.

16. The process of applying a sheet of flexible wrapping material around a pipe which comprises placing the sheet in a body of fluid cementing material extending underneath the pipe, moving the sheet through said body of cementing material to coat only a central portion thereof with the cementing material, lifting the coated sheet from said body, contacting the coated portion of the sheet with the bottom portion of the pipe, applying additional cementing material to the uncoated marginal portions of the sheet, and lapping the marginal portions around the top of the pipe.

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